National Audit
of
Scotland's Sports Facilities

Outdoor Pitches, Courts, Greens, Tracks,
&
Associated Changing Facilities

Prepared for sportscotland
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Introduction

Introduction

Professional Sportsturf Design (PSD) was commissioned by **sport**scotland to carry out an audit of Scotland's outdoor pitches, courts, greens and associated changing facilities. The study is one of a suite of audits which are intended to complement work previously undertaken in respect of swimming pools - *The Ticking Time Bomb: The Maintenance, Upgrading and Refurbishment of Scotland's Public Pools*. The other audits being carried out concurrently concern Indoor Sports Facilities, Golf Courses and Facilities for Countryside Sports and together they will provide a picture of the current range of sports provisions in Scotland, their condition, and the capital and revenue cost implications of bringing them up to an acceptable standard and maintaining them in a proper condition thereafter.

The study was carried out in the period August 2002 to March 2004 and the methodology adopted included review of background data, planning and design guidance; the establishment of models for construction and maintenance against which current conditions could be tested; detailed site surveys of more than 400 facilities in Scotland; the issue of self completion questionnaires to site managers of all known outdoor sports facilities in Scotland; and a series of interviews with senior officers responsible for outdoor sports facilities throughout the country.

The facilities covered by this study include those used for athletics, football, hockey, rugby, shinty, tennis and bowling. The types of surface examined include those constructed of natural grass, artificial turf, rubber surfaces, mineral surfaces and hard surfaces such as concrete and tarmac.

The information gathered has enabled an assessment to be made of the condition of outdoor sports facilities in Scotland and current trends in maintenance and provision. The identification of model construction and maintenance standards sets desirable targets for facility providers in terms of new provisions, upgrading and refurbishment and enables a cost model to be established to identify the capital cost implications on a single facility, area and national basis for bringing all outdoor pitches, courts, greens and changing facilities up to an acceptable standard.

PSD were assisted in this study by:

Tim Cruttenden & Associates
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External consultants undertaking studies such as this have, inevitably, to rely on the willingness and support of a wide range of individuals and agencies to provide information, advice and assistance. PSD wishes to thank all those who have assisted in the execution of this study as detailed in the acknowledgements.

Part 1

Strategic Background and Key Considerations

1 General Overview and Considerations

1.1 Sport is an important part of the social and economic structure of Scotland as evidenced by the following statement made in Sport 21: 2003 – 2007.

> *"Sport matters to the people of Scotland. It affects our lives in many ways, contributing to our health, supporting employments for tens of thousands and generating significant economic activity. All the evidence shows that this fact is widely recognised throughout Scotland and beyond. 95% of us feel that sport adds to the quality of life in Scotland."*
>
> Sport 21 2003 – 2007.

Despite this broad based support, sport needs to be considered in the wider context of the social and economic factors which are influencing the country.

Demographic Structure

1.2 Overall the population of Scotland has remained largely static for the past 50 years. Although population levels are expected to decline over the next 10 years significant regional and demographic variations are expected. Heavy population losses are predicted for the west of Scotland and the islands whereas increases are expected in the east and north-east of the country.

1.3 Age structures are also expected to change markedly with fewer children and young people and many more older people as the effects of the post war baby boom take effect. Statistics released by the Scottish Executive in November 2004 reveal that school rolls in Scotland shrunk by almost 8300 in 2003-2004. The decline in school pupil numbers has been mainly felt by primary schools and their rolls are expected to fall by a further 25,000 in the period to 2008 and by another 22,000 in the period to 2014. In due course these reductions in the number of school pupils will be felt by secondary schools and their rolls are expected to fall by 16% to 268,000 in the period to 2014.

1.4 The impact of declining school rolls will certainly be the closure of some primary schools and possibly the closure of some secondary schools if the predicted impacts have not been taken account of in the current school refurbishment and school build programmes being adopted by local authorities. Any school closures will have impacts on communities in a variety of ways, not least in terms of access to facilities, given that many school facilities serve important community recreational functions and that there is pressure from government to widen and expand their support to communities.

1.5 An ageing population will also have impacts on facility requirements given that the most physically active group are the young. However, the

impacts of various health initiatives and the interest and willingness of the emerging middle aged generation to remain active for longer than their predecessors and to participate in physical activity should not be underestimated. This will have the effect of ensuring a continued need for facilities, albeit of a different type and of a higher standard.

Employment and Disposable Income

1.6 Levels of employment in Scotland have increased overall in recent years although there have been significant changes in employment patterns – more women working, more home working and more self employed. Levels of disposable income have also increased although the gap between high and low earners has increased. It is estimated that the top 40% of income earners are responsible for 70% of leisure spend while the bottom 20% of income earners are responsible for only 5% of leisure spend.

1.7 These changes and variations to employment and earnings patterns will be significant for leisure opportunity providers in terms of the types and location of facilities which will be required, their hours of operation and charging levels. Given the disparity between the richest and poorest, there will continue to be big challenges for those responsible for the poorest areas of the country and the poorest and most disadvantaged sections of the community.

The Health Agenda

1.8 There is now universal recognition of the poor state of the health of Scotland's citizens and the importance of physical exercise and healthy living in helping to redress the situation. A range of national initiatives have been developed to try to improve the health of the nation and, although these are starting to bear fruit, there is still disparity between the rhetoric and the implementation of co-ordinated health improvement policies and programmes. Changing demographics and work patterns and the impacts of the health agenda present facility providers and managers with some difficult challenges in terms of providing sufficient opportunities for the whole community and ensuring that improvements to the infrastructure of necessary facilities are made. There is a need to both protect and enhance those facilities which exist and to provide wider opportunities which might bring with it a need for new and different types of facility.

1.9 Educating children from a young age to remain physically active throughout their lives is now a key feature of national and local health policies and this is having, and will continue to have, an impact on facility requirements. Levels of female participation in physical activity are lower than that of males, as is the range of activities in which they participate. With this in mind, there has been much emphasis placed on encouraging female participation and levels of female participation have increased more quickly than that of males in the past decade. This has, and will

continue to, impact on programmes, the type of facilities required and the quality standards of those facilities.

Key Trends in Outdoor Pitch and Court Sports

1.10 Levels of participation in sport in Scotland are not as high as is considered desirable for the success of individual sports or for the maintenance and improvement of the health of Scotland's citizens. Many initiatives are in place to encourage increased participation in physical exercise and doubtless these will bring some positive benefits. However, a significant factor in the national participation equation is the impact of an ageing population. Increased longevity and a declining birth rate will inevitably result in reduced participation in sports and activities which have traditionally been the province of the young and this could impact on the facility needs of those sports. Programmes to extend participation until later in life, the encouragement of greater levels of sustained participation by children and young people and the encouragement of greater levels of female participation may, to some degree, balance out the impacts of demographic change. There has also been a decline in levels of participation on Saturdays, both school and adult competition, in favour of other leisure attractions.

1.11 Research carried out by **sport**scotland indicates that overall levels of participation in pitch sports in Scotland have remained largely constant for the past decade although more women now play cricket, football and rugby. In some areas there would seem to have been a decline in adult male participation in 11 - a - side football but this has been offset by an increase in adult male participation in 5 - a - side football. There has also been a major growth in interest in junior small side football which has led to demands for soccer sevens pitches in both schools and in community recreation sites. Soccer sevens is currently directed at 5 – 12 year olds but it is likely that the age span will be extended to include under14s in the future, adding to the pressure on playing surfaces. Given the foregoing, the number of full size pitches required to accommodate adult participation has declined slightly but, if participation trends in small sided football continue, it is possible that there will be increasing numbers of young people (male and female) moving from the small-sided game to the full-sided game which will add to the pressures on existing full sized playing surfaces and possibly create demands for new pitches of appropriate size, and quality and in suitable locations.

1.12 Developments in the technology related to the manufacture and construction of synthetic surfaces has seen a steady acceptance of artificial grass surfaces for both practice and competition. Hockey was the first field sport to embrace the new surfaces and it is likely that, within the foreseeable future, artificial grass will be recognised as the only suitable surface for competition at all levels of the sport.

1.13 While the benefits of artificial grass were recognised for football practice there has been a reluctance to accept the surface for competition purposes,

largely because of the disparities which existed between synthetic surfaces and natural grass. This position has changed as new surface types have been developed and the latest 3rd Generation artificial grass surfaces are now recognised as being suitable for training and competition at all levels of the sport, although the preference of participants is for good quality natural grass surfaces.

1.14 Given the high levels of use which artificial grass surfaces are able to sustain and their improved performance specification, it is probable that there will be increased levels of provision of synthetic surfaced pitches for hockey and football as 'new build' and by the conversion of both natural grass and mineral based pitches to an appropriate surface. The Audit results and cost indications will enable providers and managers of facilities to consider different scenarios for the retention and improvement of existing facilities or their replacement with different surface types.

1.15 All of the major outdoor sports have in place national and local development programmes of varying scale and success and which it is hoped will both increase levels of participation and increase standards of performance.

1.16 As a result of increased hockey development work, it is hoped that there will be an increase in levels of participation. Hockey is best played on artificial grass surfaces and the *Sport 21* objective of ensuring that every secondary school has access to an artificial pitch should aid the sport and enable future facility demands to be largely met without recourse to the building of many new hockey specific pitch facilities, provided of course, that community access to school facilities is enabled and encouraged and that charge structures are set at levels which the public find acceptable.

1.17 Rugby remains a minority male dominated sport (88% of participants are male) and participation rates (only 1% of adults participate) and profile remain relatively low in comparison with football, although the profile of the sport is higher than most other sports. The move to professionalism has had major impacts on club rugby and it would seem to be the case that the amalgamation of clubs and a general decline in numbers of participants is making it difficult for clubs in some areas to run multiple teams or to find sufficient opposition to make 3rd, 4th and 5th XVs viable. The nationally funded network of development officers and the efforts made by local clubs to promote junior development programmes are impressive but the sport is finding it difficult in many areas to make real and sustained progress in terms of the levels of participation, particularly in areas where there is limited school activity. The quality of many of the pitch facilities available to rugby clubs is poor, as is the quality of ancillary facilities. Poor quality changing and ancillary facilities, is a significant barrier to the development of female participation.

1.18 Participation in shinty is localised and demands need to be assessed on a local basis and appropriate quality provision made as and where appropriate.

1.19 Cricket is a minority sport in Scotland although there are some areas where there is keen interest and some well founded and successful clubs. While climatic conditions can make it difficult to prepare suitable cricket wickets in some parts of the country, the introduction of artificial grass surfaces has had the effect of mitigating the effects of the weather and allowing play in sports pitch sites that might otherwise find it difficult to sustain a suitable quality wicket. Despite this, the number of sports pitch sites which accommodate cricket is limited.

1.20 Tennis is also a minority sport based largely on private clubs, although local authorities remain significant providers of facilities. Despite the efforts made in the past 20 years to replace grass, tarmac, concrete and ash courts with polymeric and artificial grass surfaces, the condition of many tennis courts is poor. Furthermore, small tennis court sites are expensive to run and control and a considerable number of local authority sites have been abandoned. In an effort to avoid the loss of local amenities, some local authorities have introduced arrangements to leave the facilities unsupervised and which allow free access or community management. Where reasonable quality of playing surfaces have been maintained and where floodlighting has been provided, this has largely had positive benefits, increasing court availability and the length of the season.

1.21 A major development in tennis provision has been the growth of indoor tennis centres in and around the major cities and urban conurbations. In the main, these tennis centres, (frequently linked to fitness and leisure centres), have been provided by the private commercial sector although there have been a few significant local authority developments. Membership levels at these centres have tended to be high and they have been successful in improving levels of participation and standards of performance. However, there is concern that, by virtue of the levels of fees charged, access is denied to those of limited means.

1.22 The future of tennis in Scotland is likely to be dependent on the provision of opportunities for low level community participation linking to successful club structures and on to a network of high quality indoor facilities.

1.23 Bowling is a popular sport in Scotland and one in which high international standards are regularly achieved. Following a period in the 1980s and 1990s where some bowling greens were abandoned or closed, the sport has achieved a stable state and is likely to become increasingly popular as the impacts of an ageing population become more evident. Despite the best efforts of those involved in the administration of the sport, uptake by young people remains low although there have been some significant achievements by those in the younger age groups.

1.24 Local authorities play an important role as direct providers of facilities or the owners of bowling green sites but the major drivers of the sport are voluntary sports clubs. The creation of indoor bowling rinks, mainly through private subscriptions, has allowed participation year round.

1.25 From the foregoing outline, it can be seen that sports participation in Scotland is in a state of flux. Factors which can influence participation can be as diverse as demographics, the fluctuating popularity of particular sports, competing interests, the impacts of national and local development programmes, charge levels and the quantity and quality of facilities. The relationship between these various factors is complex but, self evidently, it is of paramount importance that sufficient facilities of the right standard and quality are provided for all communities and user groups if the participation diversity and levels are to be increased and maintained.

1.26 The efforts being made to increase female interest in outdoor team sports will lead to demands for increased numbers of changing facilities of a higher standard. Female participants will simply not accept the basic and poor standard outdoor changing facilities which male participants have put up with for many years.

1.27 Sports planners need to be aware of the many factors which are impacting on participation and take a long term view of the likely facility needs. No doubt the aforementioned national trends and responsive national initiatives will have an impact on facility requirements but it is self evident that the quality, quantity and accessibility of appropriate facilities is crucial to the success of encouraging higher levels of participation, improving performance standards and fostering a more healthy nation.

2 National Strategies

2.1 A number of national strategies have been developed by bodies such as **sport**scotland and the Scottish Executive which impact in whole or in part on the levels of provision and condition of facilities for outdoor sports. The most significant of these to this study are *Sport 21 – Nothing Left to Chance*, the national strategy for sport in Scotland and its review *Sport 21 2003 – 2007* and *Building Our Future – Scotland's School Estate*, a national strategy for Scotland's schools.

Sport 21 – Nothing Left to Chance

2.2 *Sport 21 – Nothing Left to Chance* sets out three co-dependent visions of a sporting Scotland as:

- A country where sport is more widely available to all.
- A country where sporting talent is recognised and nurtured.
- A country achieving and sustaining world class performances in sport.

Key national policy directions include the promotion of access to sport from all sections of society, the promotion of knowledge and interest in sport by children and young people and increased levels of participation in physical exercise.

2.3 *Sport 21* recognises that participation and involvement in sport can contribute towards personal health and well-being, help promote education

and life-long learning, combat anti-social behaviour and assist economic development. Involvement in sport can also contribute towards the achievement of national objectives such as the promotion of social inclusion and the encouragement of active citizenship.

2.4 It is recognised throughout *Sport 21* that, if levels of participation are to be increased and if skills are to be developed, it will be necessary for participants at all levels and in all situations to have access to quality sports facilities. It is postulated that the consequences of poor quality facility provision can include low levels of inspiration and motivation, inhibited development and early participant dropout. Unfortunately, the quality of many of the sports facilities in Scotland do not meet current requirements and expectations and this is proving to be detrimental to the achievement of the prime objectives of the strategy. Quality, quantity, location and accessibility of facilities are factors which are central to the national strategy and they need to feature strongly in future development plans and proposals.

2.5 When *Sport 21* was published in 1998 the strategy identified targets for the numbers of outdoor pitches, courts and greens required for community use based on current estimates of supply and demand. The overall aim was to enhance the quality of facilities by upgrading existing facilities and by constructing new or replacement facilities.

2.6 Recent reviews of *Sport 21* would seem to indicate that, while some progress has been made in providing new and replacement pitches and courts, there is still a long way to go in some areas, particularly in the need for considerable investment in maintaining and upgrading existing facilities. While there is still a need for new facilities to serve underprovided areas, it has been recognised that the refurbishment or replacement of existing facilities is critical to improving opportunities to participate in sport. The review of the National Strategy for Sport – *Sport 21: 2003-2007* identifies eleven targets to be achieved in the period 2003-2007 and, in the context of this study, key to achieving these are:

- Sufficient supply of quality facilities;
- Opening up school facilities outside the school curriculum;
- Access to local facilities;
- High performance training facilities;
- Affordable access.

Building Our Future – Scotland's School Estate

2.7 It is not only *Sport 21* which recognises the need for quality facilities. *Building Our Future – Scotland's School Estate*, a national strategy developed by the Scottish Executive and COSLA, identifies the need for well designed, well built and well managed school facilities - including sports facilities – which can accommodate school and community use wherever possible.

2.8 In recent years there have been some significant developments and redevelopments in Scotland which have seen the provision of high quality facilities for outdoor sports including those at Dalziel High School and Dalkeith Campus. However, despite the increasing number of good examples of high quality facilities based on school sites, there are many existing facilities which are still in a poor condition and inappropriate for the schools and communities which they are intended to serve. There are also a number of schools which have no sports grounds whatsoever and their ability to deliver appropriate curricular and extra-curricular programmes is severely restricted.

2.9 The school PPP/PFI programmes have provided opportunities to improve the quality and suitability of sports pitches in both primary and secondary schools and some excellent examples of quality provisions are evident throughout the country. However, rebuilding projects have often been achieved by constructing the new school buildings on school playing fields. Where this has happened, the best case scenario has been the temporary loss of playing fields during construction and the resultant loss of curricular and extra-curricular programme opportunities during the construction phase but the eventual rewards have been the provision of new facilities of a higher quality than those which pre-existed. However, in a number of cases, school rebuilding projects have resulted in a loss of playing field space and the 'shoe horning' of pitches into spaces which provide limited flexibility and increase wear. It is also evident that the opportunities which PPP/PFI can provide to improve the quality and appropriateness of playing field facilities has not always been realised. Not all new schools have been provided with artificial grass pitches and there are numerous examples of mineral surfaces being provided despite the advice to the contrary contained in *Sport 21* and offered by officers from **sport**scotland and national governing bodies of sport.

3 Planning Pressures on Outdoor Pitches and Courts

3.1 While **sport**scotland maintains a database of sports facilities in Scotland which is updated periodically, there is unfortunately, no definitive figure for the number of outdoor facilities in Scotland. **sport**scotland estimates that the total stock of sports pitches is in the order of 5,500 and that the main providers are local authorities, although voluntary sports clubs make significant provisions in some sports.

3.2 A number of factors – including strong demand from housing developers, urban regeneration schemes and local authorities' own requirements for development land for new schools etc. - have lead to pressure to develop playing fields for purposes other than sport or to dispose of parts of playing field sites to allow development. The National Playing Fields Association (NPFA), amongst others, has expressed its concerns about the continuing loss of land for sport and recreation.

3.3 **sport**scotland takes this matter seriously and monitors all planning applications affecting playing fields and, as a statutory consultee, opposes as a matter of principle the granting of permission for redevelopment unless there is clear evidence that there is no long term need for particular playing fields, or adequate arrangements are in place for comparable replacement. **sport**scotland takes the following into account when asked to comment on a planning application:

- Access in terms of location, cost and availability.
- Poor quality of a significant proportion of grass pitches.
- The need to replace mineral pitches with natural grass or synthetic grass pitches.
- Expansion of the role of synthetic grass pitches.
- Achieving the right balance between natural grass and synthetic grass and between the different types of synthetic surfaces.
- The need to provide for the growth of small sided games.
- The need to provide, upgrade or replace changing accommodation.
- The lack of dedicated training areas.
- Ensuring accessible playing fields of an acceptable standard for schools.

3.4 From June 1996 to 31 March 2004, there were 397 planning applications for development on playing fields across Scotland of which 225 to some degree involved the loss of sports pitches. As a result of planning permissions granted, the overall net loss in pitches is 115. The majority of the pitches that have been lost were mineral based (blaes or ash) pitches which are gradually being phased out as unsuitable for modern use. Many of these have been converted to grass, making the net loss in mineral pitches 137. The net loss in grass pitches is 37. However over this same period some 59 synthetic turf pitches have also been created.

3.5 Sports pitch provision throughout Scotland is guided mainly by *National Planning Policy Guideline NPPG 11: Sport, Physical Recreation and Open Space (1996).* The guidance recommends that local authorities should determine the amount of open space, including playing fields, required in their areas and include this in their development plans. The planning system should ensure that enough land is allocated for use as pitches and playing fields to satisfy current and future needs and provide pitches and playing fields with an appropriate level of protection from development.

3.6 In order to ensure that the requirements of sport are taken fully into account in future planning, **sport**scotland recommends that the targets from *Sport 21 2003 – 2007* should be taken account of in every local authority area's community planning process. In respect of pitch sports, **sport**scotland recommends that every local authority should prepare a pitch strategy based on an acceptable methodology in order to set out their plans for the long term improvement and development of facilities for pitch sports, and to assist with the assessment of development proposals affecting playing fields.

3.7 In contrast to the protectionist approach advocated by the NPFA, a more radical approach to satisfying the quantity and quality issues of sports pitch provision and to resolving a number of other planning and development issues has been proposed by Kit Campbell, a leisure and tourism planning consultant based in Edinburgh. In essence he argues that government plans to provide for the housing needs of the country by building on brownfield sites are doomed to failure and that building in the Green Belt is inevitable unless land can be found to provide housing in urban areas. Given that the condition of many pitches and ancillary facilities is substandard and that these poor conditions discourage participation, he argues that it would be better to use the Green Belt for playing fields and existing playing fields sites for houses. Kit Campbell does not advocate building on all playing fields sites; he recognises the need for local facilities which he believes can be satisfied by the provision of more artificial grass pitches - preferably located on all primary and secondary school sites and to which the public can have access at reasonable cost. He also recognises the open space amenity value which pitch sites are claimed to have - albeit low grade and with little biodiversity – and advocates that any development proposals should include high quality green spaces which provide a diversity of informal leisure opportunities in a traffic free environment.

3.8 Kit Campbell suggests that local authorities should be proactive in respect of the redevelopment of playing fields and seek to get the best deal for the community, not necessarily in cash terms but in vision, amenities, social housing etc. Any cash raised from disposals should be ring fenced for the provision of new local facilities and for the creation of new outdoor sports complexes, possibly in the green belt, providing quality grass pitches and ancillary accommodation. If, after development costs have been met, any capital raised from disposal remains, this might be invested to pay for future maintenance.

3.9 Such an approach would raise numerous planning and social issues. It assumes that much of the competitive play for the pitch sports would transfer from natural to synthetic grass and implies that increased provision of artificial grass pitches, but an overall reduction in the total number of pitches (grass) would allow demands to be met. However, given the reluctance of clubs and governing bodies to be flexible in respect of matters such as playing days and times, this might not be easy to achieve. Furthermore, natural grass will continue to be the preferred and required surface for rugby and cricket.

3.10 All pitch providers need to develop an investment strategy based on an evaluation of current provision and use, assessment of future requirements and an estimation of the capital and revenue costs associated with any actions proposed. Many local authorities have looked at their stock of pitches and have decided that by virtue of their location, condition, levels of use etc. that they no longer meet their intended purpose. Some local authorities have advocated the closure of small and expensive to operate sports pitch sites and have opted to dispose of them and to create large new

multi sports sites which are of better quality than those which they replaced and are more economical to manage and operate.

4 Climate Change

4.1 It is generally accepted that we are in the midst of a period of climate change. While there is much debate about the root causes and the long term impacts of climate change, there seems to be broad agreement that in the short term (next 50 years plus) Scotland will experience milder, wetter winters and wetter summers. It is also suggested that the climate will experience greater extremes of weather with more frequent storms and extremes of precipitation (including snowfall) interspersed with periods of very cold and very hot weather. If these predictions are accurate, there will be implications for outdoor sports pitches and courts. Facilities will need to be designed and constructed to a specification which will allow high levels of precipitation to be shed from and permeated through playing surfaces.

4.2 The technology has, to a large extent, already been developed to allow winter sports pitches to drain much more efficiently. Methodologies include by pass drainage such as sand slit or gravel banding systems which take the topsoil largely out of the equation in terms of surface water drainage. In addition where higher performance is required manufactured rootzone material can be used whereby the particle size distribution of the rootzone material can be carefully designed to allow surface water to infiltrate while the surface remains stable.

4.3 The difficulty with these systems is that, while drainage systems to remove surface water efficiently can be readily installed, they must be properly maintained to ensure that they continue to operate to their design specifications. Furthermore, the greater efficiency of these drainage systems in removing surface water can cause ongoing wear and maintenance problems by encouraging higher levels of play than with more traditionally constructed surfaces. Because these more efficient drainage systems prevent standing water accumulating, unaware site managers often assume that pitches are playable, even though the topsoil is saturated and possibly unstable, causing surface disruption under play. Because of this, maintenance requirements can be higher and, it is possible that a natural grass pitch played unwisely in say, early November, would not recover fully until the spring

4.4 A further implication of climate change has, and will continue to be, damage caused by disease and pests. Pitches rarely seem to get prolonged periods of hard frost through the winter months assisting the pitch by disturbing the construction profile and killing turf pests. Warm damp conditions are an ideal environment for many turf diseases and pests and higher levels of groundsmanship are now required to maintain some of the more modern constructions. This is particularly true on constructions for high end use such as pitches with sand based rootzones or in closed arenas with protected and fluctuating environmental conditions.

4.5 Given the foregoing factors, it is essential that maintenance regimes are detailed and specific and that the use of facilities is sensitively managed to prevent play when surface conditions are inappropriate, and indeed, to prevent overplay.

4.6 Climate change has not had a severe effect on other types of playing surface, indeed they have been shown to be quite successful. The only climatic conditions which would cause, for example, well constructed and maintained artificial turf and polymeric surfaced pitches to be taken out of use, are heavy snow or sharp frost after rain or a thaw. Mineral based pitches which have been well maintained and have no problems with surface water drainage are only really susceptible to frost 'heave', very heavy rain and heavy snow. Other than periods of very heavy rain these conditions seem to be abating and therefore playing days lost are likely to reduce on non natural grass pitches.

Part 2

The Audit Process

1 The Audit Methodology

1.1 The audit methodology employed for this study comprised identification of construction and maintenance models for each of the different types of surface against which facilities could be compared. Some 400 in depth site surveys were carried out by PSD which provided base data against which information extracted from self completion questionnaires sent to the managers of all pitch and court sites in Scotland could be compared. The detailed site surveys were complemented by interviews with senior local authority officers responsible for the strategic and detailed management of pitches and courts in half of Scotland's local authorities with a view to gaining an impression of their perceptions of the condition of the pitches and courts under their control.

1.2 Having obtained the survey data, each facility was compared with the appropriate construction model which allowed a cost to bring each facility up to a recommended standard to be calculated. Each individual facility cost is able to be aggregated in a variety of ways to provide national, regional and local cumulative costs to bring all facilities up to the recommended standards. From the returns, it has been possible to calculate the costs which might be associated with bringing those facilities for which no returns have been submitted up to the recommended standards.

2 Appropriate, Safe, Usable and Sustainable Facilities

2.1 Before any action could be taken to assess the standard and condition of pitches, courts, greens and ancillary facilities, it was necessary to establish some general parameters against which assessment could take place. Detailed construction, maintenance and cost models are provided for each of the facility types under the appropriate section but, in addition, it is suggested that all pitches, courts, greens and ancillary facilities associated with outdoor sports should be of an appropriate, safe, usable and sustainable standard as outlined below:

Appropriate Facilities

2.2 Facilities need to be appropriate for the purposes to which they are to be used. The Audit assessed the following key requirements:

- ✓ Pitches, court and greens should meet the spatial and technical requirements of the appropriate national governing bodies of sport Where necessary, sizes should be scaled down to meet the needs of younger users.
- ✓ Changing rooms and ancillary facilities (not including social facilities) should be sufficient to meet the maximum load capacity of the playing facilities and meet the requirements of junior and adult, male and female users. **sport**scotland Technical Digest No. 110 – *Sports Pavilions and Team Changing Accommodation*

provides detailed planning and design criteria for those undertaking new developments or refurbishing facilities.

Facilities should also:

- ✓ Meet the requirements of the Disability Discrimination Act.
- ✓ Have car parking facilities appropriate to the maximum capacity of the facilities at a particular site and there should be parking spaces for disabled users within 50m of the main entrance.
- ✓ Be appropriately located to allow ready access by the communities which they are intended to serve.
- ✓ Have appropriate directional and identification signing.

Safe Facilities

2.3 The design and management of facilities should be such that they do not impact on the safety and security of users. Points to be borne in mind include:

- ✓ Pitches and courts should be aligned in a broadly north-south direction to avoid problems associated with glare from the sun. Fig. 5 replicates the National Playing Fields Association guidance on pitch orientation in relation to aspect.

- ✓ Careful consideration needs to be given to the layout of facilities to ensure that adequate safety margins are provided around them. The minimum distance between the playing lines of adjacent pitches and courts recommended by national governing bodies should be adhered to so as to avoid problems which might be associated with collision between users of different pitches and courts. The recommended minimum distances between playing lines and obstructions such as fences or floodlight columns should also be adhered to. Where it might be necessary to prevent balls and implements straying onto roads and footpaths or into private property, larger margins might be required. Special care needs to be taken to ensure that hazards which might result from hockey or shinty balls being struck out of the field of play are minimised.

- ✓ Where it has been necessary to tier a sports pitch site to provide level playing surfaces, care should be taken to ensure that there are adequate safety margins to prevent players running down or into an embankment. Consideration should also be given to the hazards which might result from hockey or shinty balls being struck off a higher level and endangering people at a lower level.

- ✓ Playing surfaces need to be flat and without undulations which might cause users to stumble or fall.

- ✓ Playing surfaces need to be maintained in a condition whereby reasonable grass cover is maintained, holes and undulations are

repaired expeditiously. Synthetic surfaces need to be maintained at prescribed intervals to maintain surface quality and loose debris needs to be removed from hard surface areas.

- ✓ All playing surfaces should be inspected at regular intervals, and particularly before use, for litter, broken glass and dog fouling.

- ✓ Where fences are provided around pitches and courts for security or ball stop purposes, they should be constructed in such a way that trip and cut hazards are mitigated. Following regular inspections, any necessary remedial works should be carried out expeditiously.

- ✓ Maintenance regimes should be such as to prevent the creation of hazards to users from maintenance plant and machinery.

Usable Facilities

2.4 While issues such as layout and pitch and court dimensions might be adequately dealt with in the planning and layout of a site, the facilities need to be constructed and maintained in such a way as to ensure that they remain usable throughout the year and in different weather conditions. Actions which might help achieve these objectives include:

- ✓ Construction specifications should be such that the playing surfaces are able to shed water rapidly and remain playable after precipitation.

- ✓ Where sites have terraced areas, action needs to be taken to limit the scouring and flooding effects of water run off.

- ✓ Maintenance regimes need to be such that playing surfaces are kept in a good and playable condition.

Sustainable Facilities

2.5 In view of the high costs associated with maintaining facilities, it is important that they are designed and constructed by methods and to standards which, provided that reasonable care is taken of the resources, ensure that they are able to be kept in a suitable condition for their whole life. Sustainability can only be achieved if:

- ✓ The basic design and construction of facilities is to a standard and specification which allows development and improvement over time. For example, drainage materials which are compatible with a higher grade specification, top soils which can be amended/ameliorated and sub structures capable of taking a different form of artificial surface should be used where possible and practical.

- ✓ Routine maintenance regimes are adhered to.

- ✓ Periodic maintenance actions such as top dressing, sand slitting, replacement of carpets and renewal of polymeric and hard surfaces is undertaken in accordance with design specifications and as necessary.

2.6 The foregoing not only formed the basis of the audit surveys, they provide the foundations for sound planning, design, construction and maintenance of new and refurbished pitches, courts and greens.

3 Site Survey Methodology

3.1 Site surveys were carried out by site owners and managers and by representatives of Professional Sportsturf Design using a common format. The self completion questionnaires for site owners formed the backbone of the survey and the majority of the base data. Over 400 site surveys carried out by PSD were intended to both verify the accuracy and consistency of the self completion questionnaires and provide a foundation for the classification of facilities and the works programmes and cost estimates which are the prime requirement of the study.

3.2 Where PSD surveyed a site the dimensions of the facilities were duly recorded and topsoil profiles were checked by taking cores from the surface. The PSD staff who carried out the site surveys were experienced personnel with in excess of 25 years experience in the industry at managerial level and one can therefore be confident that condition assessments etc. are accurate and relevant.

3.3 The survey forms used by both site owners and PSD were designed to be both comprehensive and easy to use and allow the easy transfer of information into a new database format for use by **sport**scotland in the future. Figs 1 and 2 show how the information for good and poor standard facilities might have been logged.

3.4 While the decision was taken to simplify the survey forms in order to reduce the workload for site managers and owners and to help encourage a high level of responses, one of the impacts was to restrict the range and depth of information collected. While this was unfortunate, it is still believed that the quantity and quality of information gleaned and collated is sufficiently detailed to allow robust conclusions to be drawn and future planning to be soundly based.

Fig. 1 . National Audit – Example of a Site Survey Record Sheet for a Bad Facility

NATIONAL AUDIT OF SCOTLAND'S OUTDOOR SPORTS FACILITIES | **SPORTS PITCHES** | sportscotland Ref:

Name of Facility:
A BAD FACILITY

Address:
ANYWHERE IN SCOTLAND

Postcode:

Council Area:

Operator:
COUNCIL

Do you own or lease the facility?

Own	
Lease	X
Part-own / Part-lease	
Outstanding Lease (yrs.)	5

When was the facility first built?

1990 - 2002	
1970 - 1989	
1945 - 1969	X
1919 - 1944	
Pre 1918	

Parking Provision:

Approx. no. of parking spaces	10
Parking shared with other sports?	N

Changing Facilities:

Changing Pavilion/Clubhouse	X
Sports Centre/Complex	
None	

Indicate facilities for disabled users:

Designated Parking	N
Ramped or At-level Access	N
Disabled Toilets	N
Disabled Changing Facilities	N

Form Completed by (initials): VGG

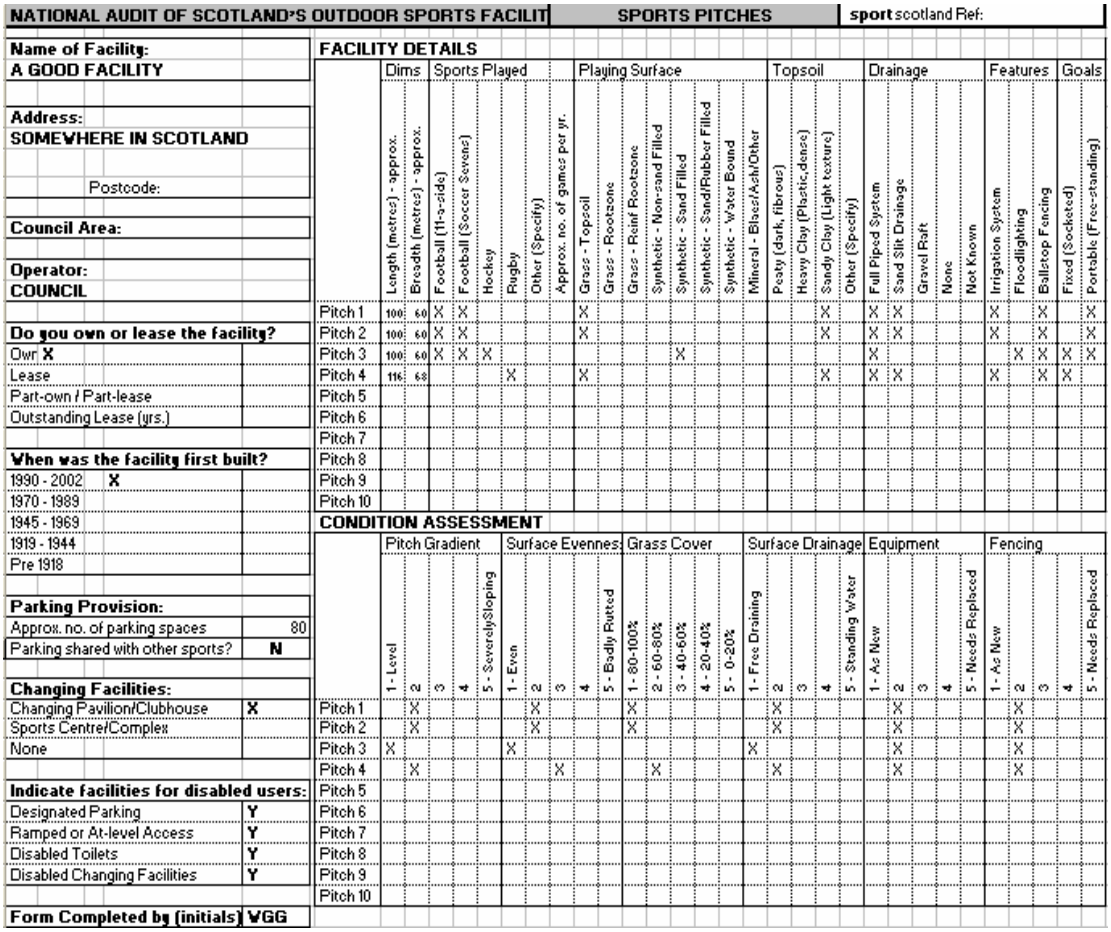
FACILITY DETAILS

	Dims		Sports Played						Playing Surface							Topsoil				Drainage				Features			Goals	
	Length (metres) - approx.	Breadth (metres) - approx.	Football (11-a-side)	Football (Soccer Sevens)	Hockey	Rugby	Other (Specify)	Approx. no. of games per yr.	Grass - Topsoil	Grass - Rootzone	Grass - Reinf Rootzone	Synthetic - Non-sand Filled	Synthetic - Sand Filled	Synthetic - Sand/Rubber Filled	Synthetic - Water Bound	Mineral - Blaes/Ash/Other	Peaty (dark, fibrous)	Heavy Clay (Plastic,dense)	Sandy Clay (Light texture)	Other (Specify)	Full Piped System	Sand Slit Drainage	Gravel Raft	None	Not Known	Irrigation System	Floodlighting	Ballstop Fencing	Fixed (Socketed)	Portable (Free-standing)
Pitch 1	90	45	X	X	X	X			X								X							X				X	
Pitch 2	88	45	X	X					X									X							X			X	
Pitch 3	90	50	X	X	X											X									X			X	
Pitch 4	110	60				X			X								X							X				X	
Pitch 5																													
Pitch 6																													
Pitch 7																													
Pitch 8																													
Pitch 9																													
Pitch 10																													

CONDITION ASSESSMENT

	Pitch Gradient					Surface Evenness					Grass Cover					Surface Drainage					Equipment					Fencing				
	1 - Level	2	3	4	5 - Severely Sloping	1 - Even	2	3	4	5 - Badly Rutted	1 - 80-100%	2 - 60-80%	3 - 40-60%	4 - 20-40%	5 - 0-20%	1 - Free Draining	2	3	4	5 - Standing Water	1 - As New	2	3	4	5 - Needs Replaced	1 - As New	2	3	4	5 - Needs Replaced
Pitch 1					X				X		X									X					X					
Pitch 2				X					X				X						X					X						
Pitch 3			X						X										X					X						
Pitch 4		X								X		X								X				X						
Pitch 5																														
Pitch 6																														
Pitch 7																														
Pitch 8																														
Pitch 9																														
Pitch 10																														

Fig.2. National Audit –Example of a Site Survey Record Sheet for a Good Facility



NATIONAL AUDIT OF SCOTLAND'S OUTDOOR SPORTS FACILIT | SPORTS PITCHES | sportscotland Ref:

Name of Facility: A GOOD FACILITY

Address: SOMEWHERE IN SCOTLAND

Postcode:

Council Area:

Operator: COUNCIL

Do you own or lease the facility?

Own	X
Lease	
Part-own / Part-lease	
Outstanding Lease (yrs.)	

When was the facility first built?

1990 - 2002	X
1970 - 1989	
1945 - 1969	
1919 - 1944	
Pre 1918	

Parking Provision:

Approx. no. of parking spaces	80
Parking shared with other sports?	N

Changing Facilities:

Changing Pavilion/Clubhouse	X
Sports Centre/Complex	
None	

Indicate facilities for disabled users:

Designated Parking	Y
Ramped or At-level Access	Y
Disabled Toilets	Y
Disabled Changing Facilities	Y

Form Completed by (initials) VGG

FACILITY DETAILS

	Dims		Sports Played						Playing Surface							Topsoil				Drainage					Features			Goals	
	Length (metres) - approx.	Breadth (metres) - approx.	Football (11-a-side)	Football (Soccer Sevens)	Hockey	Rugby	Other (Specify)	Approx. no. of games per yr.	Grass - Topsoil	Grass - Rootzone	Grass - Reinf Rootzone	Synthetic - Non-sand Filled	Synthetic - Sand Filled	Synthetic - Sand/Rubber Filled	Synthetic - Water Bound	Mineral - Blast/Ash/Other	Peaty (dark, fibrous)	Heavy Clay (Plastic,dense)	Sandy Clay (Light texture)	Other (Specify)	Full Piped System	Sand Slit Drainage	Gravel Raft	None	Not Known	Irrigation System	Floodlighting	Ballstop Fencing	Fixed (Socketed)	Portable (Free-standing)
Pitch 1	100	60	X	X					X										X		X	X				X		X		X
Pitch 2	100	60	X	X					X										X		X	X				X		X		X
Pitch 3	100	60	X	X	X								X								X						X	X	X	X
Pitch 4	116	68					X		X										X		X	X				X		X	X	
Pitch 5																														
Pitch 6																														
Pitch 7																														
Pitch 8																														
Pitch 9																														
Pitch 10																														

CONDITION ASSESSMENT

	Pitch Gradient					Surface Evenness					Grass Cover					Surface Drainage					Equipment					Fencing				
	1 - Level	2	3	4	5 - Severely Sloping	1 - Even	2	3	4	5 - Badly Rutted	1 - 80-100%	2 - 60-80%	3 - 40-60%	4 - 20-40%	5 - 0-20%	1 - Free Draining	2	3	4	5 - Standing Water	1 - As New	2	3	4	5 - Needs Replaced	1 - As New	2	3	4	5 - Needs Replaced
Pitch 1		X					X				X						X					X					X			
Pitch 2		X					X				X						X					X					X			
Pitch 3	X					X										X						X					X			
Pitch 4		X						X				X					X					X					X			
Pitch 5																														
Pitch 6																														
Pitch 7																														
Pitch 8																														
Pitch 9																														
Pitch 10																														

4 The National Audit Data Base

4.1 The data captured on the site survey forms has been transferred to an electronic database and is set out in Microsoft Access. The database is designed to allow easy access to the information recorded and logged from the returns. Interrogation of the database allows the user to identify under various classifications the numbers of facilities and their conditions as assessed by the Audit. The database is able to incorporate photographs so that any person interrogating the system can gain a more complete impression of the site and facilities under review. Photographic records are not presently available for all facilities but can be easily added to the database as they become available.

4.2 The data captured by the Audit only represents about 20% of the national stock of outdoor sports amenities and ancillary facilities. Much of this information came from the operators of facilities and it was in some cases incomplete and in others inaccurate. There was no mechanism within this

Audit process to fully check every return and therefore, it is difficult at this stage to draw anything other than site specific or aggregated conclusions from the information. Clearly, it would be beneficial if **sport**scotland's records covered all facilities and consideration will need to be given to how the missing data might be captured. Options which might be considered include the commissioning of a further exercise to survey all remaining sites and input the data or placing requirements upon all local authorities and organisations seeking Lottery funding to carry out site surveys and provide site record photographs.

4.3 As with any record system, the data base is only as good as the data which it contains. Therefore, it is essential that every effort be made to ensure that the data is kept updated and that any changes to a site or the facilities located therein are recorded.

4.4 Appendix 1 describes how the database can be accessed and manipulated.

Part 3

Audit Findings
&
Upgrading Proposals

Part 3.1

Perception Interview Findings

1 Perception Interview Findings

1.1 As part of the background research for the National Audit, interviews were held with senior officers responsible for the strategic and detailed management and maintenance of pitches, courts and greens in half of Scotland's local authorities. These interviews allowed general perceptions about adequacy, condition and use to be identified. The following, mainly negative points, were identified from these interviews:

Natural grass pitches and courts:

- Overplay
- Surface conditions unsuitable for play for prolonged periods in a year
- Poor drainage, probably resulting from poor construction methods and lack of remedial maintenance
- Inadequate construction specification for the levels of use expected
- Low and inadequate levels of routine maintenance
- Insufficient remedial maintenance.

Mineral pitches and courts:

- No longer meet current requirements and expectations
- Inadequate routine maintenance
- Insufficient remedial maintenance
- Facilities subject to flooding, scouring and "frost heave".

Artificial grass surfaces:

- Popular and can generate interest and increase participation rates
- Inadequate routine maintenance
- Inadequate periodic and remedial maintenance of surfaces, fencing and floodlights.

Hard surface areas:

- Some surfaces breaking up causing hazards
- Inadequate routine sweeping and cleaning maintenance
- Inadequate major and minor remedial maintenance.

General Issues:

- Litter and broken glass
- Dog fouling
- Unauthorised use of facilities for formal and casual play
- School pitches believed to be in poorer condition than public use pitches.
- Grass pitches in schools unlikely to be able to withstand additional community use.

1.2 Significantly, the interviews revealed that most local authority officers believed that not all, but many of the pitches and courts under their care, particularly grass pitches, might have had inadequate construction specifications for the levels and types of use which they have had to support and, in recent years, they had suffered from insufficient and reducing funding to allow proper maintenance to preserve and improve standards and protect the resources in their care. It was acknowledged that local authorities had faced, and continued to face, severe financial pressures, and that the maintenance of sports pitches in schools seemed to be the lowest spending priority for the majority of local authorities interviewed. However, the advent of PPP/PFI has provided a mechanism for the improvements of pitches and courts in some secondary schools and may well be a means by which the quality of outdoor pitches and courts in all schools in Scotland might be improved within a relatively short time. However, there was some concern expressed that the opportunities afforded by PPP/PFI were not being fully grasped.

1.3 There is no doubt that there are some excellent examples of quality sports pitch developments in schools funded by PPP/PFI and other means but there are also examples of recent provisions which have been poorly planned and executed. Problems identified included:

- Insufficient quality of facilities to meet the demands of schools and their wider communities.
- Inadequate design and construction specifications or poor supervision of works.
- Changes of specifications to lesser design and construction specifications after initial planning approvals and funding agreements have been secured.
- The use of mineral based surfaces at a time when there is a general move away from this surface in favour of artificial grass surfaces
- Pitches and courts of inadequate size to support match play and community use
- Inadequate and inappropriate fencing around pitches and courts, thereby reducing flexibility and exacerbating wear.

1.4 These problems highlight the need for design and construction specifications to be formalised before PPP/PFI contracts are let. **sport**scotland might usefully be required to take a more prominent role in providing guidance for use by local authorities in respect of future PPP/PFI programmes and have a right to be heard if development proposals do not meet best practice.

1.5 The advent of PPP/PFI has also served to illustrate the differences in funding allowed for pitch maintenance by some private sector PPP facility managers and local authority maintenance departments. In some local authorities, senior officers and elected members had recognised these differences and there appeared to have been some movement towards providing service departments with proper levels of funding for construction, maintenance and remedial works. In those local authorities

where sports pitch policies and strategies had been prepared or were in process of being prepared, it is expected that these will result in greater awareness of the need for quality facilities, the need for a co-ordinated approach to facility provision, the need for capital investment and for adequate resources to maintain facilities once created.

1.6 With regard to ongoing maintenance, there was a strong belief among many local authority officers that inadequate funding for periodic maintenance will inevitably result in the deterioration of new and refurbished facilities and the view was expressed that, if Lottery funds are to be provided for the construction of new pitches, courts and greens, there should be a binding obligation upon the recipients of awards to provide adequate funds to manage and maintain the facilities to an agreed standard over their whole life. It was generally accepted that, if Lottery funded facilities are not maintained appropriately, the benefits of new and upgraded provision will only be transient and the capital invested will effectively have been wasted.

1.7 The pessimistic perceptions identified from these strategic interviews are interesting but do not reflect the whole picture in each or every local authority. The site surveys and questionnaire returns support in the main the views expressed but also identify that a significant number of facilities have been constructed to a high standard and are largely being maintained adequately. Clearly, the strategic interviews indicate that problems exist, but the extent needs to be identified by careful analysis of the survey data.

Part 3.2

Winter Sports Pitches

Natural Grass and Mineral Pitches for Football, Rugby, Hockey, Shinty and Lacrosse

2 Winter Sports Pitches

2.1 Pitch and Sports Requirements

2.1.1 For the purposes of this study, winter sports pitches are those natural grass or mineral playing surfaces used for the playing of football, rugby, hockey, shinty and lacrosse. Pitches used for these sports can range from the maximum size permitted by the appropriate international governing body to small sized, small team playing and practice facilities. Winter sports pitches can be found in a wide variety of locations including primary and secondary schools, colleges and universities, public parks, public recreation grounds, within amenity public open space areas and in voluntary sports clubs, private sports clubs and a small number of commercial leisure centres. Standards of construction and maintenance can vary widely.

2.1.2 The role which winter sports pitches play in the sporting and social hierarchy of the communities which they serve can differ widely. In many areas they are multi-functional areas of open space and are used for a wide range of purposes additional to their prime sporting function. In some remote communities they might be the only public recreation facility available for a considerable distance. Many winter sports pitches are used extensively and are often overplayed, while others are underutilised. The way in which they are regarded by the communities which they serve can also vary considerably – some are well regarded and well looked after, others are the subject of abuse and neglect. Some are very important to their local communities, others less so. Many winter sports pitches, no matter their location, are used for dog walking and are constantly badly soiled by dog excrement. Some are even used as bonfire sites.

2.1.3 Each and every winter sports pitch site is different and has different construction and use characteristics.

2.1.4 Association Football is the major outdoor winter sport in Scotland and, in the main, this is played on natural grass surfaces although, at some levels, the use of mineral and artificial grass surfaces is accepted for practice, training and competition. The current preferred surface for football is natural grass and expectations from participants at all levels have risen significantly in the past 20 years in terms of the quality of surface which they expect.

2.1.5 Rugby is also played on natural grass surfaces and, although there has historically been a tendency for club level participants in this sport to accept a lesser quality playing surface than their football counterparts, expectations have risen and there has been slow but steady progress in the provision of improved quality club pitches. Unfortunately, this has not been matched by improvements to rugby pitches which fall within the aegis of local authorities.

2.1.6 Field hockey has historically been played on grass and mineral surfaces but the advent of synthetic surfaces has lead to a situation whereby artificial grass - sand filled or preferably 'water bound' systems - is the preferred surface. For the foreseeable future, grass and mineral will continue to be an accepted and acceptable surface for play at the lower levels of the sport, provided that surface evenness and appropriate ball roll characteristics can be achieved and maintained. Depending upon how quickly artificial grass pitches are provided in schools and public recreation areas in Scotland, the use of natural grass and mineral pitches for hockey might become unacceptable quite quickly.

2.1.7 The requirements of shinty and lacrosse are for high quality natural grass pitches, ideally similar in standard to a grass hockey pitch.

2.2 Natural Grass Winter Sports Pitch Classification Grades

Natural Grass Winter Sports Pitches

2.2.1 In order to produce a standardised set of models for this audit, information was collated from a wide range of current and previous research. This included current construction and maintenance practice as undertaken and advised upon by PSD, industry standards (where applicable) and reported and published case studies on related subject matter.

2.2.2 Although the ball and mode of play might be different for each of the major winter pitch sports, similar construction specifications are required to achieve the necessary playing characteristics and ensure that facilities are appropriate, safe, useable and sustainable. Once facilities have been created, maintenance regimes need to be adjusted to ensure that playing surfaces which meet the requirements of the sport are maintained.

2.2.3 Five classifications of pitch have been identified and used as the outline for the models in this study thus allowing representative samples of pitch types to be used for the statistical analyses. The five classifications or grades of pitch identified are:

Grade 1 - Undrained/unimproved pitch;
Grade 2 - Pipe drained pitch;
Grade 3 - Pipe drained/sand slit pitch;
Grade 4 - Sand rootzone pitch;
Grade 5 - Reinforced sand rootzone pitch (suspended water table).

The Grade 3 category pitch has been identified as the desirable Satisfactory Standard for natural grass pitches used in education, public recreation and club contexts.

Pitch Model Grade 1 – Undrained/Unimproved

2.2.4 This classification of pitch is relatively common, and they may be laid out on a wide variety of soil types and topographies. Many of these pitches have been developed on available reasonably level ground which has been historically used by the community. Often there is no detail of any drainage which might have been installed and if present, drainage is likely to be agricultural tiles.

2.2.5 Undrained/unimproved pitches frequently fail to satisfy performance standards for playing quality due to problems associated with:

- Loss of grass cover
- Loss of natural soil structure (soil plasticity)
- Waterlogging/saturation
- Loss of levels
- Poor traction
- Poor/inconsistent ball reaction.

2.2.6 While individually some of these problems would not necessarily prevent use of the pitch, cumulatively they reduce substantially the sustainable level of use. Maintenance can also be compromised by soil and surface conditions. While there are cases where Grade 1 pitches have been formed on a well draining natural medium and are able to satisfy the local user demands, these are not the norm. This type of pitch might be found in rural or coastal locations or in areas with very sandy soil.

2.2.7 Many undrained/unimproved pitches have unmonitored or uncontrolled use but are usually only able to sustain some 4 hours of use a week. In small communities this might be entirely adequate but, in larger communities, overplay can cause serious damage to the grass sward which tends to be shallow rooted.

Pitch Model Grade 2 – Pipe Drained

2.2.8 Grade 2 winter sports pitches are similar to Grade 1 pitches but have had works carried out to improve their condition and formalise them - usually by way of the addition of a piped drainage system.

2.2.9 As with Grade 1 unimproved pitches, use of Grade 2 improved pitches is often restricted by soil conditions and the construction profile. Installed drainage may vary in performance from ineffectual to locally adequate depending on topsoil type, pipe spacing, whether the drainage is connected to the pitch surface, age, levels of use, and maintenance arrangements.

2.2.10 The piped drainage systems of these pitches can vary significantly and range from older agricultural tile 'herring bone' systems through to plastic piped 'grid' systems. The centres of drains can vary from 5 metres to 10 metres and above dependent on when they were installed – closer centres having become the norm as understanding of the science of pitch construction has improved. In many cases, the installation of a piped

drainage system on a Grade 1 Pitch which has failed, will not in itself improve surface water drainage where the topsoil has been degraded to a level which prevents surface water infiltration to the natural or installed drainage systems.

2.2.11 Grade 2 pitches generally fail to satisfy performance standards for playing quality due to problems associated with:

- Loss of grass cover
- Loss of natural soil structure (soil plasticity)
- Water logging/saturation
- Loss of levels
- Poor traction
- Poor/inconsistent ball reaction.

While short term improvements in local drain down can be achieved by the installation of under-drainage, once stabilising grass cover has been lost and soil structure has been damaged, the performance and limitations of a Grade 2 pitch can be similar to a Grade 1 undrained/unimproved pitch.

Pitch Model Grade 3 – Piped Drained and Sand Slit Pitch

2.2.12 The Grade 3 model has been identified as the base standard to which most sustainable local authority, further education and club pitches should be constructed. The design specification has been generalised for the purposes of the Audit and takes no cognisance of local topsoil conditions, which can vary widely and can alter dramatically the performance of a pitch.

2.2.13 Grade 3 pitches are deemed to have been constructed with a well structured sandy loam topsoil over an uncompacted subsoil and have an efficient piped drainage system at no greater than 8 metre centres with a clean gravel backfill into which a system of sand/gravel slits connects from the surface. It is often necessary to amend the topsoil by ameliorating the top 50 mm or so with an approved medium grade sand although it should be noted that not all top soils are suitable for such amendment as the combination of materials can sometimes lead to the creation of an impermeable surface. Site managers undertaking new constructions or reconstructions should have prepared a full design specification which takes into account all of the variables which might exist on a site, including soil type and the appropriateness and need for amelioration.

2.2.14 Grade 3 pitches generally perform satisfactorily as long as the slits remain surface connected. For this reason, sand topdressing is important in keeping the integrity of the slits and the surface intact and needs to be carried out as part of planned periodic maintenance. While the performance standards of a Grade 3 pitch are likely to be acceptable for longer if maintenance is sufficiently intensive, problems can still occur associated with:

- Loss of grass cover (seasonal/less extensive than Grade1 and 2). This is often caused by a tendency to increase the levels of play on higher quality pitches**.**
- Loss of levels, particularly in goal mouths. While this tends to be less extensive in Grade 3 pitches than in Grade 1 and 2 facilities, it is imperative that renovation works are carried out periodically and as required.

Pitch Model Grade 4 – Sand Rootzone Pitch

2.2.15 Grade 4 pitches comprise a comprehensive and efficient drainage system and/or a gravel raft and a construction profile which allows the easy infiltration of air and water to the rootzone. They are usually constructed where a higher quality of play is required or where the ground conditions are such that the indigenous topsoil will not sustain sand amendment. In either case, a high quality playing surface can be created by careful design of the rootzone profile making sure that there is continuity between the materials used.

2.2.16 Grade 4 type winter sports pitch constructions require a much higher level of maintenance than Grades 1, 2 and 3 pitches. They also require an efficient irrigation system due to the ease with which water can evaporate from the soil and to assist in maintenance, renovations and preparing the surface for play. Problems which can usually be associated with this type of construction are:

- Loss of grass cover due to over play
- Surface instability
- Poor maintenance practice (particularly lack of sand topdressing)
- Nutrient stress
- Disease.

These problems can be overcome by careful monitoring and management of use and the introduction of proper maintenance regimes.

Pitch Model Grade 5 – Reinforced Sand Rootzone Pitch (Suspended Water Table)

2.2.17 Grade 5 winter sports pitches, like Grade 4 pitches, are usually to be found in very formalised sports areas or stadia and are often designed to provide first class playing surfaces for representative games. Rootzone reinforcement may be added when a pitch is expected to provide both a high quality surface and is also expected to sustain high levels of use for one or more sports.

2.2.18 Although there are comparatively few of these pitches outside of 'high end' football, they currently represent the best specification in terms of performance set against use. However, they are expensive to construct and require intensive maintenance. They might best be provided in places such as city or urban areas where there is limited land available to develop large

numbers of winter sports pitches to meet top level local demands or in sports specific training centres where demands can be especially high.

2.2.19 Grade 5 pitches will usually have a piped drainage system and gravel or stone carpet below the sand and rootzone layers (Suspended Water Table). The fibre reinforcement can comprise polypropylene fibres or polypropylene yarn and these can be introduced into the rootzone prior to seeding, after establishment of the sward or laid within specially grown turf.

2.2.20 Most pitches falling into this category will have been designed with a view to maximising usage. However varying age, specification and maintenance, will result in a wide variance in condition and performance. Problems associated with Grade 5 reinforced rootzone pitches can include:

- Overuse
- Unfocussed maintenance
- Loss of grass cover
- Contamination by organic matter, soil 'fines', 'silts' etc.
- Poor or inappropriate maintenance
- Nutrient Stress
- Disease

These problems can be overcome by careful monitoring and management of use and the introduction of proper maintenance regimes.

2.2.21 Appendix 2 provides an outline design specification as used in this study for each of the identified winter sports pitch grades 3, 4 and 5.

Mineral Winter Sports Pitches

2.2.22 Mineral winter sports pitches can be of the ubiquitous 'blaes' construction found throughout the West and Central Belt of Scotland or be of one of a number of proprietary brands. Mineral surfaces were created to withstand the rigours of extensive wear and high levels of rainfall and were seen as an answer to many of the facility and participation problems experienced in parts of Scotland in the 1960s and 1970s. However, they are not the 'all weather' surfaces which it was hoped they might be – in periods of cold weather they can be subject to 'frost heave' and, like natural grass, surfaces, they can become water logged and unplayable. The playing characteristics of these surfaces are quite different from natural grass and injury from falls and tackles is common. They also require frequent maintenance.

2.2.23 In recent years, fewer mineral pitches have been built and football and hockey have progressively taken actions to prevent or discourage them from being used for competition purposes. Indeed, hockey is rapidly moving to a situation whereby the only acceptable surface will be artificial grass.

2.2.24 A considerable number of mineral pitches (both full size and small size) still exist in Scotland although some local authorities have been taking action to convert mineral pitches to natural grass or artificial grass. Given national and international trends and the known shortcomings of mineral surfaces, it is unfortunate that some local authorities have recently specified and constructed mineral pitches in new school PPP projects.

2.2.25 For the purposes of the Audit, mineral pitches were graded:

Grade 1 – Requires reconstruction;
Grade 2 – Requires renovation of the playing surface;
Grade 3 – Satisfactory Standard.

2.2.26 A Grade 1 mineral pitch is a facility where the quality of the playing surface has been severely compromised by any or all of failure of the drainage system, erosion, rutting, severe disturbance of the sub base etc. Overcoming these problems will require reconstruction of the facility.

2.2.27 A Grade 2 mineral sports pitch is a facility where there has been a less extreme loss of surface quality than that described for Grade 1 mineral pitches, which problems might be ameliorated without recourse to reconstruction.

2.3 The Upgrading Process for Winter Sports Pitches

Natural Grass Winter Sports Pitches

2.3.1 For optimum performance, usability and playability, a Grade 5 winter sports pitch which incorporates a reinforced rootzone, a fully automatic irrigation system, high quality ancillary facilities and an intensive and focussed maintenance regime would be required. However this standard of construction can only be afforded and justified in special circumstances and it is recommended that the Grade 3 model should be adopted as the basic standard target for winter sports pitches for general use by local authorities and educational establishments. This standard will also be adequate for many voluntary sports clubs, although higher grade pitches may be required for clubs competing at the higher levels of their sport.

2.3.2 While there will be some exceptions, drained and undrained soil pitches can be assumed to perform poorly unless the soil is extremely free draining (sand) and upgrading to Grade 3 would be desirable. However, levels of use of some Grade 1 and 2 winter sports pitches might be such that, despite their lower construction specification, they are able to adequately meet the needs of the communities which they serve. In this circumstance, it would make economic sense to retain the existing facility until such time as user levels or performance standards make upgrading necessary.

2.3.3 Upgrading of pipe drained soil pitches to Grade 3 can be carried out by sand slitting as long as the existing drain spacings and efficiency are suitable and the drainage aggregate is uncontaminated by soil. Further

options to sand ameliorate the upper rootzone and to install a sand carpet by heavy top dressing may then be considered, although stripping out of existing turf, upper rootzone, and reconstruction would be required.

2.3.4 Existing sand slit pitches which have not been maintained adequately or which have reached a stage where the efficiency of the sand slits has been eroded can be upgraded by installing sand or gravel bandings across the surface. The integrity of the sand slits or sand and gravel bands has to be preserved by regular top dressings of sand. Failure to carry this out will inevitably lead to failure of the drainage system and the capital invested will have been wasted.

2.3.5 Rootzone (specified sand dominated) pitches are generally the most expensive option. Unfortunately, overuse (usually due to better performance during and following rainfall and the inclusion of floodlights) can lead to a loss of grass cover, a subsequent loss of stability and reduced infiltration rates.

2.3.6 Using the outline design specifications provided in Appendix 2 it is possible to identify the potential work requirements of upgrading a winter sports pitch from one level to another. The cost implications can also be assessed by reference to the indicative capital costs provided models detailed in Appendix 2 and by reference to the examples provided in the tables within the main body of the report. It should be noted however, that these outline design specifications and cost models are indicative and any redesign of an existing facility or creation of a new facility should only be undertaken following a full evaluation of the site and its condition and the preparation of a full design specification and schedule of works.

2.3.7 Having sounded the appropriate cautionary notes, the design specifications and cost models can be used to identify the necessary actions and indicative costs of carrying out various upgrades although, it should noted that every project will be different. The following are examples of how the model might be used to cost upgrades for different standards and types of natural grass pitches:

Example 1:

Upgrade a Grade 2 Natural Grass Football Pitch to Grade 3

2.3.8 A Grade 2 natural grass football pitch 100m by 60m on a level site and with piped drainage at 10m centres and with reasonable soil conditions requires to be upgraded to Grade 3. This is the most basic level of intrusive works required to upgrade a pitch and the actions requiring to be taken under Category 1 works might comprise the installation of sand slits, top dressing and overseeding only and the cost calculations using the identified indicative rates might be:

Ref	Details	Qty	Cost/M2	Sub Total
22	Chemical Additives (soil conditioners etc.)	1	£0.060	£0.060
23	Deep Aeration (vertidrain or similar)	2	£0.050	£0.100
31	Fertiliser Granular	1	£0.040	£0.040

43	Grass Cutting by Tractor (Cylinder Cut)	2	£0.015	£0.030
44	Grass Cutting by Tractor (Rotary Cut)	4	£0.015	£0.060
59	Over Seeding (drilling or similar)	1	£0.100	£0.100
60	Rolling	1	£0.030	£0.030
68	Sand/Gravel Slits at 1 m centres	1	£1.600	£1.600
82	Top Dressing with Sand 10kg/m2	2	£0.280	£0.560
83	Top Dressing with Sand 12kg/m2	1	£0.300	£0.300
	Cost per square Metre			£2.880
	Cost per 6000m^2 Pitch			£17,280.00

Example 2:

Upgrade a Grade 1 Natural Grass Rugby Pitch to Grade 3

2.3.9 A Grade 1 natural grass rugby pitch 116m by 65m on a level site and with reasonable soil conditions but without installed drainage requires to be upgraded to Grade 3. Actions requiring to be undertaken under Category 2 works would include the installation of a pipe drainage system and the installation of sand slits. The actions requiring to be taken and the cost calculations might be:

Ref	Details	Qty	Cost/M2	Sub Total
22	Chemical Additives (soil conditioners etc.)	1	£0.060	£0.060
23	Deep Aeration (vertidrain or similar)	2	£0.050	£0.100
27	Drainage system at 6 m centres	1	£2.500	£2.500
31	Fertiliser Granular	1	£0.040	£0.040
43	Grass Cutting by Tractor (Cylinder Cut)	2	£0.015	£0.030
44	Grass Cutting by Tractor (Rotary Cut)	6	£0.015	£0.090
59	Over Seeding (drilling or similar)	1	£0.100	£0.100
60	Rolling	1	£0.030	£0.030
68	Sand/Gravel Slits at 1 m centres	1	£1.600	£1.600
82	Top Dressing with Sand 10kg/m2	2	£0.280	£0.560
83	Top Dressing with Sand 12kg/m2	1	£0.300	£0.300
	Cost per square Metre			£5.410
	Cost per 7540m^2 Pitch			£40,791.00

Example 3:

Upgrade a Grade 1 Natural Grass Pitch to Grade 3

2.3.10 A Grade 1 natural grass pitch 100m by 60m with poor soil conditions and without drainage requires to be upgraded to Grade 3. This would involve the installation of pipe drainage and a sand slit system and sand amelioration of the topsoil. Works items and cost calculations under Category 3 works for a 6000m^2 pitch might include:

Ref	Details	Qty	Cost/M2	Sub Total
2	Amelioration with sand 50 mm deep	1	£3.000	£3.000
21	Chemical Additives - Topsoil Pitches	1	£0.170	£0.170
22	Chemical Additives (soil conditioners etc.)	1	£0.060	£0.060
23	Deep Aeration (vertidrain or similar)	2	£0.050	£0.100
27	Drainage system at 6 m centres	1	£2.500	£2.500
31	Fertiliser Granular	1	£0.040	£0.040

32	Fertiliser Liquid	1	£0.070	£0.070
35	Goal Posts Football - Fixed	1	£0.300	£0.300
43	Grass Cutting by Tractor (Cylinder Cut)	10	£0.015	£0.150
44	Grass Cutting by Tractor (Rotary Cut)	2	£0.015	£0.030
59	Over Seeding (drilling or similar)	1	£0.100	£0.100
60	Rolling	1	£0.030	£0.030
68	Sand/Gravel Slits at 1 m centres	1	£1.600	£1.600
72	Seeding by mechanical means	1	£0.300	£0.300
74	Subsoil and Topsoil Cultivations	1	£1.000	£1.000
82	Top Dressing with Sand 10kg/m2	2	£0.280	£0.560
83	Top Dressing with Sand 12kg/m2	1	£0.300	£0.300
88	Topsoil re spread	1	£2.500	£2.500
89	Topsoil Strip	1	£0.700	£0.700
93	Trimming surface	1	£0.200	£0.200
	Cost per Metre			£13.710
	Cost per 6000m^2 Pitch			£82,260.00

Mineral Winter Sports Pitches

2.3.11 Mineral winter sports pitches were developed as an all weather surface capable of sustaining high levels of play. Until the development of artificial grass and polymeric surfaces they fulfilled a useful function but, modern synthetic surfaces are more user friendly, better able to be used in most weather conditions and increasingly better suited to the sports for which they have been developed and tailored.

2.3.12 The main problem which arises with a mineral pitch is loss of surface quality. In its mildest form, poor surface quality can be remedied by retexturing the playing surface thereby improving levels, surface drainage etc. The works actions necessary to achieve this would include light scarification or spiking, removal of stones, brushing, top dressing with fresh material and light rolling. This type of programme would cost in the region of £ 1.45 per m^2.

2.3.13 In extreme cases, loss of surface quality can include erosion and rutting and this is usually caused by poor surface drainage or water run off from adjacent high land. It is extremely difficult to remedy these problems in mineral pitches because any loss of cover of the playing surface generally results in the stone sub base rising through to the surface. Unfortunately, the processes which are designed to maintain the mineral surface - namely light scarification, rolling, 'luting' and brushing – tend to exacerbate any problems associated with a rising sub-base by dislodging further stone materials from the base construction. It is therefore, often the case that in order to remedy the problem, it is necessary to remove the top surface and reconsolidate the stone base using clean material prior to the importation of new surface material.

2.3.14 The upgrading of a mineral pitch where the surface has eroded and the stone backfill has worked its way to the surface making the pitch dangerous, requires a more comprehensive programme of works than those involved in the simple rejuvenation of a surface. Works would include the removal of all contaminated surface material from site, regulating a clean

and consolidated stone sub-base and the spreading of new surface material. Any such works should also seek to alleviate the reasons for the erosion by the provision of cut off drains to prevent surface wash or regulating the surface levels to prevent the surface 'scouring' The costs associated with this type of upgrading are high and it is estimated that a works programme that would suit such a scheme would require some £ 13.50 per m^2.

2.3.15 The importation of new surface materials can be problematic. The sources of good quality graded blaes, burnt ashes or bound clay surfacing etc. are now quite scarce and it is often only the propriety mineral surfaces which are available and, unfortunately, these can be expensive.

2.3.16 Because of the costs and difficulties associated with rejuvenating and refurbishing mineral sports pitches and bearing in mind the fact that they are no longer considered suitable for match play, site managers might usefully consider the examples set by many local authorities in Scotland and convert mineral sports pitches to Grade 3 natural grass. This would require trimming to adjust the levels, installation of drainage system, the application of a grit layer, the importation and spreading of sandy loam, the establishment of the grass sward and finally the installation of slits through to the grit layer. Example 4 below outlines the works and capital cost implications for a 6000m^2 pitch using the capital cost model.

Example 4

Convert a Mineral Pitch to Natural Grass Grade 3

Ref	Details	Qty	Cost/M2	Sub Total
2	Amelioration with sand 50 mm deep	1	£3.000	£3.000
21	Chemical Additives - Topsoil Pitches	1	£0.170	£0.170
22	Chemical Additives (soil conditioners etc.)	1	£0.060	£0.060
23	Deep Aeration (vertidrain or similar)	2	£0.050	£0.100
27	Drainage system at 6 m centres	1	£2.500	£2.500
31	Fertiliser Granular	1	£0.040	£0.040
32	Fertiliser Liquid	1	£0.070	£0.070
35	Goal Posts Football - Fixed	1	£0.300	£0.300
43	Grass Cutting by Tractor (Cylinder Cut)	10	£0.015	£0.150
44	Grass Cutting by Tractor (Rotary Cut)	2	£0.015	£0.030
59	Over Seeding (drilling or similar)	1	£0.100	£0.100
60	Rolling	1	£0.030	£0.030
68	Sand/Gravel Slits at 1 m centres	1	£1.600	£1.600
72	Seeding by mechanical means	1	£0.300	£0.300
82	Top Dressing with Sand 10kg/m2	2	£0.280	£0.560
83	Top Dressing with Sand 12kg/m2	1	£0.300	£0.300
92	Topsoil supply and spread	1	£4.500	£4.500
93	Trimming surface	1	£0.200	£0.200
102	Grit layer 75 mm	1	£ 2.42	£2.420
	Cost per Metre			£16.430
	Cost per 6000m^2 Pitch			£98,580.00

2.4 Winter Sports Pitch Survey Findings

2.4.1 **sport**scotland estimates that there are some 5,500 full size and small size winter sports pitches and training areas in Scotland.

Table 1
National Database Sports Pitch Analysis - Full Size Winter Sports Pitches

Surface Type	Football	Rugby	Hockey	Shinty	Other	Total	%
Natural Grass	3010	634	327	32	0	**4003**	73%
Mineral	632	0	158	0	7	**797**	17%
Other	5	0	0	0	0	**5**	0%
Total	**3647**	**634**	**485**	**32**	**7**	**4805**	**100%**

Table 2
National Database Sports Pitch Analysis - Small Size Winter Sports Pitches and Training Areas

Surface Type	Football					Total	%
Natural Grass	394					**394**	57%
Mineral	278					**278**	40%
Other	23					**23**	3%
Total	**695**					**695**	**100%**

2.4.2 The audit comprised site surveys and the issue of self completion questionnaires. PSD directly surveyed 400 facilities and questionnaires were issued directly to all known site managers in Scotland. The response rate to the self completion questionnaires was only 20%, which is disappointing, given the importance of the study and the potential benefits which might derive in terms of supporting the case for additional funding. However, the combined direct survey and questionnaire response rate is sufficient to allow an estimate to be made of the overall position in Scotland.

Natural Grass Pitches

2.4.3 Responses were received in respect of 1,145 full size natural grass pitches and 466 small size pitches and training areas, broken down as detailed in Table 3. "Junior" football clubs and Highland League club returns were included in the survey and have been identified as "commercial operators" for the purposes of the study. Professional football club facilities (teams playing in the Scottish Premier League and Scottish League) were not included in the survey because their facilities are not generally able to be used by the public.

Table 3
Audit Responses: Full Size Natural Grass Pitches – Distribution and Condition Survey Results

Facility Operator	Not Known	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total	%
Local Authority		79	600	101	64	4	**848**	74%
Primary Schools	1	2	15				**18**	1%
Secondary Schools	11	23	165	5	2		**206**	18%
Colleges & Universities		9	13	2			**24**	2%
Voluntary Clubs	4	2	26	7			**39**	4%
Commercial Operator		2	6	2			**10**	1%
Total	**16**	**117**	**825**	**117**	**66**	**4**	**1145**	**100%**

2.4.4 Of the responses received for full size natural grass pitches, a grade of pitch was not identified for 16 pitches. If these unspecified returns are apportioned on a pro-rata basis, then the following totals result:

Table 4
Audit Responses: Full Size Natural Grass Pitches - Totals adjusted to reflect non-specific returns

Facility Type	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
Full size natural grass	117	835	119	67	5	1145
%	10%	73%	10%	6%	1%	100%

2.4.5 It can be seen from the above that, of the returns received a total of 954 or 83% of full size natural grass pitches fell below the recommended Grade 3 standard. If these findings are adjusted to reflect the assumed national stock of 4003 full size natural grass winter sports pitches, the following picture emerges:

Table 5
Interpolated Condition of National Stock of Full Size Natural Grass Pitches

Surface Type	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
%	10%	73%	10%	6%	1%	100%
Full size natural grass	400	2923	400	240	40	4003

2.4.6 Responses were received from 318 sites with 4666 small size natural grass pitches broken down as follows:

Table 6
Audit Responses: Small Size Natural Grass Pitches – Distribution and Condition Survey Results

Facility Operator	Not Known	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total	%
Local Authority	0	45	157	28	3	0	**233**	50%
Primary Schools	1	33	109	1	1	0	**145**	31%
Secondary Schools	0	16	62	2	0	0	**80**	17%
Colleges & Universities	0	0	1	0	0	0	**1**	1%
Voluntary Clubs	0	0	6	1	0	0	**5**	1%
Other Operators	0	0	0	0	0	0	**0**	0%
Total	**1**	**94**	**335**	**32**	**4**	**0**	**466**	**100%**

2.4.7 Of the responses received for small size natural grass pitches, a grade of pitch was not identified for one pitch which has been added to the Grade 2 category.

Table 7
Small Size Natural Grass Pitches: Totals adjusted to reflect non-specific returns

Facility Type	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
Small size natural grass	94	336	32	4		466
%	20%	72%	7%	1%		100%

Of the small size pitches surveyed, 92% failed to meet the recommended Grade 3 standard.

2.4.8 The **sport**scotland data base identifies only 481 small size natural grass pitches whereas the Audit identified 466 facilities. This would indicate a disparity between the data base and Audit definitions and methodology but no means of resolving this problem has yet been identified. The Audit findings have therefore been interpolated to the assumed national stock of 481 small size natural grass pitches and improvement proposals and costs estimates have been identified accordingly.

Table 8
Interpolated Condition of Assumed National Stock of Small Size Natural Grass Pitches

Facility Type	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
%	20%	72%	7%	1%		100%
Small size natural grass	96	346	34	5		481

Mineral Winter Sports Pitches

2.4.9 Responses were received in respect of 201 full size mineral pitches broken down as follows:

Table 9
Full Size Mineral Pitches – Distribution and Condition Survey Results

Facility Operator	Not Known	Grade 1	Grade 2	Grade 3	Total	%
Local Authority		50	32	6	**88**	44 %
Primary Schools		16	3	4	**23**	11%
Secondary Schools		20	42	24	**86**	43%
Colleges & Universities		3		1	**4**	2%
Total		**89**	**77**	**35**	**201**	**100%**
%	-	44%	38%	18%	100%	

2.4.10 If these figures are interpolated to the assumed national stock of full size mineral pitches, the following emerges:

Table 10
Full Size Mineral Pitches – Interpolated Condition Results

Facility Type	Grade 1	Grade 2	Grade 3	Total
%	44%	38%	18%	100%
Full Size Mineral Pitches	351	303	143	797

Some 82% (654 pitches) of mineral pitches are estimated to fall below the Grade 3 – Satisfactory Standard.

Small Size Mineral Pitches

2.4.11 Responses were received from a total of 235 small size mineral pitches broken down as follows:

Table 11
Small Size Mineral Pitches – Distribution and Condition Survey Results

Facility Operator	Not Known	Grade 1	Grade 2	Grade 3	Total	%
Local Authority		27	9	2	**38**	16%
Primary Schools		89	67	12	**168**	75%
Secondary Schools		7	15	5	**27**	8%
Voluntary Clubs			1	1	**2**	1%
Total		123	92	20	**235**	**100%**
%		52%	39%	9%	100%	

2.4.12 If these figures are interpolated to the assumed national stock of small size mineral pitches, the following emerges:

Table 12
Small Size Mineral Pitches – Interpolated Condition Results

Facility Type	1	2	3	Total
%	52%	39%	9%	100%
Small Size Mineral Pitches	145	108	25	278

2.4.13 Some 91% (253 pitches) of small size mineral pitches fell below the recommended Grade 3 - Satisfactory Standard.

2.5 Improvement Proposals

Natural Grass Winter Sports Pitches

2.5.1 Although five grades of natural grass winter sports pitch were identified, for the purposes of the survey, detailed examination of the findings reveals that there is a significant variation in the works required to bring Grade 1 and Grade 2 pitches up to the recommended Grade 3 standard. Therefore, four categories of works have been identified which would achieve the desired objectives:

Category 1 Works — This is the most basic level of intrusive works which would be required to bring a Grade 2 pitch up to Grade 3 standard by the installation of a sand slit system to complement the existing drainage. The construction is deemed to be adequate in terms of gradient, surface evenness, soil composition and pipe drainage.

The average cost of Category 1 works is £2.88m^2 and £17,280 for a 6000m^2 pitch.

Category 2 Works — Pitches requiring Category 2 works have been deemed to be satisfactory in terms gradient, surface evenness and soil composition but have inadequate structural drainage systems. Works would comprise the installation of a pipe drainage system and sand slit system.

The average cost of Category 2 works is £5.41m^2 and £32,460 for a 6000m^2 pitch.

Category 3 Works — Pitches requiring Category 3 works have inadequate drainage systems and poor soil composition. Works required to bring them up to the recommended Grade 3 standard comprise the installation of a pipe drainage system, improvement of the top soil characteristics by sand amelioration and the installation of sand slits to link the surface drainage to the pipe system.

The average cost of Category 3 works is £13.74m^2 and £82,260 for a 6000m^2 pitch.

Category 4 Works — Category 4 works comprise complete reconstruction of a pitch including earthworks, installation of a pipe drainage system, installation of sand slits, top soil amendment and establishment of the grass sward.

The average cost of Category 4 works is £16.43m^2 and £98,580 for a 6000m^2 pitch.

2.5.2 The identification and categorisation of works is further complicated by the fact that, although 83% of full size natural grass pitches fail to meet the Grade 3 standard, not all are unfit for purpose. The Audit indicates that some 11% of Grade 1 and 2 pitches are laid out on naturally free draining sandy soil or machair and are able to recover sufficiently after rainfall to allow reasonable programmes of use. Other pitches, although without installed drainage or the benefits of naturally free draining soil have such low levels of use that they too are able to sustain current levels of use. Therefore, for the present, no improvement works are considered essential although, if levels of use increase or drainage and soil conditions deteriorate, the position regarding these pitches will need to be reassessed.

Mineral Winter Sports Pitches

2.5.3 Ideally, all mineral winter sports pitches would be converted to natural grass Grade 3 Satisfactory Standard or, if required to sustain high levels of use or fulfil a multi-sports function, to an artificial grass or polymeric surface. However, it is acknowledged that due to financial constraints or local site conditions, some pitches which meet the Grade 3 Satisfactory Standard for mineral surfaces may be retained and that site owners/managers might prefer to refurbish Grade 2 mineral pitches if appropriate. These assumptions have been incorporated into the cost estimates although cost indications for upgrading to natural grass have been identified also.

2.6 Capital Cost Implications

Full Size Natural Grass Winter Sports Pitches

2.6.1 Using the results from the survey, the identified design specifications and indicative schedule of rates, the capital cost implications of bringing all natural grass winter sports pitches up to the recommended Grade 3 standard have been calculated.

2.6.2 From the audit results it has been identified that of the natural grass pitches surveyed:

All winter sports pitches graded 3 or above (17% of the total stock) are in satisfactory condition and require no immediate action.
11% of winter sports pitches graded 1 and 2 require no immediate action because of their construction or low levels of use.
36% of winter sports pitches graded 1 and 2 require Category 1 Works.
42% of winter sports pitches graded 1 & 2 require Category 2 Works.
7% of winter sports pitches graded 1 & 2 require Category 3 Works.
4% of winter sports pitches graded 1 & 2 require Category 4 Works.

2.6.3 If these results are accepted as being indicative of the position nationally and are applied to the estimated stock of 4003 full size natural grass winter

sports pitches and the average costs per pitch in each of the four works categories identified above, the following capital costs would need to be incurred to bring the national stock of pitches up to the recommended standards:

1	No. of pitches requiring no immediate action:		
	Grades 1 and 2	365	
	Grades 3, 4 and 5	680	
2	No. of pitches requiring Category 1 Works -	1,196	
	1,196 pitches at £17,280 =		£20,666,880
3	No. of pitches requiring Category 2 Works –	1,396	
	1,396 pitches at £32,460 =		£45,314,160
4	No. of pitches requiring Category 3 Works -	233	
	233 pitches at £82,260 =		£19,166,580
5	No. of pitches requiring Category 4 Works -	133	
	133 pitches at £100,260 =		£13,334580
Total			**£98,482,200**

Small Size Natural Grass Winter Sports Pitches

2.6.4 The audit survey identified that some 92% (442 pitches) of small size pitches and training areas failed to meet the recommended Grade 3 standard. The assumptions regarding the treatment of full size natural grass winter sports pitches and outlined in paragraph 2.6.2 have been applied to small size natural grass pitches giving the following treatment and cost implications:

1	No. of pitches requiring no immediate action:		
	Grades 1 and 2	49	
	Grades 3	39	
2	No. of pitches requiring Category 1 Works -	159	
	159 pitches @ £10,080 =		£1,602,720
3	No. of pitches requiring Category 2 Works –	186	
	186 pitches @ £18,935 =		£3,521,910
4	No. of pitches requiring Category 3 Works -	31	
	31 pitches @ £47,985 =		£1,487,535
5	No. of pitches requiring Category 4 Works -	17	
	17 pitches @ £58,485 =		£994,245
Total			**£7,606,410**

2.6.5 The above figures reflect the position regarding the surveyed small size natural grass winter sports pitches, many of which are in schools - particularly primary schools. In fact, many of the small sized pitches provided in schools, particularly primary schools, might be better suited to being constructed of artificial grass. It is also possible that demands will

increase significantly for the playing of small side games and that it will be necessary to increase the number of small size pitches to meet demands if the current practice of playing across full size pitches results in undue and unsustainable wear. This situation will need to be reviewed and appropriate action taken if circumstances warrant it.

Mineral Sports Pitches

2.6.6 Eighty two percent (654 pitches) of full size mineral pitches and 93% (253 pitches) of small size mineral pitches fell below the recommended Grade 3 - Satisfactory Standard. From the audit results it has been identified that of the pitches surveyed:

1	No. of pitches requiring no immediate action:		
	Full size Grade 3	143	
	Small size Grade 3	25	
2	No. of Grade 2 full size pitches requiring rejuvenation works :	303	
	Cost of rejuvenating a full size Grade 2 pitch of 4500m^2 @ £1.45m^2 = £6,525 per pitch		
	303 full size mineral pitches @ £6,525 per pitch		£1,977,075
3	No. of Grade 2 small size pitches requiring rejuvenation works :	108	
	Cost of rejuvenating a small size Grade 2 pitch of 2500m^2 @ £1.45m^2 = £3,625 per pitch		
	108 small size mineral pitches @ £3,625 per pitch		£391,500
4	No. of full size Grade 1 mineral pitches requiring reconstruction –	351	
	Full size Grade 1 pitch of 4500m^2 @ £13.50m^2 =£60,750 per pitch		
	351 full size Grade 1 pitches @ £60,750 per pitch		£21,323,250
5	No. of small size Grade 1 mineral pitches requiring reconstruction –	145	
	Small size Grade 1 pitch of 2500m^2 @ £13.50m^2 = £33,750 per pitch		
	145small size Grade 2 pitches @ £33,750 per pitch		£4,893,750
	Total		**£28,585,575**

2.6.7 From the foregoing, it can be seen that if all mineral pitches Graded 1 and 2 were to be brought up to the Mineral Grade 3 Satisfactory standard, the capital costs to the nation would be £28,585,575. While it would be possible to improve the stock of substandard mineral pitches it should be remembered that they are no longer considered to be a suitable surface for the playing or even practicing of sport and it is recommended that, over time, but as soon as possible, all mineral pitches and courts be converted to natural grass, artificial grass or, for those sites which are effectively multi-

purpose areas, a suitable hard surface, polymeric surface or artificial grass surface.

2.6.8 If all full size mineral pitches were converted to Grade 3 natural grass, they would need to be totally reconstructed with most of the materials required being imported. The capital cost implications would be:

Convert 797 No. full size pitches to natural grass @ £98,580 per pitch £78,568,260

The cost of converting all small size mineral pitches to Grade 3 natural grass would be:

Convert 278 No. small size pitches to natural grass @ £58,485 per pitch £16,258,530

Note A full size pitch is recognised as one which is a minimum of 90 x 45m – and a constructed area of 6000m^2. A small size pitch is anything which falls below the minimum size and for calculation purposes, a constructed area of 3500m^2 has been assumed.

2.6.9 Given that mineral sports pitches are now generally considered to be unsuitable for both practice and competition, and bearing in mind that natural grass pitches are unable to sustain the high levels of use which mineral pitches can accommodate, it might be appropriate to convert some to artificial grass. The itemised cost of converting a 6000m^2 mineral pitch to sand filled artificial grass on an engineered base and with polymeric shockpad, including fencing and floodlighting, is approximately £363,840 as detailed below:

Capital Cost for a 6000m^2 Multi-use Sand Dressed Artificial Grass Pitch on an existing mineral surface size of pitch

Ref	Details	Qty	Cost/M2	Sub Total
24	Drainage at 10 m centres	1	£1.760	£1.760
93	Trimming	1	£0.200	£0.200
104	Remove existing Mineral Surface	1	£1.970	£1.970
105	Install Synthetic Surface – Sand Dressed[1]	1	£40.07	£40.070
108	Install Floodlighting – Hockey	1	£7.380	£7.380
110	Install 3 & 5 m High Fence	1	£5.400	£5.400
			Cost per Square Metre	£56.62
			Cost per Average Pitch	**£363,840.00**

*__Note__: 1 This cost is based on an engineered base and a polymeric shockpad.
2 The pro-rata cost for converting a 3,500m^2 mineral pitch to sand filled artificial grass is £191,170 per pitch

2.6.10 If say, 20% (160 full size and 55 small size pitches) of mineral pitches were converted to sand filled artificial grass, the cost implications would be:

Convert 160 No. 6000m^2 mineral pitches to sand filled artificial grass with fencing and floodlights @ £363,840 per pitch	£58,214,400
Convert 56 No. 3,500m^2 small mineral pitches to sand filled artificial grass @ £191,170 per pitch	£11,097,520
Total cost of converting 20% of mineral pitches to sand filled AG	£69,311,920

2.7 Winter Sports Pitches - Combined Capital Costs

2..7.1 The combined capital costs of bringing all winter sports pitches up to the respective recommended Grade 3 standards would be:

Full size natural grass pitches	£98,482,200
Small size natural grass pitches	£7,606,410
Full size mineral pitches	£23,300,325
Small size mineral pitches	£5,285,250
Total	**£134,674,185**

2.7.2 If existing natural grass pitches were improved as described above, and all mineral pitches were converted to Grade 3 natural grass, the total national cost implications would be:

Improve full size natural grass pitches	£98,482,200
Improve small size natural grass pitches	£7,606,410
Convert all full size mineral pitches to natural grass	£78,568,260
Convert all small size mineral pitches to natural grass	£16,258,965
Total	**£200,951,835**

2.7.3 The above cost estimates present a simplistic view of how the existing stock of facilities might be upgraded and improved. In reality, a variety of actions will be taken. One scenario might be to improve the natural grass pitches as described above but to take no action in respect of 50% of small size and full size mineral pitches, convert 30% of small size (83 pitches) and full size (239 pitches) mineral pitches to natural grass and the remaining 20% of small size (56 pitches) and full size (160 pitches) mineral pitches to sand filled artificial grass. The capital cost implications of this scenario would be:

Improve and upgrade full size natural grass pitches	£98,482,200
Improve and upgrade small size natural grass pitches	£7,606,410
Convert 239 No. full size mineral pitches to natural grass	£23,560,620
Convert 83 No. small size mineral pitches to natural grass	£4,854,255
Convert 160 No. full size mineral pitches to sand filled artificial grass	£58,214,400
Convert 56 No. small size mineral pitches to sand filled artificial grass	£11,097,520
Total	**£203,815,405**

2.7.4 The above estimated capital costs of improving the nations stock of winter sports pitches could be subject to a number of variations.

- Scotland's school estate is undergoing a major transformation, particularly in the secondary school sector, and the majority of secondary schools are likely to be improved through PPP/PFI schemes. If these improvements to school sites include upgrading and improvement to playing fields then, assuming that the 400 secondary school in Scotland have an average of 2.5 full size winter sports pitches, this would reduce the number of pitch facilities requiring to be upgraded to 3,800. The position regarding Scotland's 2,500 primary and special needs schools is less clear and no allowance has been made for improvements which might be made to winter sports pitches as a result of school improvement programmes.

- **sport**scotland has identified as a policy objective the aim of every secondary school in Scotland having direct and immediate access to a synthetic grass pitch. If this is achieved, then circa 400 natural grass or mineral pitches would be removed from the equation. The capital costs associated with achieving this objective would be approximately £147,536,000. The provision of a significant number of artificial grass pitches might have the effect of reducing the number of playing facilities needed to meet demands, provided of course that costs were affordable and users and sports governing bodies were willing to be flexible in respect of playing/start times.

- It is estimated that in the order of 500 of the national stock of pitches are designated as hockey pitches, although this figure includes many natural grass pitches at schools which are no longer used exclusively for this sport if a synthetic grass pitch is available. Hockey is best played on artificial grass and it would be beneficial if existing natural grass and mineral pitches were replaced with artificial grass pitches. The **sport**scotland policy objective of ensuring that all secondary schools have access to an artificial grass pitch will greatly assist the needs of hockey, provided that the surface selected is suitable for the sport. Schools provision will contribute significantly to the requirement for artificial grass hockey pitches, but there will still be a need for specialist hockey pitches or centres at strategic locations throughout the country. The capital costs associated with the provision of the various types of artificial grass pitches are detailed in Section 3 Artificial Grass Sports Pitches.

2.7.5 The above factors will influence the level of capital which needs to be expended on bringing the nation's stock of winter sports pitches up to acceptable standards. The estimates provided in this section enable the combined capital costs to be forecast for various options for upgrading pitches. The preparation of local pitch strategies will be a key factor in identifying the actions required and the associated cost implications.

2.8 Maintenance of Winter Sports Pitches

Natural Grass Pitches

2.8.1 As a general rule, the more comprehensive and complicated the chosen method of construction, the more intensive the maintenance has to be to keep the system in a stable and usable condition. Identified below are outline maintenance programme and indicative annual maintenance costs for the five grades of pitches identified in the assessment. It is important that the maintenance schedules identified for pitches graded 3, 4 and 5 be strictly carried out if the facilities are to be kept in good condition for their whole life. It should also be recognised that, while the required maintenance programmes might be implemented, if the facilities are not managed properly and overplay or use in inappropriate conditions is not prevented, playing surfaces and structures can be damaged. Management and maintenance are therefore, intrinsically linked and there should be close co-operation between the parts of any organisation responsible for these functions.

2.8.2 Site managers should review their current specifications to establish whether maintenance regimes are sufficient for the type of surface and levels of use.

Recommended Natural Grass Grade 1 and 2 Pitch Maintenance Schedule and Indicative Costs

Ref	Details	Qty	Cost/M2	Sub Total
1	Aeration	6	£0.040	£0.240
22	Chemical Additives (soil conditioners etc.)	1	£0.060	£0.060
23	Deep Aeration (vertidrain or similar)	2	£0.050	£0.100
31	Fertiliser Granular	3	£0.025	£0.075
43	Grass Cutting by Tractor (Cylinder Cut)	26	£0.015	£0.390
44	Grass Cutting by Tractor (Rotary Cut)	1	£0.015	£0.015
59	Over Seeding (drilling or similar)	1	£0.100	£0.100
60	Rolling	1	£0.030	£0.030
69	Scarification	1	£0.050	£0.050
100	Lining Pitches for Play	22	£0.013	£0.275
	Cost per Square Metre			£1.325
	Cost per Average Pitch			**£7,950.000**

Note:
1. The unit costs detailed above and in subsequent tables include on-costs such as management charges, travel time (making assumptions to balance between single remote sites and multi facility sites), , insurances etc.

2. The schedules and costs include sums to allow for essential periodic maintenance to keep the pitch operating as designed. This would comprise the regular opening of the surface by the installation of sand or gravel bands at 90^0 to the sand slits to keep them open to the surface and the regular application of top dressing. The cost of sand banding a $6000m^2$ pitch would be £4,500 which would need to be incurred every five years approximately. However, to assist the calculation of the total annual national costs, this figure has been disaggregated to a yearly cost.

2.8.3 In the case of a Grade 3 Natural Grass pitch, the intensity of some of the works items has been increased to combat the impacts of increased levels

of play and higher construction specification. This produces a maintenance schedule and indicative costs as follows:

Recommended Natural Grass Grade 3 Pitch Maintenance Schedule and Indicative Costs

Ref	Details	Qty	Cost/M2	Sub Total
1	Aeration	10	£0.040	£0.400
22	Chemical Additives (soil conditioners etc.)	1	£0.060	£0.060
23	Deep Aeration (vertidrain or similar)	4	£0.050	£0.200
31	Fertiliser Granular	4	£0.025	£0.100
43	Grass Cutting by Tractor (Cylinder Cut)	30	£0.015	£0.450
44	Grass Cutting by Tractor (Rotary Cut)	1	£0.015	£0.015
59	Over Seeding (drilling or similar)	1	£0.100	£0.100
60	Rolling	1	£0.030	£0.030
69	Scarification	1	£0.050	£0.050
82	Top Dressing with sand	0.50	£ 0.280	£0.140
100	Lining Pitches for Play	30	£0.013	£0.390
103	5 Yearly sand banding to open slits (allow p.a.)	0.20	£ 0.750	£0.150
		Cost per Square Metre		£2.085
		Cost per Average Pitch		**£12,510.00**

2.8.4 Grade 4 and 5 pitches would normally be provided at professional club grounds or at prestigious facilities where representative games are played and the pitches are built to a higher standard than normal to reflect this type of use. In the case of Grade 5 Natural Grass Pitches, the surface may be reinforced to reflect the very intensive use pattern likely to be experienced. The reinforced sward is designed to support higher levels of wear and tear and, while the actual grass cover may be lost, the reinforcement will assist in retaining surface levels. The maintenance of Grade 4 and 5 natural grass pitches needs to be geared to suit not only the construction of the pitches but also the anticipated higher standard of use. In either scenario i.e. higher standard of play or higher volumes of play, the maintenance levels may need to be significantly increased. For example:

- On a facility being maintained for professional play or representative matches, grass cutting might need to be increased to three times per week and possibly daily at key times of the year. Grass cuttings will almost always be carried out by cylinder mowers with clippings being removed, thus avoiding the contamination of the rootzones used in the construction by organic material.

- The high quality expected of Grade 4 and 5 pitches necessitates increased frequencies of works such as application of fertilisers, divoting, forking, over seeding, repairs to damaged area and brushing the sward.

- The enhanced fertilising regime necessitated by the construction specification will also prolong the growing season and, as a result, grass cutting may be necessary throughout the whole of the year.

- The construction techniques for Grade 4 and 5 pitches also make it necessary to ensure that the materials used for top dressing are compatible and that, where there is a reinforced sward, the reinforcement is not buried under progressive years of ill chosen top dressings. This requires surface scarification on a regular basis allied to programmed verticutting.

The desire to present Grade 4 and 5 pitches in the best possible condition influences maintenance regimes and schedules and, given the enhanced frequencies and works items required, ideally there should be a qualified groundsman on site or, if not based on site, one identified to be solely responsible for the facility.

2.8.5 In light of the above, the maintenance regime and cost implications for a Grade 4 pitch used for representative matches or similar might be as follows:

Ref	Details	Qty	Cost/M2	Sub Total
1	Aeration	12	£0.040	£0.480
22	Chemical Additives (soil conditioners etc.)	1	£0.060	£0.060
23	Deep Aeration (vertidrain or similar)	6	£0.050	£0.300
31	Fertiliser Granular	6	£0.025	£0.150
32	Fertiliser Liquid	2	£0.055	£0.110
34	Fungicide treatment	1	£0.060	£0.060
43	Grass Cutting (Cylinder Cut incl. verticutting)	120	£0.018	£2.160
59	Over Seeding (drilling or similar)	1	£0.100	£0.100
60	Rolling	1	£0.030	£0.030
69	Scarification	2	£0.050	£0.100
82	Top Dressing with rootzone	1	£ 0.380	£0.380
100	Lining Pitches for Play	40	£0.013	£0.520
103	5 Yearly sand banding to open surface (allow p.a.)	0.20	£ 0.750	£0.150
	Cost per Square Metre			£4.600
	Cost per Average Pitch			**£27,600.00**

2.8.6 A natural grass Grade 5 pitch would require slightly different maintenance techniques to those identified above for a Grade 4 pitch and these would depend to a large extent on the form of reinforcement. It would be difficult, for example, to carry out the same type of deep aeration on a Desso Grassmaster pitch as on a Fibresand pitch. Furthermore, it would be necessary to ensure that the benefits of the reinforcement were not lost under heavy top dressings and, in view of the higher levels of play which a Grade 5 pitch is likely to attract, it would be beneficial to allow for a heavy scarification every second year. This, and other subtle changes to the costed maintenance schedule for a Grade 4 pitch identified above, would add some £ 0.45 per square metre per annum bring the cost up to £5.05 per m2 per annum and an average annual cost of £30,300 per pitch per annum..

2.8.7 Because of uncertainties about the precise timing of periodic maintenance tasks such as sand banding, an allowance of £0.15m^2 has been built into the annual costs calculators for routine maintenance.

2.8.8 Based on the above outline maintenance schedules and indicative costs, the current annual expenditure on maintenance of the estimated national stock of natural grass pitches should be:

Full Size Natural Grass Pitches

3,323 No. full size Grade 1 & 2 natural grass pitches @ £7,950 per pitch per annum	£26,417,850
400 No. full size Grade 3 natural grass pitches @ £12,510 per pitch per annum	£5,004,000
240 No. full size Grade 4 natural grass pitches @ £27,600 per pitch per annum	£6,624,000
40 No. full size Grade 5 natural grass pitches @ £30,300per pitch per annum	£1,212,000
Total	£39,257,850

Small Size Natural Grass Pitches

442 No. small size Grade 1 & 2 natural grass pitches @ £3,312 per pitch per annum	£1,464,125
34 No. small size Grade 3 natural grass pitches @ £5,180 per pitch per annum	£177,242
5 No small size Grade 4 natural grass pitches @ £11,500 per pitch per annum	£57,500
Total	£1,698,867

Total annual maintenance costs for natural grass pitches	**£40,956,717**

2.8.9 If the exiting stock of natural grass pitches is improved in accordance with previous proposals the annual revenue cost implications would be:

Full Size Natural Grass Pitches

365 No. full size Grade 1 & 2 natural grass pitches @ £7,950 per pitch per annum	£2,901,750
3,358 No. full size Grade 3 natural grass pitches @ £12,510 per pitch per annum	£42,008,580
240 No. full size Grade 4 natural grass pitches @ £27,600 per pitch per annum	£6,624,000
40 No. full size Grade 5 natural grass pitches @ £30,300per pitch per annum	£1,212,000
Total	£52,746,330

Small Size Natural Grass Pitches

49 No. small size Grade 1 & 2 natural grass pitches @ £3,312 per pitch per annum	£162,288
427 No. small size Grade 3 natural grass pitches @ £5,213 per pitch per annum	£2,225,951
5 No small size Grade 4 natural grass pitches @ £11,500 per pitch per annum	£57,500
Total	£2,445,739

Total annual maintenance costs for improved natural grass pitches	**£55,192,069**

2.8.10 It can be seen from the cost calculations provided in paragraphs 2.8.7 and 2.8.8 that if natural grass pitches are improved to meet Grade 3 standards there would be an increase in annual maintenance costs of approximately £14,259,110. This assumes of course, that the estimated current annual maintenance expenditure on natural grass pitches is accurate, whereas, in reality, it is believed that these estimates do not reflect the current position.

2.8.11 As indicated above, some 83% of full size and 92% of small size natural grass pitches do not meet the Grade 3 standard and the reasons for this include inadequate initial construction specification, overuse and poor maintenance. It is in the areas of periodic maintenance such as application of fertiliser, top dressings, deep aeration (vertidraining earthquaking etc.), sand banding, and repairs to damaged areas etc. that maintenance has been inadequate. However, in terms of routine maintenance, tasks such as grass cutting appear to be executed to reasonable frequencies although they are lower than might be necessary if applications of fertiliser were at desirable levels (low nutrient levels slows grass growth).

2.8.12 Discussions with a selection of grounds maintenance managers confirmed survey observations, which revealed that pitches can often be fertilised only twice per year; be irregularly top dressed i.e. not annually and not in sufficient quantity; vertidrained only once per year; and sand banding to open up slit drainage systems is often not carried out for several years, if at all. It is calculated that these omissions, allied to the reduced number of grass cuts and aerations can reduce the maintenance spend on the various grades of pitches as follows:

Pitch Grade	**Estimated m^2 Under Spend**	**% Under Spend**	**Total Annual Under Spend Per Pitch**
Grade 1 & 2	£0.48 m^2	35%	£2,880 per pitch per annum
Grade 3	£0.88 m^2	41%	£5,280 per pitch per annum
Grade 4 & %	£1.50 m^2	33%	£8,000 per pitch per annum

2.8.13 It is emphasised that not all natural grass pitches are maintained inadequately. It is estimated that some 11% of Grade 1 and 2 pitches, 30% of Grade 3 pitches and 50% of Grade 4 and 5 pitches are maintained adequately for their soil type, construction and use levels. If these calculations are interpolated to the assumed national stock of natural grass pitches, the following under spends result:

Pitch Grade	**% of Pitches**	**No. of pitches**	**Estimated Annual Under Spend Per Pitch**	**Total Annual Under Spend**
Grade 1&2	89% of 3,323	2957	£ 2,880	£ 8,516,160
Grade 3	70% of 400	280	£ 5,280	£ 1,478,400
Grade 4&5	50% of 280	140	£ 8,000	£ 1,120,000
Estimated total national under spend on annual maintenance				£ 11,114,560

2.8.14 Based upon these calculations, the current annual spend on maintenance of natural grass winter sports pitches is some 28% below that which is considered necessary to maintain the existing stock of pitches in good

order, although it should be recognised that there will be considerable variations between sites and the bodies responsible for pitches. Some facilities are presently maintained to high standards and it is hoped that this study will encourage site owners and managers to improve their maintenance standards generally.

2.8.15 A further factor which needs to be taken into account is the proposal that 30% of mineral pitches be converted to Grade 3 natural grass. If this proposal is implemented, the annual revenue cost implications for natural grass pitches would be:

239 No. full size mineral pitches converted to Grade3 natural grass pitches @ £12,510 per pitch per annum	£2,989,890
83 No. small size mineral pitches converted to Grade 3 natural grass pitches @ £5,213 per pitch per annum	£432,679
Total	£3,422,569

Assuming that any converted mineral pitches are currently being maintained appropriately, annual maintenance costs would be:

239 No. full size mineral pitches @ £5,824 per pitch per annum	£1,391,936
83 No. small size mineral pitches @ £3,120 per pitch per annum	£258,960
Total	£2,650,896

Based on these figures, converting 30% of mineral pitches to natural grass would result in the need to incur an additional £771,673 on annual maintenance costs.

2.8.16 It can be seen from the foregoing that, if natural grass pitches are to be kept in 'fit for purpose' condition, proper maintenance regimes must be implemented and the facilities must be managed so as to avoid undue wear. It is estimated that some £40,956,717 per annum should currently be being spent on maintaining the existing stock of natural grass pitches in fit for purpose condition (although actual spend is probably 28% less) and this figure would increase to approximately £55,192,069, an increase of £14,235,352 if the recommended improvements to the existing stock are implemented. Furthermore, if, as proposed, 30% of mineral pitches were to be converted to Grade 3 natural grass there would be a further net increase of approximately £771,673.

Mineral Winter Sports Pitches

2.8.17 If they are to be kept in good condition and suitable for play, mineral sports pitches require a rigorous and detailed maintenance programme. The great majority of mineral sports pitches in Scotland are crushed burnt pit shale or blaes as it is more commonly known. A high quality smooth and firm mineral playing surface is achieved by encouraging the particles used in the surface to bind by watering and rolling. Poorly graded surface materials will not bind, nor will a surface which has been allowed to dry

out. Therefore, the basic maintenance actions required to maintain a mineral surface comprise:

Water – Brush – Roll

Few, if any mineral winter sports pitches in Scotland have irrigation systems and when surfaces dry out, the blaes surface materials tend to be blown away by the wind. If the surface materials are not kept at an appropriate depth, the sub base can infiltrate the surface and provide a hazard to users. As has previously been explained, remedying this is not easy and success levels are low.

2.8.18 The maintenance requirements of mineral sports pitches will depend upon levels of use and weather conditions, but most actions can be undertaken using machinery. Pitch lining is often required to be carried out several times a week if facilities are heavily used. If mineral facilities are to be kept in good condition, it is essential that adequate resources are allocated to allow the appropriate maintenance regimes to be put in place. An outline maintenance schedule is detailed below:

Daily.
- Check facility, fixtures and fittings.
- Remove litter and debris as required

As Required
- Water as often as necessary in dry condition.
- Scarify, brush and roll
- Mark out pitch

Annually
- Treat facility with moss-killer / algaecide.
- At the start of the season, scarify, lightly regrade and apply a light dressing.

Note: These are minimum recommendations. Cleaning, grooming and court inspection can always be done more frequently.

2.8.19 The average cost implications for the above maintenance schedule for full size and small size pitches are:

Average weekly cost for full size pitch	£112	
Average annual cost for full size pitch		£5,824
Average weekly cost for small size pitch	£60	
Average annual cost for small size pitch		£3,120

If applied to the assumed national stock of full size and small size mineral pitches, the following annual maintenance cost implications arise:

Maintain 797 No. full size mineral pitches @ £5,824 per pitch per annum	£4,641,728
Maintain 278 No. small size mineral pitches @ £3,120 per pitch per annum	£867,360
Total annual maintenance costs for mineral pitches	**£5,509,088**

2.8.20 If the improvement and conversion option concerning mineral pitches identified in 2.7.3 are implemented, 50% of full size and small size mineral pitches would be converted to natural grass or sand filled artificial grass. The annual costs of maintaining the residual stock of 398 full size and 139 small size mineral pitches would be:

Maintain 398 No. full size mineral pitches @ £5,824 per pitch per annum	£2,317,952
Maintain 139 No. small size mineral pitches @ £3,120 per pitch per annum	£433,680
Total annual maintenance costs for mineral pitches	**£2,751,632**

While this would result in reduced costs for the maintenance of mineral pitches, the costs of maintaining natural grass and artificial grass would increase accordingly. One option might be to remove the residual stock of mineral pitches from sports use if other mineral pitches are being replaced by better facilities, with resulting savings in maintenance costs.

2.8.21 Based on the maintenance schedules and frequencies identified in the various options above, the combined annual costs to the nation of maintaining natural grass and mineral winter sports pitches in a proper condition, should be approximately:

Current Estimated Annual Costs

Estimated required current annual costs for natural grass pitches	£40,956,717
Estimated required current annual costs for mineral pitches	£5,509,088
Total estimated current annual costs for winter sports pitches	£46,465,805

If natural grass winter sports pitches are improved in line with the proposals contained above, the annual maintenance cost implications would be:

Estimated Annual Costs Following Improvement of Natural Grass Pitches

Estimated annual costs for improved natural grass pitches	£55,192,069
Estimated annual costs for mineral pitches	£5,509,088
Total estimated current annual costs for winter sports pitches	£60,701,157

If natural grass pitches are improved and mineral pitches are converted in part to natural grass and artificial grass in line with options identified above, the annual maintenance cost implications would be:

Estimated Annual Costs Following Improvement of Natural Grass Pitches and Conversion of 50% of Mineral Pitches

Estimated annual costs for improved natural grass pitches	£55,192,069
Estimated annual costs for reduced stock of mineral pitches	£2,751,632
Estimated costs for mineral pitches converted to Grade 3 natural grass	£3,422,569
Total estimated current annual costs for winter sports pitches	£61,366,270

If the 50% residual stock of mineral pitches was taken out of use, this figure would fall to £58,614,638.

2.9 Conclusion

2.9.1 It is estimated that there are some 5,500 winter sports pitches in Scotland and they represent the greatest national investment in terms of land area, number of facilities, capital costs and ongoing revenue commitment to maintenance of all the types of outdoor sports facility included in this study. Most winter sports pitches, (76%) are football facilities.

2.9.2 The majority of winter sports pitches (73% full size and 57% small size) are of a form of natural grass, the remainder being of mineral construction. Mineral surfaces are no longer considered to be suitable for sports play and practice, but, given that around 1,000 such facilities still exist and in view of the costs associated with converting them to natural grass or artificial grass, they are likely to play some role in sports participation in certain areas for a considerable time to come.

2.9.3 Given national and international trends and the known shortcomings of mineral surfaces, it is unfortunate that some local authorities have recently provided new mineral pitches in new school PPP projects despite **sport**scotland advising against the construction of mineral based pitches. Clearly, there is nothing which can be done in the short term to rectify the position created by these new builds but, it would be beneficial if **sport**scotland and the Scottish Executive were to issue guidance on this matter.

2.9.4 Approximately 83%% of full size and 92% of small size natural grass winter sports pitches fall below the identified Grade 3 Natural Grass Satisfactory Standard, while 82% of full size and 91% of small size mineral pitches fail to meet the Grade 3 Mineral Sports Pitches Satisfactory Standard. The cost implications of bringing all winter sports pitches up to a minimum of their respective Grade 3 Satisfactory Standards have been identified at £134.7m if all mineral pitches are retained. If all existing natural grass pitches are improved and all mineral pitches are converted to Grade 3 natural grass, the capital cost implications would be £201m. A more suitable and practical option however, would be to improve existing natural grass pitches, retain 50% of mineral pitches, convert 30% of mineral pitches to natural grass and convert 20% of mineral pitches to sand filled artificial grass, the cost implications of which would be £204m..

2.9.5 Given the high level of capital which has been expended in the provision of winter sports pitches, it is unfortunate that so many fall below what are identified as acceptable standards. This can be explained in part by increased expectations on the part of national sports bodies and users and developments in sports pitch construction technology but, all too often, expensive facilities have been created and then been allowed to deteriorate as a result of inadequate maintenance. It is estimated that nationally, a sum

of approximately £48m should currently be spent on annual maintenance although the actual amount spent is thought to be some 28% (circa £11.1m) less than is required. The required maintenance spend figure would rise to £61.4m if the improvement proposals contained in this study are implemented.

2.9.6 Unfortunately, the general picture throughout the country is one of a lack of care for facilities once created and one cannot ignore the fact that there has been, nationally, a considerable waste of physical and financial resources. There are many factors contributing to this, including the difficulties associated with maintaining pitches which also fulfil amenity functions, over play, poor management and insufficient resources. Regardless of the reasons for inadequate maintenance, it has to be questioned whether capital should be invested in new facilities if adequate resources are not to be made available to maintain them in a proper condition thereafter. While **sports**cotland cannot control all facility provisions, it can raise awareness of the problems and requirements and make grant awards conditional upon guarantees being given that approved maintenance schedules will be implemented for the life of a facility.

Part 3.3

Artificial Grass Sports Pitches

3 Artificial Grass Sports Pitches

3.1 Pitch and Sports Requirements

3.1.1 For the purposes of this study, artificial grass sports pitches are those surfaces which provide a synthetic alternative to natural grass for the playing of winter sports. First developed in the 1960s, artificial grass sports surfaces are now in their third generation. First generation pitches comprised a carpet of artificial grass, usually nylon but latterly polypropylene, in a dense carpet with no infill – the fibres were allowed to stand free with the density designed to keep the pile upright. These surfaces suffered greatly from being over firm and very fast because over a relatively short period the pile would bend over and therefore, instead of playing on the depth of the pile, the surface became very compact. These surfaces also had high friction values and this caused bad burns to anyone who attempted to play the game as on a natural grass surface. As these early carpets had no ballast they inevitably had problems with stability and this led to ongoing problems with split joints, ripples etc. as the carpets moved through expansion caused by atmospheric conditions or poor base construction etc.

3.1.2 Although they were hard wearing and able to withstand high levels of use, first generation artificial grass pitches were expensive and did not meet the precise playing requirements of most sports as surfaces tended to be hard and uncomfortable for players, ball bounce was high and ball roll quick. In order to overcome these shortcomings, a second generation of artificial surfaces was developed which saw the introduction of shock pads and a ballast of sand infill to encourage the artificial grass blades to stand up and to provide playing surfaces which more accurately mimicked good quality natural grass. Unfortunately, the yarns used in the carpet also tended to fold over at the surface interface thus locking in the sand and increasing the firmness and ball speed. Furthermore, the abrasive nature of the infill caused the pile to fibrillate and erode and often the polypropylene residue and airborne silts would combine to cause ongoing drainage problems. This problem was exacerbated as, very early in the development of artificial pitches, it was widely believed by site managers that low maintenance meant no maintenance.

3.1.3 Because of their high development costs and the initial limited supply of facilities, site developers tended to specify a multi-purpose facility which catered for as many sports as possible. Unfortunately, these multi-purpose surfaces tended to be a compromise for the main sporting uses of football and hockey.

3.1.4 Developments in artificial grass surfaces have tried to overcome these problems and create surfaces which more closely match the playing characteristics of natural grass and meet the performance requirements of different sports. Today there are a large number of artificial surfaces available, most of which look similar but may be made of different

materials, manufactured by different techniques and designed for use in different ways. The most basic distinction is between filled and non-filled artificial grass systems. In filled systems, the pile of the artificial grass is filled to within about 3mm of the fibre tips with a fine granular material such as silica sand which represents about 90% of the total weight of the material. Play takes place on the composite bed of fibre and sand.

3.1.5 Sand dressed systems are a development of the filled system – the carpet pile being denser and shorter and with a reduced quantity of infill. This produces a more player friendly surface as it slows the ball and allows the boot or stick to get under the ball.

3.1.6 Non-filled surfaces consist of carpet alone and play takes place entirely on the fibre. The pile of the carpet has to be much denser per unit area to support the player and the stresses of play. This type of carpet is used almost entirely for hockey and the ball speed is regulated by watering the surface.

3.1.7 The latest development is that of the Third Generation Carpets. These have been developed to more closely mimic the playing characteristics of good quality natural grass surfaces. The pile length is longer and more open and the infill is either a combination of sand and rubber granulate or rubbers granulate. The manufacturers have developed a range of carpets to date that are more sport specific and new yarns and carpet constructions are evolving constantly.

3.1.8 As more manufacturers have arrived on the scene and more facilities have been built, so prices have reduced and surfaces have been developed which are better able to meet a variety of needs and uses. Today there are basically four types of surface:

- Sand filled pitches which tend to be multi-purpose facilities able to cater for a variety of sports including football, hockey, basketball, netball, volleyball and even tennis.

- Sand dressed pitches which have an exposed pile and allow greater skills development as play takes place 'in the carpet' and not 'on top of the carpet' as is the case in sand filled pitches. Sand dressed pitches can be used for a range of sports but are more suitable for hockey than football.

- Water based pitches which are a non-filled system and play takes place entirely on the surface of the carpet. Consequently, the pile of the carpet has to be much denser per unit area in order to support the player and the stresses of play. Water is added to these surfaces before play in order to reduce player/surface friction and reduce the speed of the ball. Water based pitches are particularly suited to hockey.

- Third generation surfaces comprise a shock pad arrangement which mirrors that of natural grass and long pile artificial grass strands in filled with a mixture of sand and rubber granules.

3.1.9 Third Generation artificial grass surfaces are intended primarily for football but are not suitable for hockey. So successful has this type of surface been that FIFA is considering approving it for use in international matches and UEFA is part funding an experiment involving the installation of five third generation artificial grass pitches for use by high level professional clubs. If these trials prove successful, it is likely that third generation surfaces will be acceptable for use by professional and amateur competitions at all levels. The UEFA trials are drawing to a close and the use of artificial surfaces has been sanctioned for competition at the highest level. New standards are being set out with a new set of Common Guidelines being issued by FIFA and UEFA and, effective from March 2005, FIFA and UEFA have agreed on joint Guidelines for Artificial Turf Pitches. The Guidelines will identify FIFA 1 Star and 2 Star facilities. The 2 Star Guidelines will cover the high end facilities for Stadia etc. while the 1 Star Guidelines will cover municipal and community facilities. These joint Guidelines should bring some clarity to the industry.

3.1.10 There is undoubtedly reluctance by some professional football clubs to make use of artificial grass pitches, due in part to the unsatisfactory nature of some of the surfaces tested. However, as the technology develops and once it becomes clear that there is a wide range in performance characteristics in the various artificial carpets available, it is anticipated that acceptance and take up will accelerate. This could have significant implications for local provisions if local authorities in particular, opt to provide third generation pitches in preference to natural grass because of their higher use capacity.

3.1.11 The main advantage of artificial grass pitches is that they can withstand levels of play which natural grass surfaces could not match. Disadvantages include:

- They are expensive to install. Third generation surfaces are more expensive than first or second generation surfaces if laid with an engineered base and shock pad, although third generation pitches laid on a dynamic base can be created at much less cost. However, guidance from UEFA and FIFA suggests that an engineered base with shockpad or 'E' Layer will produce a more satisfactory surface in the long term and may prolong the carpet life span.

- Surfaces are not truly multi-purpose and sports specific surfaces for football and hockey need to be provided. Third generation surfaces are not suitable for hockey being too bumpy and the pace irregular.

- Artificial grass surfaces require a substantial degree of maintenance and specialist equipment.

- Life expectancy of modern surfaces is uncertain.

3.1.12 Different sports require different playing characteristics and their respective governing bodies stipulate precise requirements. Choosing a priority sport may mean that certain playing characteristics are not ideal for – or even compatible with – other sports. Governing bodies of sport identify in their technical specifications performance requirements for artificial grass surfaces in areas such as:

Ball surface properties:

- Ball roll
- Ball rebound
- Ball-to surface friction
- Surface pace (angled ball behaviour).

Player surface properties:

- Traction coefficient
- Slip resistance
- Sliding distance
- Force reduction
- Vertical deformation
- Peak G
- Severity Index.

Carpet properties:

- Mass per unit area
- Tufts per unit area
- Tuft withdrawal force.

Construction tests:

- Porosity (or permeability)
- Slope
- Evenness

3.1.13 Because of the high costs of providing artificial grass sports pitches, governing bodies have identified various standards of performance and construction to meet the requirements of different playing standards. For example, the International Hockey Federation (FIH) has introduced three levels of pitch specification with differing performance requirements: Global, Standard and Starter and as previously indicated, FIFA and UEFA are in the process of approving a standard for match play in football.

3.2 Artificial Grass Sports Pitch Classification Grades

3.2.1 Whereas five classifications of pitch have been identified for natural grass winter sports pitches, only three grades have been identified for artificial grass winter sports pitches. These are:

Grade 1 - Requires Refurbishment;
Grade 2 - Requires Rejuvenation;
Grade 3 - Satisfactory Standard.

3.2.2 A Grade 3 – Satisfactory Standard artificial grass pitch is identified as one which has been constructed in accordance with recognised technical and performance specifications and has been maintained appropriately so that the required performance and playing characteristics have been preserved.

3.2.3 A Grade 2 – Requires Rejuvenation artificial grass pitch is identified as one where the surface is 'tired' and not able to deliver the required performance characteristics.

3.2.4 A Grade 1 – Requires Refurbishment artificial grass pitch is identified as one where the carpet surface has become completely worn out and requires to be replaced, possibly with the same carpet type and possibly with a more modern or sports specific surface. Repairs to or, exceptionally, renewal of the sub-base, might also be required.

3.3 The Upgrading Process

3.3.1 For information purposes, indicative design specifications, new build schedules of rates and capital costs have been provided for the four main types of artificial grass pitches now being constructed:

Capital Cost for 7,000m^2 New Build Multi-use Sand Dressed Artificial Grass Pitch

Ref	Details	Qty	Cost/M2	Sub Total
13	Bulk earthworks	1	£1.125	£1.125
24	Drainage at 10 m centres	1	£1.600	£1.760
89	Topsoil strip	1	£0.700	£0.700
93	Trimming	1	£0.200	£0.200
105	Install Synthetic Surface – Sand Dressed	1	£40.07	£40.070
108	Install Floodlighting – Hockey	1	£7.380	£7.380
110	Install 3 & 5 m High Fence	1	£5.400	£5.400
150	Apply residual herbicide1	1	£ 0.120	£0.120
151	Remove excavated material from site	1	£4.500	£4.500
	Cost per Square Metre			£61.255
	Cost per Average Pitch			**£428,785.00**

Note: This cost is based on an engineered base and a polymeric shockpad.

Capital Cost for 6,426 m^2 Water Based Nylon Carpet Hockey Specific Pitch

Ref	Details	Qty	Cost/M2	Sub Total
13	Bulk Earthworks	1	£1.125	£1.125
24	Drainage at 10 m centres	1	£1.600	£1.760
89	Topsoil Strip	1	£0.700	£0.700
93	Trimming	1	£0.200	£0.200
152	Install Fence 3 metre high weldmesh	1	£4.900	£4.900
111	Install Synthetic Surface – Water Based Hockey	1	£51.500	£51.500
112	Install Floodlighting – Hockey Global	1	£13.500	£13.500
113	Install Irrigation – Fully Automatic - Hockey	1	£4.25	£4.250
150	Apply residual herbicide1	1	£0.120	£0.120
151	Remove excavated material from site	1	£4.500	£4.500
		Cost per Square Metre		£82.555
		Cost per Average Pitch		**£530,498**

Note: This cost is based on an engineered base and a polymeric shockpad

Capital Cost for New Build Sand Filled Synthetic Grass Pitch: Carpet Size 106 x 66

Ref	Details	Qty	Cost/M2	Sub Total
13	Bulk Earthworks	1	£1.125	£1.125
24	Drainage at 10 m centres	1	£1.760	£1.760
89	Topsoil Strip	1	£0.700	£0.700
93	Trimming	1	£0.200	£0.200
110	Install Fence 3 & 5 metre high weldmesh	1	£5.400	£5.400
111	Install Sand Filled Synthetic Surface	1	£33.200	£33.200
112	Install Floodlighting	1	£6.600	£6.600
150	Apply residual herbicide1	1	£0.120	£0.120
151	Remove excavated material from site	1	£4.500	£4.500
		Cost per Square Metre		£48.83
		Cost per Average Pitch		**£341,615**

Note: This costing is based on an engineered base with polymeric shock pad.

Capital Cost for New 3rd Generation Filled Pitch: Carpet Size 106 x 66 = 6996 m^2

Ref	Details	Qty	Cost/M2	Sub Total
13	Bulk Earthworks	1	£1.125	£1.125
24	Drainage at 10 m centres	1	£1.760	£1.760
89	Topsoil Strip	1	£0.700	£0.700
93	Trimming	1	£0.200	£0.200
110	Install Fence 3 & 5 metre high weldmesh	1	£5.400	£5.400
111	Install Synthetic Surface – 3rd Generation	1	£29.070	£29.070
112	Install Floodlighting	1	£6.600	£6.600
150	Apply residual herbicide1	1	£0.120	£0.120
151	Remove excavated material from site	1	£4.500	£4.500
		Cost per Square Metre		£49.475
		Cost per Average Pitch		**£346,127**

Note: This costing is based on a 3rd Generation surface on a dynamic base. The extra over cost for a 3rd Generation Pitch on an engineered base would be £16.25 m^2 = £113,685 – total cost £459,812 per pitch.

3.3.2 Problems experienced with artificial grass surfaces might include:

- Poor surface drainage;
- Slippery surface;
- Seam failure;
- Compacted surface;
- Erosion of the pile;
- Lines/pitch markings lifting.

In the main, if these problems occur within say, 5 years of construction, it is usually a sign that the carpet has been poorly constructed or, more likely of inadequate and ill thought out maintenance programmes.

3.3.3 Problems associated with poor surface drainage are seldom the result of poorly functioning underlying drainage systems and more often the result of contamination of the top zone of the carpet infill by organic matter such as topsoil or vegetable matter deposited on the carpet surface by users or airborne silts. Eroded yarn of the carpet surface can also contribute to contamination of the sand infill. This problem can be deferred by careful maintenance and management including regular brushing of the surface and ensuring that sand infill levels are correct. However, in the medium to long term, environmental conditions and the natural tendency of the pile to 'lie over' will cause the surface to go hard and result in loss of traction. This problem can be rectified by rejuvenation of the surface.

3.3.4 Rejuvenation of a surface involves the removal of the contaminants from the carpet and the brushing up of the pile before backfilling with clean fill material. This process is carried out using specialist machinery which blasts the contaminated backfill out with compressed air or jets of water. Once the contaminated material has been removed, the carpet is vigorously brushed to raise the pile and clean backfill material is applied. At the same time seams and pitch markings can be inspected and repaired as necessary.

3.3.5 The rejuvenation process can add three or more years (about 25%) to the life of an unsuitable facility. Indicative costs for rejuvenation of a 6000m^2 full size artificial grass pitch are:

Type of work	**Cost per m^2**	**Cost per pitch**
Rejuvenation of full size pitch	£4.35 m^2	£26,100

More serious problems might include:

- Deterioration/disintegration of the carpet;
- Deterioration of the shock pad and sub-base.

3.3.6 If the carpet pile has been completely eroded, or eroded to an extent whereby the rejuvenation process would not be cost effective in terms of the extended life of the facility which it would offer, refurbishment will be necessary. Refurbishment can also be required where the initial construction has been found to be poor and there has been movement of the carpet or sub-base, where the carpet has been chosen incorrectly or the carpet is of poor quality.

3.3.7 Refurbishment of artificial grass pitches usually involves the removal of the existing playing surface, minor works to repair and prepare the sub-base and the replacement of a like for like carpet or a more suitable alternative to reflect demand and anticipated use. Before carrying out refurbishment there are a number of factors which need to be considered:

- Is the reason for the facility needing to be refurbished a result of underlying construction problems? For example, is the topography of the site suitable, is the drainage system operating effectively and as designed, or has the sub-base failed in some way?

- Have the demands placed upon the facility changed? Is there a higher demand for hockey or football? If so, there might be a case for installing a sports specific/more user friendly carpet type.

- What is the existing construction and will it support the desired carpet type? Some artificial grass carpets and processes are not recommended for 'Dynamic' or unbound base constructions and require an 'Engineered' or Bitumen base construction.

3.3.8 Once these and any other factors which might be relevant have been considered, it may be possible to refurbish a facility. For the purposes of this study, the following cost estimates have been calculated.

a) Like for Like Replacement

Assuming that there are no infrastructure problems, works would involve the lifting and removal of the existing carpet and replacing it with a suitable new product. Indicative costs for a 6000m^2 area are:

Surface Type	**Cost per m^2**	**Cost per pitch**
Sand Filled Carpet	£ 17.50 m^2	£105,000
3rd Generation	£ 25.50 m^2	£153,000
Sand Dressed	£ 22.50 m^2	£135,000
Water Based	£ 28.50 m^2	£171,000

b) Change Surface Type

It has been assumed that, if a change of surface is desired, the new surfaces will either be Sand Filled 3rd Generation or Sand Dressed constructions. Indicative costs are:

Surface Type	**Cost per m^2**	**Cost per pitch**
Sand Filled – 3rd Generation	£ 25.75	£154,500
Sand Filled – Sand Dressed	£ 22.75[1]	£136,500
Sand Filled – Water Based	£ 37.50[2]	£225,000
3rd Generation – Sand Dressed	£ 33.75[3]	£202,500
Sand Dressed – Water Based	£ 36.15[4]	£216,900

Note:

[1] Slightly higher costs reflects disposal of heavier carpet.
[2] The high rate reflects the need for irrigation, increase floodlighting etc.
[3] The works would include Engineered Base and Shockpad
[4] The works would include irrigation and increase spec. for floodlighting etc.

3.4 Artificial Grass Sports Pitches Audit Survey Findings

3.4.1 Audit responses indicated the following picture in respect of full size artificial grass winter sports pitches. Responses were received from 46 facilities and their condition was assessed as follows:

Table 13
Full Size Artificial Grass Pitches – Audit Responses

Facility Operator	Grade 1	Grade 2	Grade 3	Total	%
Local Authority	5	6	16	**27**	59%
Primary Schools		1		**1**	2%
Secondary Schools	2	3	2	**7**	15%
Colleges & Universities		2	2	**4**	9%
Voluntary Clubs		1		**1**	2%
Other Operators	2	3	1	**6**	16%
Total	**9**	**16**	**21**	**46**	**100%**
	20%	**35%**	**45%**	**100%**	

3.4.2 Audit results show that 55% of full size artificial grass surfaces fell below the Grade 3 – Satisfactory Standard. If these figures are interpolated to the assumed national stock of 120 full size artificial grass surfaces, the following position emerges:

Table 14
Interpolated National Condition of Full Size Artificial Grass Pitches

Facility Type	1	2	3	Total
Full size Artificial Grass Pitches	24	42	54	120
Total	**20%**	**35%**	**45%**	**120**

3.5 Capital Cost Implications

3.5.1 Using the results from the survey interpolated to provide an indication of the national picture, the identified design specifications and indicative schedule of rates, the capital cost implications of bringing all artificial grass pitches up to Grade 3 Satisfactory Standard have been calculated.

Refurbishment of Grade 1 Artificial Grass Pitches

3.5.2 It has been assumed that all full size artificial grass pitches requiring refurbishment will be resurfaced with a 'like for like' carpet although it is accepted that the opportunity will be taken by some site managers to change or upgrade the surface. Five cost estimates have been provided above for refurbishment but the cost estimate for a 3rd Generation – Sand Filled pitch has been used as the calculator for the purpose of this study.

Full size Grade 1 artificial grass pitch of 6000m^2
@ £25.75m^2 = £154,500 per pitch.

24 full size Grade 1 pitches @ £154,500 per pitch **£3,708,000**

Rejuvenation of Grade 2 Artificial Grass Pitches

3.5.3 While the various types of artificial grass surfaces may require slightly different actions to rejuvenate the playing surface, there is sufficient similarity in the processes and work requirements to use a single indicative cost for total cost estimate purposes.

Full size Grade 2 artificial grass pitch of 6000m2
@ £4.35 m^2 = £26,100 per pitch.

42 full size Grade 2 pitches @ £19,575 per pitch **£1,096,200**

Artificial Grass Pitches – Combined Capital Costs

3.5.7 The combined capital costs as indicated above for bringing all full size artificial grass pitches up to Grade 3 – Satisfactory Standard are:

Refurbish 24 Grade 1 pitches	£3,708,000
Rejuvenate 42 Grade 2 pitches	£1,096,200
Total	**£,4,804,200**

3.5.8 The above capital cost estimates are based on an assumed national stock of 120 full size artificial grass pitches. It should be recognised however, that a considerable number of new facilities are in process of planning or construction, primarily as a result of new school developments under the PPP/PFI initiatives and the New Opportunities Fund's PE in Schools programme. It is also possible that as a result of the preparation of local sports pitch strategies, a number of existing natural grass and mineral facilities will be converted to artificial grass. For the purposes of this audit, it has been assumed that these facilities will be constructed to appropriate standards taking account of current best practice and that they will be maintained appropriately thereafter. Since the position concerning new build is so indeterminate, no attempt has been made to predict the capital and revenue cost implications.

3.6 Ongoing Refurbishment and Periodic Maintenance

3.6.1 The life of artificial grass sports facilities can be prolonged by proper routine maintenance and periodic rejuvenation and refurbishment works. Factors affecting the life of an artificial grass sports surface can include proper construction, proper maintenance and levels of use. Some artificial grass surfaces have been known to last for only a few years while others have lasted for up to 15 years. If properly maintained, and provided that levels of use are not inordinately high, it is not unreasonable to expect an artificial grass carpet to last for say, 12 years before refurbishment is required and the carpet replaced. To achieve this life span, rejuvenation would be required to be carried out after about 7 or 8 years. Therefore, over a 25 year period an artificial grass pitch would require to be the subject of two rejuvenation processes at years 7 and 19 and two refurbishment programmes with the carpet being replaced at years 12 and 24.

3.6.2 For the purposes of this cost calculation, it has been assumed that all facilities have been brought up to the Grade 3 – Satisfactory Standard. Therefore the periodic maintenance capital costs which would require to be incurred on each artificial grass pitch would be:

Rejuvenation at year 7/8	£26,100
Refurbishment at year 12	£154,500
Rejuvenation at year 19	£26,100
Refurbishment at year 24	£154,500
Total	£361,200
Average annual cost per artificial grass pitch: £361,200 ÷ 25 =	£14,448

3.6.3 If the 25 year periodic capital maintenance cost for artificial grass surfaces is applied to the total stock of full size artificial grass pitches in Scotland the following capital cost implications would arise:

Average annual cost per artificial grass pitch	£14,448
Average annual cost for national stock of 120 artificial grass pitches	£1,733,760
Total 25 year periodic maintenance costs for 120 pitches @ £361,200 per pitch	£43,344,000

Note: This total figure could be reduced initially by £4,804,200 (the sum previously identified to bring the current stock of facilities up to the Grade 3 satisfactory Standard) but once all facilities were put in good condition, the identified schedule and costs would kick in.

Fencing

3.6.4 Many early artificial grass pitches are bounded by light rolled weld mesh or chain link fences. Unfortunately, these have proved to be unable to withstand the rigours of use and are subject to deterioration behind goal areas and vulnerable to vandalism. Older facilities with low quality fencing appear to be in a position whereby it is necessary to replace parts of ball stop/boundary fencing every 3 to 5 years and, following discussions with specialist fencing suppliers, it has been assessed that those facilities with light weight weld mesh and chain link fences will need to have their fences completely replaced during the course of the 25 year projection period of this study. Recently developed artificial grass pitches have mostly been provided with higher quality fences comprising 6mm bar mesh and it is estimated that these should have a life span of approximately 25 years provided that they are not subject to extreme vandalism.

3.6.5 When replacement does become necessary, specifying a higher quality 6mm bar mesh fence would prove financially beneficial in the long term. The cost of a 3m high bar mesh fence is £145 per metre run and it is assumed that 108 of the 120 full size artificial grass pitches in Scotland will need to have their boundary fences replaced. Cost estimates are:

Replace fence around a full size (106 x 66m) artificial grass pitch with a top quality 3m high 6mm bar mesh fence @£145 per linear metre.	
344m @£145m =	£49,880
108 full size artificial grass pitches @ £49,880 per pitch	£5,387,040
Average annual cost per pitch over 25 years	£1,995

3.6.6 Given that not all artificial grass pitches will require to have their fences replaced immediately, the costs have been disaggregated over 25 years although it is likely that those facilities with light weight fences will need to have them replaced in a shorted time scale – say, 12 years. Based on a 25 year time span, the average annual disaggregated cost will be in the order of £215,481.

Floodlights

3.6.7 It is believed that all full size artificial grass pitches in Scotland are floodlit and the survey results would suggest that these lighting installations are currently in sound condition and require only appropriate routine maintenance. No immediate capital costs are believed to be necessary to bring floodlighting installations up to acceptable standards given present uses. If, however, artificial grass surfaces and uses should be changed to accommodate a different sport (say Hockey) it may be necessary to provide a higher specification lighting system, in which case capital costs would need to be incurred. No cost predictions have been made in this regard. Specialist lighting contractors have indicated that, if appropriate life cycle maintenance is carried out, lighting installations should last for the 25 year period covered by this study.

3.6.8 Using the Life Time Recommended Maintenance Schedule and costs for a 350 Lux Pitch (Appendix 3), it can be seen that the total lifetime costs for a single pitch are £85,886. If these costs are applied to the total stock of 120 full size artificial grass pitches and the total costs aggregated out over the 25 year period produces the following results:

Estimated 25 year Life Time maintenance costs for 350 LUX installation	£85,886
Average annual cost per pitch over 25 years	£3,435
Average annual cost for a national stock of 120 floodlit pitches	£412,200
Total 25 year costs for a stock of 120 floodlit pitches	£10,306,320

3.6.9 Based on the foregoing, the composite periodic maintenance costs for a national stock of 120 fenced and floodlit artificial grass pitches would be:

Average annual cost per artificial grass pitch:		
Artificial grass surfaces		£14,448
Fencing		£1,995
Floodlighting		£3,435
	Total	£19,878
Average annual cost for a national stock of 120 artificial grass pitches:		
Artificial grass surfaces		£1,733,760
Fencing		£215,514
Floodlighting		£412,252
	Total	£2,361,526
Total 25 year costs for a national stock of 120 artificial grass pitches:		
Artificial grass surfaces		£43,344,000
Fencing		£5,387,040
Floodlighting		£10,306,320
	Total	£59,037,340

3.6.10 If the national stock of artificial grass pitches was increased to 280 pitches in line with the improvement options outlined in the section on natural grass winter sports pitches, the following periodic maintenance cost implications would arise:

Average annual cost for a national stock of 280 artificial grass pitches:

Artificial grass surfaces		£4,045,440
Fencing[1]		£215,514
Floodlighting		£961,800
	Total	£5,222,754

Total 25 year costs for a national stock of 280 artificial grass pitches:

Artificial grass surfaces		£101,136,000
Fencing[1]		£5,387,040
Floodlighting		£24,048,080
	Total	£130,571,120

Note: [1] The costs for fencing remain constant because any new build pitches are assumed to have been provided with 6mm bar mesh fencing with a lifespan of more than 25 years. Therefore, only those existing pitches with fences which will need to be replaced during the 25 year study period have been costed.

3.7 Routine Maintenance of Artificial Grass Pitches

3.7.1 Many site managers have the misconception that artificial grass surfaces are maintenance free but they are not. If surface quality and playing characteristics are to be maintained and the problems identified above are to be avoided, it is essential that planned and regular maintenance in accordance with the manufacturers' recommendations is carried out. Failure to maintain any surface properly can greatly shorten the life of a carpet and require capital reinvestment more frequently than might be the case if proper maintenance is carried out.

3.7.2 Once all artificial grass surfaces have been brought up to an acceptable standard, it is essential that they are maintained in accordance with manufacturers' specifications. Each of the different surface types available might have some minor specialist maintenance treatments which are required to be carried out from time to time but, all surfaces have certain common maintenance actions which should be carried out if surface quality is to be maintained. Detailed below is an outline maintenance schedule identified by SAPCA:

Artificial Grass Pitch Maintenance Schedule

Daily - at end of the day's play.
Check fixtures and fittings. Make sure gates are shut.

Weekly
Clear leaves and rubbish from the area. Deal with any new weeds, moss or algae. Brush the surface of the pitch to redistribute sand.

Monthly
Check infill levels. Outside the fence, check and clear mowing strips and check cleanliness of access paths. Check the irrigation system if installed.

Periodically – at least every six months
Check thoroughly for moss and algae growth, food stains, etc, and remedy as appropriate. Check seams, inlaid lines etc, and report any failures to the installer.

Annually
Treat pitch with moss-killer / algaecide

Call in installer if any aspect is causing significant concern.

Note:

These are minimum recommendations. Cleaning, brushing and pitch inspection can always be done more frequently, to the benefit of the surface. Common sense and careful observation should prevail.

3.7.3 The average estimated annual cost of maintaining an artificial grass pitch is £2,600 for the specialised maintenance aspects. To this needs to be added the costs of daily and weekly inspections, litter clearance and brushing. Most facilities will have some form of on-site staff presence which can tend to the inspection and litter clearance tasks but the brushing might require to be undertaken by specialist staff. It has been assumed that an average weekly cost for this work would be in the order of £250 although it is recognised that many sites might be able to considerably reduce this cost. The indicative annual cost for maintenance is therefore estimated to be £15,100.

3.7.4 Based on the above routine maintenance cost estimates, the average annual routine maintenance cost for each full size artificial grass pitch is:

Maintenance of playing surface – per pitch per annum	£15,100

3.7.5 It is believed that the routine maintenance requirements of artificial grass pitches are broadly being met. However, in view of the deterioration of a significant number of artificial grass pitches, it is believed that, on many pitches, periodic maintenance is not being carried out to the frequencies, or in a manner, which will ensure both the preservation of high quality playing surfaces and the potential life of the surface.

3.8 Composite Annual Revenue and Periodic Maintenance Costs

3.8.1 Based on the foregoing estimated annual revenue maintenance costs for artificial grass pitches, the following cost implications would arise in respect of the national stock of 120 artificial grass pitches:

Annual maintenance cost requirements for national stock of full size artificial grass pitches; 120 x £15,100	£1,812,000
Total maintenance costs over 25 year period: £1,812,000 x 25 years	£45,300,000

Depending upon how site owners and managers treat periodic maintenance costs the following cost implications might need to be brought into account in determining annual expenditure requirements:

Average annual periodic maintenance costs for national stock of 120 full size artificial grass pitches	£2,361,526
25 Year periodic maintenance cost requirements for national stock of 120 full size artificial grass pitches	£59,037,340

3.8.2 If the national stock of artificial grass pitches is increased to 280 by the conversion of 160 full size mineral pitches to artificial grass, the total cost implications for routine and periodic maintenance would be:

Annual maintenance cost requirements for national stock of full size artificial grass pitches; 280 x £15,100	£4,228,000
Total maintenance costs over 25 year period: £4,228,000 x 25 years	£105,700,000

Depending upon how site owners and managers treat periodic maintenance costs, the following cost implications might need to be brought into account in determining annual expenditure requirements:

Average annual periodic maintenance costs for national stock of 280 full size artificial grass pitches	£5,222,754
25 Year periodic maintenance cost requirements for national stock of 280 full size artificial grass pitches	£130,571,120

3.9 Conclusion

3.9.1 From the foregoing it can be seen that the while the condition of the national stock of some 120 full size artificial grass sports pitches is not as serious as is the case with natural grass pitches, only 45% meet the Grade 3 Satisfactory Standard. It is estimated that approximately £4.8m needs to be spent on bringing these facilities up to the required standard.

3.9.2 Given the high levels of capital investment involved in making these provisions and the benefits which they can bring to sport in terms of quality of playing surface, volume of use and hours of operation, it is worrying that more than half of facilities are failing to meet the identified Grade 3 Satisfactory Standard. It is essential that all artificial grass facilities are maintained appropriately, and it is believed that, while routine maintenance is probably adequate, insufficient funds are being invested in periodic maintenance of the playing surfaces and associated facilities such as floodlighting and ball stop fencing. The estimated national annual expenditure requirement to maintain the stock of 120 full size artificial grass pitches is £1.8m to which should be added some £2.4m annually for periodic maintenance.

3.9.3 Although the costs of annual and periodic maintenance regimes may appear high, if appropriate schedules are implemented, the life of facilities can be extended resulting in long term capital expenditure savings.

3.9.4 The national stock of artificial grass pitches will increase steadily to meet demands and as a result of PPP/PFI schools initiatives, NOF and **sport**scotland funding. These developments could impact quite quickly on capital programmes and revenue expenditure requirements although, in theory, those artificial grass pitches which have been, or will be constructed under PPP/PFI should have adequate funds allocated to them through the inbuilt management contracts to ensure proper life cycle maintenance, but this has yet to be demonstrated. It is the facilities which

might be created by other funding means which give cause for concern in view of the audit findings. Providers need to be aware that the periodic capital costs associated with maintaining a facility (rejuvenation and refurbishment of artificial grass surfaces and periodic maintenance of fencing and floodlights) over 25 years are approximately 4% more than the initial capital costs of providing the facility and that ongoing routine maintenance costs up to £15,100 per pitch per annum need to be incurred also.

Part 3.4

Multi-Courts and Multi-Use Games Areas

4 Multi-Courts and Multi Use Games Areas

4.1 Pitch and Sports Requirements

4.1.1 For the purposes of this study, Multi-Courts and Multi Use Games Areas are small sized areas used primarily for playing and practicing sport. These sports areas may be enclosed with a ball stop fence or ball rebound wall or may be open. Playing surfaces might be tar macadam, porous concrete, polymeric or artificial grass.

4.1.2 Multi-sports surfaces can provide a cost effective solution for schools and other facilities or organisations which have a wide range of sporting demands. However, it is this range of demands which causes a need for facilities to be as multi-purpose as possible and this in turn leads to a need for compromise, particularly in terms of dimensions and the playing characteristics of the surface.

4.1.3 Sport England and the Sport and Play Construction Association (SAPCA) have recently produced a series of guidance notes on Multi Use Games Areas (MUGAs) and Multi-sport Synthetic Turf Pitches (STP). This guidance defines a MUGA as any facility of less than 3000m^2 surfaced with macadam, polymeric or synthetic turf areas. This broad definition has been adopted for the audit.

4.1.4 Part 1 of the guidance identifies five different types of facility. These are:

Type 1 MUGA

Open textured porous macadam areas used for ball rebound sports where tennis is the priority and sports such as mini-tennis, netball, and basketball are secondary users. These areas are suitable for wheelchair sports although care is needed in warm weather during the first year of use.

Type 2 MUGA

Open textured porous macadam areas used for ball rebound sports where netball is the priority and sports such as tennis, mini-tennis, and basketball are secondary users. These areas are suitable for wheelchair sports although care is needed in warm weather during the first year of use.

Type 3 MUGA

Polymeric surfaced areas used for ball rebound sports where netball is the priority and sports such as tennis, mini-tennis, and basketball are secondary users. These areas are suitable for wheelchair sports.

Type 4 MUGA

Polymeric surfaced areas used for five-a-side football, basketball and general sports and recreational training and play. Due to their greater shock absorbency and lower surface friction these areas are not recommended for tennis or netball.

Type 5 MUGA /STP

Synthetic turf areas (STPs) surfaced with a shockpad and either sand filled or sand dressed synthetic turf or a needle-punch carpet. The areas are used for sports such as hockey, uni-hockey, five-aside football, football, lacrosse, American football and training for activities such as athletics and rugby union and rugby league.

4.1.5 The most commonly played sports on multi-sports games areas are tennis, mini-tennis, netball, basketball, football, five-a-side football and hockey but they might also be used for training or for activities such as touch rugby, athletics practice, volleyball and roller hockey. There is no one surface which provides the performance requirements of all of the above mentioned sports and certain surface types are more suitable than others for different sports. Appendix 4 is a table included in the Sport England/SAPCA guidance note which identifies the general suitability of the main types of playing surface for different sports. These are explained below.

Macadam Surfaces

4.1.6 Macadam surfaces may take the form of *dense* or *porou*s macadam. Whilst the former may provide a more durable surface and is typically laid on school playgrounds etc; its inability to drain is a major constraint on sports use. For this reason porous macadam is considered more suitable and can be played on in most weather conditions year round.

4.1.7 Porous macadam courts may be colour coated to improve aesthetics and the playing environment. This is achieved by either using pigmented materials to form the macadam or by painting the un-pigmented surface after installation. Although the use of pigmented macadam may be initially higher the increased durability of the colour may make it more suitable for areas of high use.

Polymeric Surface

4.1.8 Polymeric surfaces have a degree of inherent shock absorption, which may be varied by increasing the thickness of the surfacing layer or altering the composition of the polymeric materials. To provide the high degree of slip resistance required by sports such as tennis and netball a specially modified final coating can be applied, although the use of this surface for ball contact sports will cause a rapid reduction in its slip resistance. For

this reason, combining sports such as five-a-side football and netball is not recommended.

4.1.9 Thicker forms of the surface may be specified where the intended sports include five-a side, football or athletics' training. This type of polymeric is also capable of taking a running shoe spike.

4.2 Types of Synthetic Turf Surface

4.2.1 As explained in the previous section, there are many different types of synthetic turf construction with a range of properties, and advantages and disadvantages. Variables include the polymer used for the fibre yarn (such as polyolefin and nylon), the cross-sectional area of the individual ribbons of fibre, the method of carpet manufacture, the pile height and pile density. Two principal designs are offered for multi-sports areas, those with a vertical pile of tufted, woven or knitted construction that is supported with a sand filling or dressing and those with an interlocking pile of needle-punch construction that are also filled or dressed with sand.

4.2.2 The majority of synthetic turf pitches are surfaced with tufted sand filled carpets. Experience has shown this form of carpet to have good durability and performance when used in the extreme wear conditions experienced on MUGAs. Sand-dressed carpets are a more recent innovation. They have a shorter, denser pile than the standard filled systems with a reduced quantity of sand fill and are primarily suited for MUGAs where hockey is the primary sport. Needle-punched carpets offer benefits of increased sand stability within the pile and higher drainage characteristics.

4.2.3 Artificial grass surfaces often have a shockpad which is a resilient layer introduced between the base and the playing surface. This is used to provide a degree of comfort to players and to create the required playing characteristics for specific sports. The most common components are rubber crumb/shred mixed with a resin binder although there are other types which have been developed to suit particular performance characteristics.

4.2.4 The type and thickness of shockpad chosen will be dictated by the priority sport, although several different options may be able to provide a surface that complies with the requirements in terms of playing characteristics. Experience has shown that the intensity of use of a MUGA can initiate carpet movement when a smooth surfaced shockpad is used.

Multi-Courts and Multi Use Games Areas Classification Grades

4.2.5 As with artificial grass pitches, three grades were identified against which to assess the condition of multi-courts and multi use games areas. These are:

Grade 1 - Requires Replacement or Refurbishment;
Grade 2 - Requires Patching or Rejuvenation;
Grade 3 - Satisfactory Standard.

4.2.6 A Grade 3 - Satisfactory Standard facility is one which has been constructed in accordance with recognised technical and performance specifications and has been maintained appropriately so that the required performance and playing characteristics have been preserved.

4.2.7 A Grade 2 - Requires Patching or Rejuvenation standard facility is identified as one where the Bitmac or concrete surface has deteriorated and requires to be patched or where the polymeric or artificial grass surface is 'tired' and unable to deliver the required performance characteristics. In the case of the latter, the actions necessary to rejuvenate the surface have been described in the section on artificial grass surfaces.

4.2.8 A Grade 1 - Requires Replacement or Refurbishment standard facility is identified as one where the tarmac or concrete playing surface has deteriorated to such an extent that it requires to be replaced/rebuilt or where artificial grass or polymeric surfaces need to be replaced as described in the section on artificial grass surfaces.

4.3 Audit Findings

4.31 The Audit surveyed 202 multi-courts and multi use games areas which were constructed as follows:

Table 15
Audit Results: Multi-Courts and Multi Use games Areas Surface Types

Surface Type	Grade 1	Grade 2	Grade3	Total	%
Unknown	4	9	56	**69**	34%
Bitmac	2	14	31	**47**	23%
Sand Filled AG	6	3	37	**46**	23%
Concrete	2	3	11	**16**	8%
Mineral	7	4	1	**12**	6%
Sand/Rubber AG		1	3	**4**	3%
Non-sand Fill	1	1	5	**7**	3%
Polymeric			1	**1**	1%
Total	**22**	**35**	**145**	**202**	100%
%	**11%**	**17%**	**72%**	**100%**	

4.3.2 The audit identified that 28% of multi-courts and multi use games areas fell below the Grade 3 Satisfactory standard. This is probably a result of the types of construction and the young age of many of the artificial grass surfaces.

4.3.3 The responses received included many school playgrounds and hard surface areas used primarily for play purposes. For costing purposes, the study has only considered those facilities which are primarily used for sport – facilities such as school playgrounds which serve wider purposes have been excluded from considerations because of the difficulties associated with identifying their primary purposes and the types of surface most appropriate to them.

4.3.4 Assuming a 20% response rate, it is assumed that nationally there are some 1,010 multi-courts and multi use games areas. The following assumptions have been made in the aggregation and subsequent costing processes:

1 All unknown surfaces have been assumed to be Bitmac.
2 50% of Bitmac surfaces are in schools and are not primarily sports facilities.

Table 16
Interpolated Condition of National Stock of Multi-Courts and MUGAs

Surface Type	Grade 1	Grade 2	Grade 3	Total	%
Bitmac (Total)	24	170	376	**570**	56%
Bitmac primarily used for sport (50%)	(12)	(85)	(188)	**(285)**	
Sand Filled AG	30	15	185	**230**	23%
Concrete	10	15	55	**80**	8%
Mineral	35	20	5	**60**	6%
Sand/Rubber AG		8	22	**30**	3%
Non-sand Fill	4	4	22	**30**	3%
Polymeric			10	**10**	1%
Total	**103**	**232**	**675**	**1010**	100%
	(91)	**(147)**	**(477)**	**(715)**	

4.4 Improvement Proposals

4.4.1 Based upon the interpolated condition survey results, costs have been identified for a range of improvements suited to the surface type and the assumed uses to which the surfaces are put. A number of assumptions have been made in identifying the proposed works:

1 It has been assumed that 50% of Bitmac MUGAs are located in school sites or recreation areas and are not true sports facilities. Therefore, only half of the Bitmac surfaces have been identified for treatment.

2 Of the sports related Bitmac MUGAs, it has been assumed that rather than reinstate to their previous condition, 10% would be converted to polymeric surfaces and 10% to artificial grass surfaces. The remaining Bitmac surfaces would be put in good order.

3 Since mineral surfaces have been identified as being no longer suitable for sports purposes, it has been assumed that they would be converted to artificial grass.

4 While the sizes of multi-courts and MUGAs vary considerably, for simplicity, it has been assumed that all facilities have an area of 650m^2.

Bitmac Surfaces

4.4.2 Only half of the 570 Bitmac surfaces are considered to be primarily sports surfaces. Of the estimated 285 Bitmac sports surfaces, it has been assumed that 28 would be converted to polymeric and 28 to artificial grass.

Table 17
Bitmac Multi-Courts and MUGAs Condition Survey Results

Surface Type	Grade 1	Grade 2	Grade 3	Total	%
Bitmac (Total)	24	170	376	**570**	56%
Bitmac primarily used for sport (50%)	(12)	(85)	(188)	**(285)**	
%	4%	30%	66%	**100%**	

4.4.3 Assuming that major conversion works would only be carried out on facilities which are below the Grade 3 Satisfactory Standard; this would have the effect of taking all of the Grade 3 courts out of consideration and reducing the number of Grade 2 courts requiring treatment to 41.

4.4.4 Indicative costs for the various types of work which might need to be carried out are:

a) Patch Bitmac Surface

Patch 650m^2 Grade 2 Bitmac courts assuming an average of 25% dilapidation per court.	
Cost per court = 165m2@ £25.75 m2	£4,248
41 Bitmac courts @ £4,120 per court	£174,168

b) Convert Bitmac area to sand filled artificial grass

Details	**Qty**	**Cost/m^2**
Punch drainage holes in Bitmac	1	£2.05
Power wash surface	1	£0.75
Sand filled synthetic grass with shockpad	1	£24.20
Cost per square metre		£27.05
Cost per 650m^2 court		£17,582
Convert 28 Bitmac courts to SFAG@ £17,582 per court		£492,296

c) Convert Bitmac area to polymeric surface

Details	**Qty**	**Cost/m^2**
Punch drainage holes in Bitmac	1	£2.05
Power wash surface	1	£0.75
Lay Polymeric Multi Play Surface	1	£ 28.00
Cost per square metre		£ 30.80
Cost per 650 m^2 court		£ 20,020
Convert 28 Bitmac courts to polymeric @ £20,020 per court		£560,560

4.4.5 The total estimated costs of improving or upgrading the stock of Bitmac courts would be:

Patch 41No. 650m^2 Bitmac areas @ £4,248 per court	£ 174,168
Convert 28 No. 650m^2 Bitmac areas to sand filled artificial grass @ £17,582 per court	£ 492,296
Convert 28 No. 650m^2 Bitmac areas to polymeric @ £20,020 per court	£ 560,560
Total	**£1,227,024**

Mineral Surfaces

4.4.6 A total of 60 multi-courts and MUGAs have mineral surfaces.

Table 18
Mineral Multi-Courts and MUGAs Condition Survey Results

Surface Type	Grade 1	Grade 2	Grade 3	Total	%
Mineral	35	20	5	**60**	6%
%	58%	33%	9%	**100%**	

4.4.7 While it would be possible to improve Grade 1 and Grade 2 surfaces to Grade 3, mineral surfaces are no longer considered to be entirely suitable and it is therefore recommended that these be converted to artificial grass – half sand filled surfaces and the remainder to 3rd Generation artificial grass. The works programmes required for conversions have previously

been described in the section on Winter Sports pitches. It is probable that some of the identified mineral multi-courts are former mineral tennis courts which have been reutilised for general use. Indicative costs are:

Convert 650m^2 mineral court to sand filled artificial grass @ £56.62 m^2 = £36,803 per court 30 No. mineral courts @ £36,803 per court =	£1,104,090
Convert 650m^2 mineral court to a dynamic 3rd Generation artificial grass @ £44.70 m^2 = £29,055 per court 30 No. mineral courts @ £29,055 per court =	£871,650
Total	**£1,975,740**

Porous Concrete Multi-Courts and MUGAs

4.4.8 It is estimated that there are some 80 porous multi-courts in Scotland of which some 30% are below the identified Grade 3 Satisfactory Standard. Some of these courts are probably former tennis courts which have been allowed to lapse into multi-use.

Table 19
Porous Concrete Multi-Courts and MUGAs Condition Survey Results

Surface Type	Grade 1	Grade 2	Grade 3	Total	%
Concrete	10	15	55	**80**	8%
%	**12%**	**19%**	**69%**	**100%**	

4.4.9 Deterioration of porous concrete surfaces can manifest itself in three main ways:

- Surface 'Bossing' where the top surface of the court has become detached from the under lying layer causing the playing surface to rise up and eventually break up.
- Panel settlement – where the porous concrete which is laid in panels with expansion joints settles and a 'step' forms at the junction with the adjacent panel.
- The surface can become impervious due to contamination of organic material.

4.4.10 In either of the first two cases, the minimum amount of work that would be entailed would be the breaking up and removal and replacement of the entire panel that had a fault. In the last case in may be possible to clean the surface through applications of algaecide and power washing.

4.4.11 Where there is more than one panel requiring attention it is often not considered worthwhile repairing the court (there is a lack of expertise now in laying this type of surface) and often the solution is to break up the porous concrete add a layer of clean stone and lay a porous Bitmac layer

over the surface. It would probably be advantageous to lay an artificial grass surface.

4.4.12 In view of the difficulties likely to arise in attempting to repair porous concrete surfaces, it is suggested that those which fall below the Grade 3 – Satisfactory Standard be converted to sand filled artificial grass. Works actions and cost implications would be:

4.4.13 The process for reconstructing porous concrete courts to new sand filled artificial grass would involve the following works:

Details	**Qty**	**Cost/m^2**
Break up and regrade the concrete surface	1	£2.80
Supply and lay new pc kerb	1	£1.65
Supply and lay 50 mm clean stone	1	£ 2.60
Supply and lay new Bitmac layer	1	£ 7.50
Supply and lay new sand filled carpet and shockpad	1	£24.20
		£38.75
Cost per 650 m^2 court		£ 25,190
Convert 25 Bitmac courts to sand filled artificial grass @ £25,190 per court =		**£629,750**

Polymeric Multi-Courts and MUGAs

4.4.14 The Audit results indicate that there are only approximately 10 polymeric multi-courts and MUGAs in Scotland although it is probable that there are more facilities than the results indicate.

Table 20
Polymeric Multi-Courts and MUGAs Condition Survey Results

Surface Type	Grade 1	Grade 2	Grade 3	Total	%
Polymeric			10	**10**	1%
%			100%	**100%**	

The audit would seem to indicate that these are in satisfactory condition and, therefore, provided that they are maintained appropriately, no immediate capital expenditure will be required.

Artificial Grass Surfaces

4.4.15 There would appear to be approximately 290 artificial grass multi-courts in Scotland with surfaces comprising sand fill, sand/rubber fill and non-sand fill. Sixty-one (21%) of these multi-courts fall below the Grade 3 Satisfactory Standard.

Table 21
Artificial Grass Multi-Courts Condition Survey Results

Surface Type	Grade 1	Grade 2	Grade 3	Total	%
Sand Filled AG	30	15	185	**230**	23%
Sand/Rubber AG		8	22	**30**	3%
Non-sand Fill	4	4	22	**30**	3%
Total	**34**	**27**	**229**	**290**	
	12%	**9%**	**79%**	**100%**	

4.4.16 The actions required to refurbish or rejuvenate artificial grass surfaces have been explained in detail in the section on Artificial Grass Pitches and the works schedules identified can be adapted to suit the requirements of smaller size multi-courts.

4.4.17 The refurbishment process for artificial grass pitches has previously been described. Depending on the type of carpet surface cost can vary:

Sand Filled Carpet - £ 17.50 m^2
3rd Generation - £ 21.80 m^2
Sand Dressed – £ 19.50 m^2

4.4.18 It is assumed that where a replacement takes place there is no requirement to replace the shockpad if one is installed. The costs also allow for disposal of the existing carpet. For cost estimate purposes, the rate for a 3rd Generation surface (£21.80 m^2) has been used.

Cost to refurbish 650 m^2 court @ £21.80 m^2 £14,170
Refurbish 34 courts @ £14,170 per court £481,780

4.4.19 The rejuvenation has also been previously described and a cost of £4.35m^2 has been used to calculate costs.

Cost for 650 m2 court @ £4.35 m2 £2,827
Rejuvenate 27 courts @ £2,827 per court £76,342

Total costs **£558,122**

Fencing

4.4.20 Multi-courts and MUGAs have often been enclosed using light weld mesh or chain link fencing. The types of use which these facilities cater for can be hard on ball stop/surround fencing and major repair and replacement on a regular basis is frequently required. As has been suggested for full size pitches, an improved specification using 6mm diameter bar mesh would have much greater longevity. It has been assumed that all courts would need to have their fences replaced once in 25 years.

Cost to replace fencing around a 650 m2 court @ £145 m^2 £15,660

Replace fencing around courts 715courts @ £15,660 per court **£4,046,900**

Lighting

4.4.21 Many multi-courts and MUGAs have floodlights which allow increased use and greater programming flexibility. Where a charge is applied for the use of the facility, the income which might be generated from extended hours of operation can help to offset running costs.

4.4.22 Where sports specific facilities have been provided, lighting systems which meet the requirements of the intended sport(s) will probably have been installed. In other cases a generic lighting system is likely to have been installed. Audit returns would seem to indicate that lighting systems associated with multi-courts and MUGAs are generally in sound condition and no significant immediate capital investment is identified as being necessary. If appropriate routine maintenance schedules are adhered to, there should be no need to incur additional major costs during the time frame for this study.

4.5 Multi-Courts and MUGAs – Combined Capital Costs

4.5.1 The estimated combined capital costs required to bring the nations stock of multi-courts and MUGAs used primarily for sport up to a uniform acceptable standard is:

Bitmac surfaced courts	£1,227,024
Convert mineral surfaced courts to polymeric/artificial grass	£1,975,740
Porous concrete surfaced courts	£629,750
Polymeric surfaced courts	Nil
Artificial grass surfaced courts	£558,122
Replace/repair fencing	£4,046,900
Repair/replace floodlighting	Nil
Total	**£8,437,536**

4.5.2 The capital estimated to be required to bring the nations stock of multi-courts and MUGAs up to acceptable standards are quite modest given the number of facilities which exist. Indeed, apart from mineral surfaces, playing surfaces would seem to be in quite good condition. This is probably a reflection of the longevity of tar macadam and porous concrete hard surface areas and the relative newness of polymeric and artificial grass facilities. The major cost identified above and associated with Bitmac surfaces relates to the conversion of sub standard tarmac surfaces to artificial grass. While, in an ideal situation, all Bitmac facilities would be converted to polymeric or artificial grass because of their greater suitability for sport, it has not been considered possible to justify the expense as part of an exercise designed to bring all existing facilities up to an acceptable standard.

4.5.3 The point should be emphasised that, of all the surfaces considered under the multi-courts and multi-use games areas heading, Bitmac is the longest lasting and requires the least maintenance. However, it is an unforgiving surface for many sports and for this reason conversion to artificial grass, a

more suitable sports surface with player friendly characteristics, has been recommended if significant expenditure on remedial works is required.

4.5.4 The biggest long term capital cost problem identified was in respect of fencing around courts. While the costs involved with bringing fencing up to a suitable, long lasting standard are considerably more than those identified as being necessary to improve court surfaces, once improved, little further expenditure should be required over the period to 2028.

4.6 Ongoing Refurbishment and Periodic Maintenance

4.6.1 The requirements for ongoing major expenditure will depend upon the type of surface provided. It has been assumed that those Bitmac and porous concrete facilities which are, or have been upgraded to Grade 3 – Satisfactory Standard, will remain usable for the period to 2028. Similarly, mineral surfaces which meet the Grade 3 standard should remain usable provided that they are maintained appropriately. However, artificial grass and polymeric surfaces will need to be rejuvenated and refurbished at regular intervals.

4.6.2 The rejuvenation and refurbishment processes for artificial grass have been previously described. Given the smaller areas of multi-courts and MUGAs and the higher intensity of use which they will experience, it is expected that on average, over a 25 year period, an artificial grass multi-court or MUGA will require two rejuvenation and two refurbishment processes:

Year 1	New
Year 5	Rejuvenation
Year 10	Refurbishment
Year 15	Rejuvenation
Year 20	Refurbishment

4.6.3 If implemented, the improvement proposals for multi-courts and MUGAs identified previously would see the stock of artificial grass surfaces standing at:

Substandard Bitmac surfaces converted to artificial grass	28
Substandard mineral surfaces converted to sand filled artificial grass	60
Substandard porous concrete surfaces converted to artificial grass	25
Existing artificial grass surfaces	290
Total	**398**

4.6.4 Using the rates of £4.35m^2 for rejuvenation and £22.75m^2 for refurbishment, the following periodic cost implications would arise:

Rejuvenate each 650m^2 sand filled artificial grass court two times @ £2,827 per treatment =	£5,654
Refurbish each 650m^2 sand filled artificial grass court twice @ £14,787 per treatment =	£29,575
Total	£35,229

If these costs are aggregated over 25 years, the average annual cost for periodic maintenance will be £1,409 per court.

4.6.5 When applied to the potential stock of artificial grass multi-courts and MUGAs the cost implications would be:

Rejuvenate 398 No. 650m^2 sand filled artificial grass courts two times @ £2,827 per treatment =	£2,250,292
Refurbish 398 No. 650m^2 sand filled artificial grass courts twice @ £14,787 per treatment =	£11,770,452
Total	**£14,020,744**

If these costs are disaggregated over 25 years, the average annual national cost for periodic maintenance would be £560,829.

4.6.6 Polymeric courts also have periodic maintenance requirements. A newly-laid surface should give firm foothold and good medium-paced ball speed. As the surface is used over the years, however, it will become smoother and more polished and this may result in increased ball speed and some impairment of the foothold when the surface is damp. When this happens it will be time for the surface to be re-coated/retextured. Re-texturing will normally need to be carried out every four years and can only usually be carried out on three occasions before the surface water infiltration rates are reduced below an acceptable standard. Once this stage has been reached, the surface must be drilled and a new surface laid. On this basis, each polymeric court would follow the following periodic maintenance schedule:

Year 1	New
Year 4	Retexture
Year 8	Retexture
Year 12	Retexture
Year 16	Lay new surface
Year 20	Retexture
Year 24	Retexture

The cost implications would be:

Retexture 650m2 court @ £5.25m2 = £3,412	
5 No. retextures @ £3,412	£17,062
Resurface 650m2 court @ £28m2 =	£18,200
Total 25 year periodic maintenance cost per court	£35,262
Average annual cost over 25 years	£1,410

4.6.7 If applied to the assumed stock of 38 polymeric courts after improvement, the following cost implications would arise:

25 year periodic maintenance costs for 38 polymeric courts @ £35,262 per court =	**£1,339,956**

If these total national costs are disaggregated over 25 years, the average national annual cost would be £53,598.

4.6.8 Total periodic maintenance costs for all artificial grass and polymeric courts are estimated to be:

Artificial grass courts	£15,146,288
Polymeric courts	£1,339,956
Total	**£16,486,244**

Based on these figures, the total national periodic maintenance costs disaggregated costs over 25 years would be £659,449

4.7 Maintenance of Multi-Courts and MUGAs

4.7.1 The routine maintenance requirements for multi-courts and MUGAs will vary according to the type of surface finish. Costed outline maintenance schedules are provided below.

Bitmac Facilities

4.7.2 Bitmac facilities are hard wearing and require relatively little maintenance. The main requirements are to keep the area free from debris, prevent moss and algae forming and ensure that the interstices of the surface do not become clogged thus impairing drainage. An annual maintenance schedule might include the following procedures:

Daily
- Check facility, fixtures and fittings.
- Remove litter and debris as required

Weekly
- Clear leaves and rubbish from the court.

Monthly
- Deal with any moss or algae.

Annually
- Wash the court.
- Apply moss-killer
- Re-paint lines as required.

4.7.3 Cost estimates for the above schedule have been based upon the assumption that the daily and weekly maintenance requirements will be carried out by on-site staff and that their costs are already provided for. However, monthly and annual maintenance requirements, it has been assumed, will be carried out by skilled personnel visiting the site specially. It has been assumed that the cost of each monthly visit would be £100 and the cost of annual moss/algae removal and power wash would be £1,209 per court based on a rate of £1.85m^2. Estimated annual costs per court would be:

12 No. monthly visits @ £100 per visit =		£1,200
Algae/Moss removal and power wash		£1,209
	Total	£2,409

If these costs are applied to the assumed residual stock of 203 Bitmac courts the cost implications would be:

Maintain 203 No. Bitmac courts @£2,409 per court per annum = **£489,027**

Porous Concrete Facilities

4.7.4 While porous concrete courts are hard wearing and need very little maintenance, it is critical that the required maintenance actions are carried out if the court is to remain free draining. It is important that vegetable matter and debris are removed from the court otherwise the free drainage of the structure will be impaired. A typical maintenance schedule might comprise:

Daily
Check facility, fixtures and fittings.
Remove litter and debris as required

Weekly
Clear leaves and rubbish from the court.

Monthly
Deal with any moss or algae.

Annually
Wash the court.
Apply moss-killer
Re-paint lines as required

4.7.5 The annual cost implications of the above schedule are similar to those identified for Bitmac surfaces at an annual cost of £2,409 per court per annum. If applied to the assumed residual stock of 55 porous concrete courts the following cost implications arise nationally:

Maintain 55 No. porous concrete courts @£2,409 per court per annum = **£132,495**

Polymeric Surfaced Facilities

4.7.6 Polymeric surfaces are comparatively easy to maintain, keeping the surface clean being the only routine maintenance that the court surface should require. A typical maintenance schedule might comprise:

Daily
Check facility, fixtures and fittings.
Remove litter and debris as required.

Weekly
Remove dust, leaves, rubbish and other detritus from the surface.

Monthly (or thereabouts depending upon the cleanness of the surface).

Wash the surface, removing stains with a mild detergent and soft brush.

Annually
Check the court surface carefully. Call in the installer if there is any cause for concern or it is suspected that the surface needs re-coating.

4.7.7 Cost estimates for the above schedule have been based upon the assumption that the daily and weekly maintenance requirements will be carried out by on-site staff and that their costs are already provided for. It has been assumed that monthly maintenance works will be carried out by skilled personnel visiting the site specially. It has been assumed that the cost of each monthly visit would be £250. Annual costs per court would be:

12 No. monthly visits @ £250 per visit =		£3,000
	Total	**£3,000**

If applied to the assumed residual stock of 38 polymeric courts the following cost implications would arise nationally:

Maintain 38 No. polymeric courts @ £3,000 per court per annum = **£114,000**

Artificial Grass Surfaced Facilities

4.7.8 Maintenance of artificial grass courts is particularly important and neglecting the recommended schedule could have serious long-term consequences even if, in the shorter term, the court does not appear to suffer. Maintenance need not be time-consuming or onerous, but its benefits are profound. To omit the recommended processes may result in a court ceasing to drain at half-life or sooner. A typical routine maintenance schedule is shown below:

Daily.
- Check facility, fixtures and fittings.
- Remove litter and debris as required

Weekly
- Clear leaves and rubbish from the court.
- Deal with any new weeds, moss or algae.
- Brush the surface to redistribute in-fill.

Monthly
- Move sand which accumulates in corners etc. and redistribute.
- Check sand levels.

Periodically - at least every six months.
- Check for moss and algae growth etc. and remedy as appropriate.
- Groom with a rotary brush/vacuum

Annually
- Treat court with moss-killer / algaecide.
- Call in the installer if any aspect is causing significant concern.

Note:
- These are minimum recommendations. Cleaning, grooming and court inspection can always be done more frequently.

4.7.9 The estimated annual cost of routine maintenance for a typical 650m^2 artificial grass multi-court is £6,450. It has been assumed that weekly visits to brush the surface will be undertaken as part of a schedule of works

carried out by an area maintenance team and, as such a cost of £100 per visit has been estimated. The costs of the other visits to move accumulations of sand and to treat for algae and moss have been estimated at £1,250.

4.7.10 It is appreciated that these costs are high compared with what is currently spent on maintenance of multi-courts and MUGAs but it is essential that prescribed schedules are adhered to if standards are to be maintained and surfaces are to achieve their potential lives. Many site managers will be able to improve on these maintenance costs through economies of scale or by using on site staff to carry out various functions.

4.7.11 If applied to the assumed national stock of 398 artificial grass courts the following cost implications would arise nationally:

Maintain 398 No. artificial grass courts @ £6,450 per court per annum =	**£2,567,100**

Floodlighting

4.7.12 Floodlighting needs to be routinely maintained if it to meet the performance requirements effectively over its working life. Maintenance actions should include routine work on the electrical services, cleaning of fittings and adjustment of aiming angles. When performance falls below the specified level or when individual lamps fail, all lamps should, ideally, be replaced as a complete set and not as individual units. Appendix 3 details indicative 25 year maintenance schedules and costs for floodlight installations. From this it can be seen that the estimated total 25 year maintenance costs are £35,886. This averages out at £1,435 a year. If applied to all multi-courts and MUGAs with floodlights, the total costs are:

25 Year maintenance costs for floodlights	£35,886 per court
Average cost per court a year	£1,435
Total 25 year costs for all courts with floodlights 61 courts x £35,886 per court	£2,189,046
Average national cost per year for all courts with floodlights	£87,535

4.8 Composite Revenue Costs

4.8.1 The composite estimated annual revenue costs for multi-courts and MUGAs are:

Bitmac surfaces	£489,027
Porous concrete surfaces	£132,495
Polymeric surfaces	£114,000
Artificial grass surfaces	£2,567,100
Floodlights	£87,535
Total	**£3,390,157**

4.8.2 The total 25 year periodic maintenance costs for artificial grass and polymeric courts are estimated to be:

Artificial grass courts		£15,146,288
Polymeric courts		£1,339,956
	Total	**£16,486,244**

This aggregates out at £659,449 pa over the 25 year period.

4.9 Conclusion

4.9.1 It is estimated that there are more than 1000 multi-courts and MUGAs in Scotland with some 700 of them fulfilling an important formal sporting purpose to some degree. The most common surfaces are Bitmac and artificial grass, with Bitmac making up approximately 56% of surfaces. Bitmac and porous concrete surfaces are long lasting and comparatively low maintenance but not as player friendly as artificial grass and polymeric surfaces. The improvement proposals made in respect of multi-courts and MUGAs suggest that Bitmac, porous concrete and mineral courts which fall below the Grade 3 Satisfactory Standard should be converted to artificial grass or polymeric surfaces. These proposals are made on the basis of sports performance characteristics and player comfort but it is recognised that they are more expensive to maintain than hard surfaces such as Bitmac.

4.9.2 Approximately 50% of courts fell below the Grade 3 – Satisfactory Standard and the total costs required to put them in a suitable condition is estimated at £8.4m and thereafter annual periodic maintenance costs of £16.5m over 25 years (average of £659,449 pa.) would need to be spent on artificial grass and polymeric courts. However, creating quality facilities is only one part of the cost equation; once created, facilities need to be maintained properly. The total national cost estimate for maintenance of £3.4m is almost certainly considerably more than is currently being spent by site managers and it will be a challenge for them to find sufficient resources to meet the desired standards.

Part 3.5

Tennis Courts

5 Tennis Courts

5.1 Court and Sports Requirements

5.1.1 For the purposes of this study, tennis courts are defined as those facilities designed primarily for use for the playing of tennis, although some playing areas might occasionally be used for other sports purposes such as netball, basketball and five-a-side football.

5.1.2 A number of different surfaces have been developed or adapted for the playing of tennis. These include:

- Bitmac or Macadam surfaces come in a variety of forms. Sealed Bitmac surfaces complying with BS 4987 are not normally free draining and shed water by means of a fall or slope in the construction. Porous Bitmac surfaces allow water to permeate through the construction medium.

  Bitmac surfaces can have a colour acrylic or polyurethane finish coat applied to improve both the aesthetics and performance of the surface. Porous surfaces can also be finished with a grey-green natural coloured natural grit but this is a light-duty surface type and not recommended for heavy use areas.

- Porous concrete surfaces are very durable and hard wearing, allow play throughout the year and provide a safe foothold on a slow to medium surface. The surface can be coloured by the addition of pigment to the cement during construction or the application of an acrylic colour coating after the surface has cured.

- Acrylic surfaces comprise a sub-base of asphalt or concrete overlaid with multiple layers of coloured acrylic surfaces which may incorporate cushioned layers to improve player comfort. Acrylic courts are impervious and rely on a cross fall to shed water. In the wet Scottish climate this can be a distinct disadvantage. There are very few acrylic surfaced courts in the UK.

- Mineral surfaces (also known as shale, clay and blaes) provide slow surfaces which require high levels of maintenance. Mineral surfaces have been very popular in Scotland but have been steadily replaced by harder wearing surfaces with lower maintenance requirements. However, at the upper performance levels of the sport, clay is an acceptable surface and there is a small number of high quality surfaces which aim to replicate the international surfaces used in the USA and on the continent.

- Polymeric surfaces comprise a mixture of rubber in a polyurethane binder laid on an open-textured porous Bitmac surface. They can be impervious or porous and cushioning can be incorporated into

the construction to provide a more comfortable surface than say Bitmac or porous concrete. Polymeric surfaces are not affected by frost, can be played on throughout the year and are virtually maintenance free.

- Pre fabricated plastic tiles have been used in a limited number of cases, usually to resurface a worn out hard courts. The court is playable throughout the year and required very little maintenance. Some products have tended to be slippery when wet.

- Artificial grass can be of the sand filled (by far the most popular) or non-sand filled methods. No non-sand filled tennis surfaces for outdoor use have been laid in Scotland.

- Sand filled artificial grass provides ball reaction similar to natural grass, it being fast and low. The surface is usually laid on porous straight-run Bitmac and, while water may drain rapidly, it can take some time for the surface to dry out with resultant impacts on balls and rackets.

5.2 Tennis Courts Condition Classification Grades

5.2.1 Three grades were identified against which to assess the condition of tennis courts. These are:

Grade 1 - Requires Replacement or Refurbishment;
Grade 2 - Requires Patching or Rejuvenation;
Grade 3 - Satisfactory Standard.

5.2.2 A Grade 3 - Satisfactory Standard court is one which has been constructed in accordance with recognised technical and performance specifications and has been maintained appropriately so that the required performance and playing characteristics have been preserved.

5.2.3 A Grade 2 - Requires Patching or Rejuvenation standard court is identified as one where the Bitmac or concrete surface has deteriorated and requires to be patched or where the polymeric or artificial grass surface is 'tired' and unable to deliver the required performance characteristics. In the case of the latter, the actions necessary to rejuvenate the surface have been described in the section on artificial grass surfaces.

5.2.4 A Grade 1 - Requires Replacement or Refurbishment standard court is identified as one where the tarmac or concrete playing surface has deteriorated to such an extent that it needs to be replaced/rebuilt or where artificial grass or polymeric surfaces need to be replaced as described in the section on artificial grass sports pitches.

5.3 Audit Findings

5.3.1 The Audit surveyed 457 tennis courts which were constructed as follows:

Table 22
Audit Results: Tennis Courts Surface Types

Surface Type	Grade 1	Grade 2	Grade 3	Unspecified	Total	%
Sand Filled AG	7	21	127	**5**	**160**	35%
Bitmac	68	46	25	**8**	**147**	32%
Mineral	36	43	54	**1**	**134**	29%
Concrete	2				**2**	1%
Polymeric		3	3		**6**	1%
Acrylic					**0**	0%
Unknown		1	6	**1**	**8**	2%
Total	**113**	**114**	**215**	**15**	**457**	**100%**
%	**25%**	**23%**	**52%**		**100%**	

Note: All returns where the surface type was identified as 'unknown' have been assumed to be Bitmac.

The response rate for tennis represented approximately 20% of the national stock of tennis facilities. From the returns it can be seen that 48% of the sample fell below the recommended Grade 3 Satisfactory Standard.

5.3.2 **sport**scotland's data base identifies that there are some 2,249 tennis courts in Scotland distributed as follows:

Public recreation and sports grounds	873
Schools	354
Clubs	822
Other	190
Total	**2249**

5.3.3 If the national audit responses are applied pro rata to the national stock of tennis facilities, the following picture emerges:

Table 23
Audit Results Interpolated to the National Stock of Tennis Courts

Surface Type	Grade 1	Grade 2	Grade 3	Total	%
Sand Filled AG	38	104	645	**787**	35%
Bitmac	352	244	169	**765**	34%
Mineral	176	209	267	**652**	29%
Concrete	23			**23**	1%
Polymeric		11	11	**22**	1%
Acrylic				**0**	0%
Total **%**	**589** **26%**	**568** **25%**	**1092** **49%**	**2249** **100%**	**100%**

Note: All returns where the surface type was identified as 'unknown' have been assumed to be Bitmac.

5.4 Improvement Proposals

5.4.1 Restoring an existing tennis court to its original condition may be a straightforward operation if the court is in relatively good condition. Older courts and those in poor condition may need more significant upgrading, including that of the underlying construction. Changing the surface of a court to another surface type may well require works akin to the construction of a new court.

5.4.2 Based upon the interpolated condition survey results, costs have been identified for a range improvements suited to the courts and surface types identified. A number of assumptions have been made in formulating improvement proposals:

1 Those Bitmac surfaces identified as Grade 1 will be converted to sand fill artificial grass rather than be reconstructed in Bitmac.

2 In view of the difficulty and costs associated with maintaining mineral courts, it has been assumed that all courts which fall in the Grade 1 and Grade 2 categories should be replaced with sand fill artificial grass.

Bitmac Surfaces

Table 24
Bitmac Surfaced Tennis Courts

Surface Type	Grade 1	Grade 2	Grade 3	Total
Bitmac	352	244	169	**765**
%	**46%**	**32%**	**22%**	**100%**

5.4.3 78% of Bitmac tennis courts are considered to be below the Grade 3 Satisfactory Standard. 46% are identified as Grade 1 and 32% Grade 2. Rather than reconstruct those identified as Grade 1 in Bitmac it is suggested that they be converted to sand fill artificial grass. For those assessed as Grade 2, it has been assumed that they will be patched. Indicative costs for the various types of work which might need to be carried out are:

Patching

5.4.4 While it is certainly possible to patch Bitmac surfaces, it can be difficult to achieve a seamless and true finish. Patching is therefore only recommended for courts which are used for informal play. Cost estimates for patching are:

Cost per m2 = £25.75
Assume an average of 25% dilapidation of a 600m^2 court (150m^2).
Patch 25%/150$m^2$of a Grade 2 Bitmac court @ £25.75 m^2 = £ 3,862

Patch 244 Grade 2 Bitmac courts @ £3,862 per court = £942,328

If a Grade 2 Bitmac court is required to be retained or reinstated for match play purposes, it should be patched and then overlaid with a new playing surface. Cost implications of this action would be:

Patch court assuming an average of 25% dilapidation per court.	£6.43
Overlay with new Bitmac layer	£ 7.50
Equipment (posts, nets etc.)	£ 0.90
Cost per m^2	£14.83
Cost of 600 m^2 court @ £ 14.83	£ 8,898
Patch and resurface 244 Bitmac courts @ £8,898 per court	£2,171,112

5.4.5 Although the costs for both patching and resurfacing Grade 2 Bitmac courts have been identified, it is assumed that all such courts are used for informal play and not for match purposes. Therefore, the cost estimate for patching and not for resurfacing has been carried forward,

Converting Bitmac Courts to Sand Filled Artificial Grass

5.4.6 In many cases, an artificial grass court is a preferable surface to Bitmac and it would be advantageous to convert those courts in need of reconstruction or resurfacing to sand filled artificial grass. For this to happen, it would be necessary to cap the punctured Bitmac with a new Bitmac layer to ensure that the playing surface was even. Indicative costs for treating all of the 352 tennis courts assessed as Grade 1 using this procedure are:

Details	**Qty**	**Cost/m^2**
Punch drainage holes in Bitmac	1	£2.05
Power wash surface	1	£0.75
Supply and lay new Bitmac layer	1	£7.50
Sand filled synthetic grass	1	£17.90
Equipment (posts, nets etc.)	1	£ 0.90
Cost per square metre		£29.10
Cost per 600m^2 court		£17,460
Convert 352 Bitmac courts to SFAG@ £17,460 per court		**£6,145,920**

5.4.7 The total estimated costs of improving or upgrading the stock of Bitmac tennis courts would be:

Patch 244 No. Bitmac tennis courts of 600m^2 @ average cost of £3,862 per court	£942,328
Convert 352 No. Bitmac tennis courts of 600m^2 to sand fill artificial grass @ £17,460 per court	£6,145,920
Total cost of upgrading Bitmac tennis courts	**£7,088,248**

Porous Concrete Surfaces

5.4.8 The survey and interpolated results would seem to indicate that there are only 22 porous concrete tennis courts in Scotland although this seems to be a low estimate given that one contractor spoken to indicated that they had installed some 50 porous concrete courts. It is of course possible that some porous concrete courts have been reconstructed with a different surface or that the missing courts have been included in the figures for open textured bitumen courts, the remedial costs of which would be similar.

Table 25
Porous Concrete Tennis Courts

Surface Type	Grade 1	Grade 2	Grade 3	Total
Concrete	22			**22**
%	**100%**			**100%**

5.4.9 All of the 22 porous concrete tennis courts have been identified as needing refurbishment or reconstruction. There are a range of options which could be followed as detailed below.

1 Resurface Porous Concrete

Resurfacing a porous concrete court involves laying a second 90mm layer of porous concrete on top of the first, having first provided a 'slip' layer of suitable material between the two layers to enable them to expand and contract independently. Although possible, this is not a recommended solution as, even if there has been no settlement this is likely to occur in the future. It is also becoming increasingly difficult to find contractors with suitable skills and experience in laying porous concrete as this product has been superseded by polymeric and artificial grass surfaces. In fact, it was not possible to identify any porous court which had been relayed in the past 10 years. Resurfacing should, therefore, only be considered if there is a very strong reason for requiring porous concrete. No cost estimates have been prepared for resurfacing with porous concrete.

2 Resurface Porous Concrete Court with Bitmac

If the concrete slabs have not moved, the slabs are level with each other at the joints and porosity has not been compromised it would be possible to lay a Bitmac layer directly onto the concrete. Once again this is not recommended as it is very likely that the concrete will move in the future, causing the Bitmac surface to break up at the concrete panel joints. A better solution would be to break up the concrete and relay with a sand filled artificial grass surface as described below. No cost estimates have been provided for resurfacing with Bitmac.

3 Resurface Worn Out Porous Concrete Court with Sand Filled Artificial Grass:

If the concrete surface is in good condition with little or no movement at the joints, it may be possible to lay a sand filled artificial grass surface directly onto it. However, this is not recommended as it is very likely that the concrete will move in the future, causing the carpet surface to undulate. A better solution would be to break up the concrete and relay with an alternative surface, preferably artificial grass. Works actions and indicative costs for breaking up the existing surface and replacing it with a sand filled artificial grass surface are:

Details	**Qty**	**Cost/m^2**
Break up and regrade the concrete surface	1	£2.80
Supply and lay new pc kerb	1	£1.65
Supply and lay 50 mm clean stone	1	£ 2.60
Supply and lay new Bitmac layer	1	£ 7.50
Supply and lay new sand filled carpet	1	£ 17.90
Equipment (posts, nets etc.)	1	£ 0.90
		£ 33.35
Cost per 600 m^2 court		£ 20,010

5.4.10 All factors considered, if a porous concrete court needs to be resurfaced, the easiest and most effective solution would be to resurface with artificial grass as described above. The total cost implications would be:

Resurface 22 No. concrete tennis courts with sand filled artificial grass @ £20,010 per court = £440,220

Polymeric Tennis Courts

5.4.11 The interpolated audit results would seem to indicate that there are only 22 polymeric surfaced tennis courts in Scotland:

Table 26
Polymeric Surfaced Tennis Courts

Surface Type	Grade 1	Grade 2	Grade 3	Total
Polymeric		11	11	**22**
%		**50%**	**50%**	**100%**

5.4.12 Of the 22 polymeric surfaced tennis courts, 11 are deemed to be Grade 2 – Requires Patching or Refurbishment. The works which might be required to refurbish a polymeric surface might comprise:

Details	**Qty**	**Cost/m^2**
Cut out worn areas and patch (allow 10% of Court area)	1	£1.55
Power wash surface	1	£0.75
Spray the surface with textured finish	1	£ 8.25
Cost per square metre		£ 10.55
Cost per 600 m^2 court		£ 6,330

5.4.13 Using these works and costs as a benchmark, the costs associated with refurbishing 11 polymeric tennis courts would be:

Refurbish 11 No. Polymeric tennis courts @ £6,330 per court £69,630

Sand Filled Artificial Grass Surfaced Tennis Courts

5.4.14 It is estimated that there are 810 sand filled artificial grass tennis courts in Scotland. Using the audit results as a base, the interpolated results indicate that the condition of the national stock of courts is:

Table 27
Sand Filled Artificial Grass Tennis Courts

Surface Type	Grade 1	Grade 2	Grade 3	Total
Sand Filled Artificial Grass	35	103	625	**763**
%	**5%**	**13%**	**82%**	**100%**

5.4.15 From the above interpolated results it can be seen that 18% of the stock falls below the recommended Grade 3 - Satisfactory Standard. Of those courts falling below the Satisfactory Standard, 5% require to be refurbished and 13% are in need of rejuvenation. The actions required to refurbish an artificial grass tennis court have been described in the section on artificial grass sports pitches.

5.4.16 It has been assumed that Courts Graded 1 – Needs Refurbishment/Replacement will need to have a new carpet laid but there will be no need to replace the shockpad if one is installed. The costs also allow for disposal of the existing carpet. For cost estimate purposes, the rate for a sand dressed carpet (£17.90 m^2) has been used.

Cost to refurbish 600 m^2 court @ £17.90 m^2 =	£10,740
Refurbish 35 courts @ £10,740 per court	**£375,900**

5.4.17 The rejuvenation process has also been previously described and a cost of £4.35m^2 has been used to calculate costs.

Cost for 600 m^2 court @ £4.35 m^2	£2,610
Rejuvenate 103 courts @ £2,610 per court	**£268,830**

5.4.18 The total estimated costs of improving or upgrading the stock of sand filled artificial grass tennis courts would be:

Refurbish 35 No. sand filled artificial grass tennis courts of 600m^2 @ average cost of £10,759 per court	£375,900
Rejuvenate 103 No. sand filled artificial grass tennis courts of 600m^2 @ £2,610 per court	£268,830
Total costs for improvement of sand filled courts	**£644,730**

Mineral Tennis Courts

5.4.19 It is estimated that there is 652 mineral tennis courts in Scotland. Their condition, interpolated from the audit results is identified below:

Table 28
Mineral Surfaced Tennis Courts

Surface Type	Grade 1	Grade 2	Grade 3	Total
Mineral	176	209	267	**652**
%	**27%**	**32%**	**41%**	**100%**

5.4.20 Of the national stock of 652 mineral tennis courts, 59% fall below the Grade 3 Satisfactory standard identified for mineral courts with 27% being deemed to be Grade1 – in need of refurbishment or reconstruction, and 32% Grade 2 - in need of rejuvenation.

5.4.21 Mineral courts are both expensive and difficult to maintain in comparison with other, lower maintenance surface types and refurbishment works are not always successful. It is suggested that, for costing purposes, the 385 mineral courts which fall below the Grade 3 Satisfactory Standard should be reconstructed/converted to sand filled artificial grass. Indicative works actions and costs are:

Details	**Qty**	**Cost/m^2**
Remove existing Blaes surface	1	£2.95
Install drainage	1	£3.55
Supply and lay new pc kerb	1	£1.65
Supply and lay stone layer	1	£6.55
Supply and lay Bitmac layer	2	£10.55
Equipment (posts, nets etc.)	1	£ 0.90
Supply and lay Sand Filled Grass Carpet	1	£17.90
Cost per square metre		£44.05
Cost per 600 m^2 court		£ 26,430
385 No. mineral courts @ £26,430 per court		£10,175,550
Total cost for refurbishing/rejuvenating mineral courts		**£10,175,550**

5.4.22 It should be noted that problems are being increasingly experienced with maintaining even those mineral courts which are deemed to be in satisfactory condition. This is because genuine difficulties are being experienced in obtaining appropriate quality dressing materials. Dressing materials require a high clay content with a low percentage of coarse material in order to create a fast and true mineral court. The screened blaes which is generally available in Scotland is often very coarse with a high percentage of the aggregate in the 4 – 6 mm range. Some site managers have taken to screening the locally sourced material prior to spreading with the result that they lose some 60 – 70% of the bulk. Other site managers and contractors have brought in material from the Continent to dress their courts. Both actions have obvious cost implications. If appropriate materials are not used to dress mineral courts, they will deteriorate and eventually need to be reconstructed or replaced with an alternative surface.

Fencing

5.4.23 Tennis courts are normally enclosed with a ball stop fence of plastic coated chain link. If properly maintained, this type of fence should have a lifespan of 25 years. However, in some locations, due to external abuse, it may be necessary to enclose courts with a robust weldmesh type fence of the type being used to enclose MUGAs and multi-courts for example. For costing purposes, it is assumed that only the lighter chain link fence is used and that all courts will need to have fencing replaced once in the 25 year time span covered by this study.

5.4.24 The cost, based on a 2.75 metre high plastic coated chain link fence on galvanised powder coated tubular steel posts and including gates etc. would be approximately £ 6,500 per court or approximately £10.85 per m.

This cost will obviously reduces when the courts are built in blocks of 2, 3 or 4 as they have shared boundaries. Where there are 2 courts grouped together the cost per metre will be approximately 70% of the single court size. Where there are 3 courts grouped together the cost per metre reduces to around £6.55 which is around 60% of the single court rate.

5.4.25 The Audit returns for tennis comprised 112 sites with 457 courts as shown in Table 23. Analysis of the court groupings suggests an average of four courts per site and that for costing purposes, 63% of the cost for fencing a single court should be applied to the total national stock of courts. This percentage makes an allowance for different court set ups – 2 and 2 or 4 in line. If this formula is used, the cost implications for replacing the fencing around the entire stock of tennis courts would be:

Cost of fencing a single court	£6,500
Apply 63% of the single court rate = £6,500/63%	£4,095
2,249 courts@ £4,095	**£9,209,655**

5.4.26 It should be recognised that not all fencing would need to be replaced at one time and a better indication of future requirements can be gained by disaggregating the total costs over 25 years giving a potential annual commitment of £368,386.

Table 29
Audit Results – Grouping of Tennis Courts

Court Site Description	No. of Sites	No. of courts per site
Single Court	3	3
Two Court	14	28
Three Court	34	102
Four Court	25	100
Five Court	11	55
Six Court	16	96
Seven Court	3	21
Eight Courts	4	32
Nine Courts	1	9
Ten Courts	0	0
Eleven Courts	1	11
Total	**112**	**457**

5.4.27 Given that fencing will need to be replaced at different times during the 25 year cycle, the disaggregated annual cost for replacing fencing is estimated to be £350,844.

Floodlighting

5.4.28 The Audit provided 457 returns in respect of tennis, analysis of which revealed that 101 (22%) courts have floodlights. Analysis of the 101 returns for courts with floodlights and interpolated to the national stock of facilities reveals the following:

Table 30
Floodlights: Audit and Interpolated Results

Surface Type	Audit Results	%	Interpolated to National Stock
Synthetic	70 of 166	42.2%	344
Bitumen	26 of 147	17.7%	128
Mineral	3 of 134	2.2%	14
Unknown	2 of 8	25%	10
Total	**101**		**496**

5.4.29 Advice on the longevity of floodlights is mixed. However, for the purpose of this Audit, the advice of contractors has been taken and which suggests that, if lighting units are properly maintained, they should have a life expectancy in excess of 25 years. It is therefore assumed that none of the existing lighting installations on tennis courts will need to be replaced over the 25 year period covered by this study. Details of appropriate maintenance of lighting installations are provided later.

5.4.30 Floodlighting can have the beneficial effect of extending playing times and season and is particularly suited to maximising the benefits of artificial grass surfaces. It would therefore be beneficial if all polymeric and artificial grass surfaces which are not lit were provided with appropriate lighting installations. It is believed that there is approximately 809 polymeric and artificial grass tennis courts in Scotland of which 344 already have floodlights leaving 465 courts which would benefit from floodlighting. However, not all locations would be suitable for floodlighting due to planning restrictions etc. If it is assumed that 20% of sites would be unsuitable, then this leaves 376 courts which it would be desirable to light as detailed in Table 32.

Table 31
Interpolated Grouping of Tennis Courts and New Floodlighting Requirements

Court Site Description	No. of Sites with floodlights	No. of floodlit courts per site	Interpolated No. of Courts	Interpolated No. of sites
Single Court	1	1	4	4
Two Court	11	22	82	41
Three Court	10	30	111	37
Four Court	6	24	88	22
Five Court	2	10	35	7
Six Court	1	6	24	4
Seven Court	-	-		
Eight Courts	1	8	32	4
Nine Courts	-	-		
Ten Courts	-	-		
Eleven Courts	-	-		
Total	**32**	**101**	**376**	**119**

5.4.31 Installation costs for new floodlight systems based on providing the LTA minimum standard of a maintained average illumination on the Principal Playing Area (PPA) with a uniformity of 0.7 utilising 1Kw Metal Halide Lamps 4 per court on 8 metre columns assuming that a suitable power source is available within 25 metres of the courts are as follows:

Cost for one court installation	£ 12,000
Cost for two court installation	£ 20,000
Cost for three court installation	£ 28,000
Cost for four court installation	£ 36,000

5.4.32 If these costs are applied to the interpolated desirable lighting requirements as outlined in Table 32 the following cost implications would arise:

Install floodlights on 4 No. single court sites @ £12,000 per installation	£48,000
Install floodlights on 41 No. two court sites @ £20,000 per installation	£820,000
Install floodlights on 37 No. three court sites @ £28,000 per installation	£1,036,000
Install floodlights on 22 No. four court sites @ £36,000 per installation	£792,000
Install floodlights on 7 No. five courts sites @ £45,000 per installation	£315,000
Install floodlights on 4 No. six court sites @ £54,000 per installation	£216,000
Install floodlights on 4 No. eight court sites @ £72,000 per installation	£288,000
Total cost of installing new floodlighting on 119 sites	**£3,515,000**

5.5 Tennis Courts – Combined Capital Costs

5.5.1 The estimated combined capital costs required to bring the nations stock of tennis courts up to an acceptable standard is:

Bitmac surfaced courts	£7,088,248
Porous concrete surfaced courts	£440,220
Polymeric surfaced courts	£ 69,630
Sand filled artificial grass courts	£644,730
Mineral surfaced courts	£10,175,550
Fencing	£9,209,655
Lighting	£3,515,000
Total	**£31,430,033**

5.6 Periodic Maintenance

5.6.1 The requirement for ongoing major expenditure on periodic maintenance will depend upon the type of surface provided. It has been assumed that those Bitmac tennis courts which are, or have been upgraded to Grade 3 – Satisfactory Standard, will remain usable for the period to 2029. Similarly, mineral surfaces which meet the Grade 3 standard should remain usable to 2029 provided that they are maintained appropriately. However, artificial grass and polymeric surfaces will need to be rejuvenated and refurbished at regular intervals.

5.6.2 The rejuvenation and refurbishment processes for artificial grass have been previously described. It is expected that on average, over a 25 year period, an artificial grass tennis court will require three rejuvenation and two refurbishment processes:

Year 1	New
Year 5	Rejuvenation
Year 10	Refurbishment
Year 15	Rejuvenation
Year 20	Refurbishment
Year 25	Rejuvenation

5.6.3 If implemented, the improvement proposals for tennis courts identified previously would see the stock of artificial grass surfaces standing at:

Substandard Bitmac surfaces converted to artificial grass	352
Substandard mineral surfaces converted to sand filled artificial grass	385
Substandard porous concrete surfaces converted to artificial grass	22
Existing artificial grass surfaces	810
Total	**1,569**

5.6.4 Using the rates of £4.35m^2 for rejuvenation and £22.75m^2 for refurbishment, the following periodic cost implications would arise:

Rejuvenate each 600m2 sand filled artificial grass court three times @ £2,610 per treatment =	£7,830
Refurbish each 600m2 sand filled artificial grass court twice @ £13,650 per treatment =	£27,300
Total	£35,130

If these costs are disaggregated over 25 years, the average annual cost for periodic maintenance will be £1,325 per court.

5.6.5 When applied to the potential stock of artificial grass tennis courts the cost implications would be:

Rejuvenate 1,569 No. 600m^2 sand filled artificial grass courts three times @ £2,610 per treatment =	£12,285,270
Refurbish 1,569 No. 600m^2 sand filled artificial grass court two times @ £13,650 per treatment =	£42,833,700
Total of periodic maintenance costs over 25 years	**£55,118,970**

If these costs are disaggregated over 25 years, the average annual national cost for periodic maintenance would be £2,204,758 per year.

5.6.6 Polymeric courts also have periodic maintenance requirements. A newly-laid surface should give firm foothold and good medium-paced ball speed. As the surface is used over the years, however, it will become smoother and more polished and this may result in increased ball speed and some impairment of the foothold when the surface is damp. When this happens it will be time for the surface to be re-coated/retextured. How often this will be needed varies considerably depending upon the system used, the intensity of use and the requirements of the players. However, for costing purposes, it has been assumed that the surface will need to be recoated at four yearly intervals. Furthermore, re-texturing can only usually be carried

out on three occasions before the surface water infiltration rates are reduced below an acceptable standard. Once this stage has been reached, the surface must be drilled and a new surface laid. On this basis, each polymeric court would follow the following periodic maintenance schedule:

Year 1	New
Year 4	Retexture
Year 8	Retexture
Year 12	Retexture
Year 16	Lay new surface
Year 20	Retexture
Year 24	Retexture

5.6.7 The cost implications of implementing the above rejuvenation and refurbishment programme would be:

Retexture 600m^2 court @ £5.25m2 = £3,150	
5 No. retextures @ £3,150	£15,750
Resurface 600m^2 court @ £28m2 =	£16,800
Total 25 year periodic maintenance cost per court	£32,250

5.6.8 If applied to the assumed stock of 22 polymeric courts after improvement, the following cost implications would arise:

25 year periodic maintenance costs for 22 polymeric courts @ £32,250 per court	**£709,500**

If these costs are disaggregated over 25 years, the average national annual cost would be £28,830.

5.6.9 The total periodic maintenance costs for artificial grass and polymeric courts are estimated to be:

Artificial grass courts		£55,118,970
Polymeric courts		£709,500
	Total	**£55,828,470**

The total periodic maintenance costs for artificial grass and polymeric courts disaggregated over 25 years are £2,233,138 per annum.

5.7 Maintenance of Tennis Courts

5.7.1 The maintenance requirements for tennis courts vary according to the type of surface and level of play which they have to support. Outline maintenance schedules and indicative costs are provided below.

Bitmac Surfaced Courts

5.7.2 Bitmac facilities are hard wearing and require relatively little maintenance. The main requirements are to keep the area free from debris, prevent moss

and algae forming and ensure that, in porous Bitmac courts, the interstices of the surface do not become clogged thus impairing drainage. An annual maintenance schedule might include the following procedures:

Daily
- Check facility, fixtures and fittings.
- Remove litter and debris as required

Weekly
- Clear leaves and rubbish from the court.

Monthly
- Deal with any moss or algae.

Annually
- Wash the court.
- Apply moss-killer
- Re-paint lines as required

5.7.3 Cost estimates for the above schedule have been based upon the assumption that the daily and weekly maintenance requirements will be carried out by on-site staff and that their costs are already provided for. However, monthly and annual maintenance requirements, it has been assumed, will be carried out by skilled personnel visiting the site specially. It has been assumed that the cost of each monthly visit would be £100 and the cost of annual moss/algae removal and power wash would be £1,209 per court based on a rate of £1.85m^2. Annual costs per court would be:

12 No. monthly visits @ £100 per visit =		£1,200
Algae/Moss removal and power wash		£1,209
	Total	£2,409

If these costs are applied to the assumed residual stock of 413 Bitmac courts the cost implications would be:

Maintain 413 No. Bitmac courts @£2,409 per court per annum = **£994,917**

5.7.4 Bitmac courts are hard wearing if appropriately maintained. It has therefore been assumed that once all courts have been put in an appropriate condition, they will remain usable for the 25 year period covered by the audit prediction without need for major capital expenditure. However, reconstruction would likely be required within a period of 30 years.

Porous Concrete Courts

5.7.5 Porous concrete courts are very durable and, like Bitmac courts, require very little maintenance. However, that maintenance which is required must be carried out properly if the court is to remain free draining for its entire life span. It is vital that debris is removed expeditiously in order to prevent the interstices becoming clogged, thus impairing free drainage. Actions to prevent the growth of moss and algae must also be taken as required. Moss prevention is the most important single action to prolong the life of porous concrete courts because invasion can cause drainage problems and make the structure susceptible to frost damage. An annual maintenance schedule might include the following procedures:

Daily
Check facility, fixtures and fittings.
Remove litter and debris as required
Weekly
Clear leaves and rubbish from the court.
Monthly
Deal with any moss or algae.
Annually
Wash the court.
Apply moss-killer
Re-paint lines as required.

5.7.6 The annual cost implications of the above schedule are similar to those identified for Bitmac surfaces at an annual cost of £2,409 per court per annum. If applied to the assumed residual stock of 22 porous concrete courts the following cost implications arise nationally:

Maintain 22 No. porous concrete courts @£2,409 per court per annum = **£52,998**

5.7.7 If the 22 porous concrete courts are put in proper condition and maintained appropriately thereafter, it is probable that they would remain playable for the 25 year time span of the audit. However, it has been suggested that the few porous concrete courts which exist be converted to artificial grass and the maintenance schedules and cost implications have been picked up in the section dealing with that surface type,

Polymeric Surfaced Courts

5.7.8 Polymeric surfaces are comparatively easy to maintain, keeping the surface clean being the only routine maintenance that the court surface should require. A typical maintenance schedule might comprise:

Daily
Check facility, fixtures and fittings.
Remove litter and debris as required.
Weekly
Remove dust, leaves, rubbish and other detritus from the surface.
Monthly (or thereabouts depending upon the cleanness of the surface).
Wash the surface, removing stains with a mild detergent and soft brush.
Annually
Check the court surface carefully. Call in the installer if there is any cause for concern or it is suspected that the surface needs re-coating.

5.7.9 Cost estimates for the above schedule have been based upon the assumption that the daily and weekly maintenance requirements will be carried out by on-site staff and that their costs are already provided for. It has been assumed that monthly maintenance works will be carried out by skilled personnel visiting the site specially. It has been assumed that the cost of each monthly visit would be £250. Annual costs per court would be:

12 No. monthly visits @ £250 per visit =		£3,000
	Total	**£3,000**

If applied to the assumed stock of 22 polymeric courts the following cost implications would arise nationally:

Maintain 38 No. polymeric courts @ £3,000 per court per annum = **£66,000**

Artificial Grass Surfaced Courts

5.7.10 Maintenance of artificial grass courts is particularly important and neglecting the recommended schedule could have serious long-term consequences even if, in the shorter term, the court does not appear to suffer. Maintenance need not be time-consuming or onerous, but its benefits are profound. To omit the recommended processes may result in a court ceasing to drain at half-life or sooner. A typical routine maintenance schedule is shown below:

Daily.
- Check facility, fixtures and fittings.
- Remove litter and debris as required

Weekly
- Clear leaves and rubbish from the court.
- Deal with any new weeds, moss or algae.
- Brush the surface to redistribute infill

Monthly
- Broom court to redistribute sand. Check sand levels.

Periodically - at least every six months.
- Check for moss and algae growth etc. and remedy as appropriate.
- Groom with a rotary brush/vacuum .

Annually
- Treat court with moss-killer / algaecide.
- Call in the installer if any aspect is causing significant concern.

Note: These are minimum recommendations. Cleaning, grooming and court inspection can always be done more frequently.

5.7.11 It is assumed that the daily and weekly checks and litter/debris collections will be carried out by on-site staff and that the brushing, grooming and algaecide treatments will be carried out by specialist staff on 40 occasions a year. Estimated maintenance costs are:

40 visits @ £100 per visit	£4,000
Treat moss/algae and redistribute sand accumulations	£1,250
Total	£5,250

If applied to the assumed national stock of 1,569 artificial grass courts the following cost implications would arise nationally:

Maintain 1,569 No. artificial grass courts @ £5,250 per court per annum = **£8,237,250**

Mineral Surfaces

5.7.12 Mineral tennis courts can only be made fit for use by the rigorous implementation of a detailed maintenance programme. The great majority of mineral courts in Scotland are crushed burnt pit shale or blaes as it is more commonly known. A high quality smooth and firm mineral playing surface is achieved by encouraging the particles used in the surface to bind by watering and rolling. Poorly graded surface materials will not bind, nor will a surface which has been allowed to dry out. Therefore, the basic maintenance actions required to maintain a mineral surface comprise:

Water – Brush – Roll

If the surface needs to be repaired, this should be undertaken prior to the watering phase. As with other types of tennis court, care should be taken to ensure that weeds and moss are not allowed to become established, particularly on the perimeters of the court.

5.7.13 The maintenance requirements of mineral tennis courts will depend upon levels of use and weather conditions and can be time consuming even for skilled grounds staff. If mineral courts are to be kept in good condition, it is essential that adequate resources are allocated to allow the appropriate maintenance regimes to be put in place. An outline maintenance schedule is detailed below:

Daily.
- Check facility, fixtures and fittings.
- Remove litter and debris as required
- Brushes, ensuring that tape lines are clear.

As Required
- Water as often as necessary in dry condition.
- Roll the surface after watering.

Annually
- Treat court with moss-killer / algaecide.
- At the start of the season, scarify, lightly regrade and apply a light dressing.

Note:
- These are minimum recommendations. Cleaning, grooming and court inspection can always be done more frequently.

5.7.14 The average cost implications for the above maintenance schedule based on a 26 week season are estimated to be:

26 weeks @ £ 175 per week = £4,550 per court per annum

If applied to the assumed national residual stock of 267 mineral tennis courts, the following costs arise:

Maintain 267 mineral courts @ £4,550 pa = £1,255,800

Floodlighting

5.7.15 Floodlighting needs to be routinely maintained if it is to meet the designed performance requirements effectively over its working life. Maintenance actions should include routine work on the electrical services, cleaning of fittings and adjustment of aiming angles. When performance falls below the specified level or when individual lamps fail, all lamps should, ideally, be replaced as a complete set and not as individual units. The maintenance requirements and costs for tennis court floodlights would be as follows:

Minor Service (annually)

Clean glass, check all weatherproof fittings are sealed and all electrical connections check and realign luminaires as required and replace any faulty lamps.

The cost for Minor Service would be £ 400 for one court, £ 500 for two and £ 600 for 4 courts.

Interim Service (every second year)

Works detailed in Minor Service plus a test to check that the system if performing as designed.

Cost for Interim Service would be as Minor Service plus £ 85 per court.

Major Service (every 4th service)

As for Interim Service plus replace all lamps.

Costs for a Major Service would be £1,450 for one court, £2,250 for two courts and £3,800 for four courts.

5.7.16 Based upon the above maintenance regime, the following cost implications would arise in respect of a four court site over a 25 year period:

Annual maintenance - £600 pa x 13	£7,800
Interim Service - £1,020 x 6	£6,120
Major Service - £3,800 x 6	£22,800
Total 25 year service maintenance costs for 4 court installation	£36,720
Average annual cost over 25 years	£1,468

5.7.17 Based upon an average of four courts per installation, the 25 year costs for the assumed national stock of 376 floodlight courts if the above maintenance schedule was implemented would be:

Total 25 year maintenance costs of floodlights for 94 No. 4 court sites @ £36,720 per 25 years	£3,451,680
Average annual maintenance costs for national stock of floodlit tennis courts	**£138,067**

5.8 Composite Revenue Costs

5.8.1 The composite estimated national annual revenue costs for tennis courts are:

Routine Maintenance	
Bitmac surfaces	£994,917
Porous concrete surfaces	-
Polymeric surfaces	£66,000
Artificial grass surfaces	£8,237,250
Mineral courts	£1,255,800
Floodlights	£138,067
Total national annual revenue costs	**£10,692,034**
25 Year Periodic Maintenance	
Bitmac surfaces	£55,118,970
Polymeric surfaces	£709,500
Total	**£55,828,470**
Average annual periodic maintenance costs disaggregated from 25 year total	**£2,233,138**

5.9 Conclusion

5.9.1 Tennis courts are the second most numerous outdoor sports pitch/court provision after winter sports pitches, there being approximately 2,250 courts in Scotland. Public recreation/access facilities and voluntary sports club provisions each represent approximately one third of the national provision. The most common surface types are Bitmac, sand filled artificial grass and mineral.

5.9.2 The quality of mineral courts is generally poor with an estimated 78% of Bitmac and 59% of mineral courts falling below the identified Grade 3 Satisfactory Standard. The position is more encouraging in respect of artificial grass pitches with only 18% of sand filled pitches falling below the Grade 3 Satisfactory Standard.

5.9.3 The estimated capital costs of bringing all facilities up to the identified Grade 3 Satisfactory Standard are £31.4m. On top of this there needs to be added 25 year periodic maintenance costs of some £55.8m (average of £2.2m nationally) and annual maintenance costs of £10.7m in order to ensure that facilities are kept in good condition and that longevity is maintained.

5.9.4 There has been a steady decline in the number of tennis facilities provided and operated by local authorities in public parks etc. and many of the facilities which remain have suffered from lack of investment. Faced with

financial restrictions, some local authorities have sought to reduce operating costs by removing site supervision and making courts available on a free access basis or by transferring management and supervisory responsibilities to local community organisations or to voluntary sports clubs. It is recommended that, before local authorities consider abandoning or closing tennis court sites, they consider as part of the local sports pitch strategies their future intentions and plans in respect of tennis development and the need for courts at specific locations. They might also wish to take into account the alternative functions which tennis court areas can fulfil in respect of formal and informal local sports participation before they consider closing or abandoning further tennis facilities.

5.9.5 The future of tennis is likely to be dependent upon the provision of good quality facilities (including indoor courts) and the development of sound club structures capable of meeting community needs, facilitating development opportunities and providing opportunities for competition. Climatic conditions will always be a consideration in Scotland and this reinforces the need for appropriate surfaces which, based upon current technology, are likely to be artificial grass or another type of polymeric.

Part 3.6

Track and Field Facilities

6 Track and Fields Athletics Facilities

6.1 Facility Requirements

6.1.1 Track and field athletics has historically been practiced on purpose built facilities, often located in enclosed grounds and stadia, and on seasonally marked out tracks located on grass and mineral sports fields. This study is only concerned with those facilities which have been 'purpose built' for track and field athletics.

6.1.2 The advent of the first polymeric tracks in the 1960s caused the gradual demise of grass and cinder or blaes tracks for club, national and international competition although many mineral tracks survive in schools and public recreation areas.

6.1.3 Polymeric surfaces provide a comfortable surface for users in both training and competition situations, are not affected by frost, can be used throughout the year and are low maintenance, whereas mineral tracks do not provide the performance characteristics which modern training and competition demands and are time consuming and expensive to maintain. For these reasons, mineral tracks are considered to be unsuitable for club, regional and national level competitions and training but they may continue to have a role in say, the school context and some community locations provided that they are maintained properly and provide a safe and usable surface. For the purposes of this study, polymeric surfaces are considered to be the only acceptable surface for competition and training.

6.1.4 Two types of polymeric surface are currently available for athletics tracks. Solid polyurethane tracks are provided mainly in locations used for national and international level competition and porous polyurethane surfaces in locations used for club, local authority, schools and college sports competitions and training.

6.1.5 Solid polyurethane tracks are constructed on a dense asphalt base with appropriate stone foundation layers with a final asphalt layer which must be laid to very fine tolerances to ensure that a consistent thickness (usually 12mm) of the resilient polyurethane system may be installed and that no surface water puddles remain after rainfall. To aid the surface water drainage, the athletics track needs to be laid with a crossfall to the inside lane or outside lane. The surface water shed from the track by the fall is collected in a drainage channel.

6.1.6 Porous polymeric tracks have an open-textured base construction, which normally consists of two layers of open-textured Bitmac over a suitable stone foundation layer. The surface tolerance of the base layers has a critical influence on the consistency of the polymeric surface thickness. Because the polymeric surface is porous, surface water should not gather unless the interstices of the surface and Bitmac have become clogged. The track is normally laid with a crossfall to the inside lane where surface and

permeated water is collected in a perimeter subsoil drain or in a drainage channel.

6.1.7 The normal surfacing method employed in porous track construction is to lay a black, polyurethane bound, rubber crumb base and to apply a polyurethane structure spray-coating which includes an EPDM (Ethylene – Propylene – Diene Monomer) coloured granule for texture.

6.1.8 A third method of constructing a polymeric track surface, known as the "sandwich" system, is a combination of the solid and porous polyurethane systems described above. The sandwich system comprises a cast in-situ base as used in the porous system and solid cast polymers from the impervious system. The "sandwich" system produces a non-porous track, performing like a solid system but with substantial savings in cost.

6.1.9 The number of lanes provided in any track design will vary with the intended use. A track intended primarily for training may have only four or six lanes in the circuit with perhaps six or eight lanes on one straight. A national level track will usually have an eight lane circuit and two 10-lane sprint straights.

6.1.10 A small number of "J" tracks (half tracks) have been provided for training purposes. These comprise a straight and a bend, normally 4 lanes wide. The total length of "J" tracks often allows for 200m sprints. Initially conceived as local training and exercise facilities, "J" tracks have become less popular as more full circuit polymeric tracks have been developed and become more readily available and accessible.

6.1.11 Field events run ups etc. are normally provided in the same material as the main track.

6.2 Track and Field Facilities Condition Classification Grades

6.2.1 Three grades were identified against which to assess the condition of polymeric track and field facilities. These are:

Grade 1 - Requires Replacement or Refurbishment;
Grade 2 - Requires Patching or Rejuvenation;
Grade 3 - Satisfactory Standard.

A Grade 3 - Satisfactory Standard facility is defined as one which has been constructed in accordance with recognised technical and performance specifications and has been maintained appropriately so that the required performance and playing characteristics have been preserved.

A Grade 2 - Requires Rejuvenation standard facility is identified as one where the polymeric or mineral surface has deteriorated but is capable of being improved so that it meets the required performance specification.

A Grade 1 - Requires Replacement or Refurbishment standard facility is identified as one where the polymeric or mineral playing surface has deteriorated to such an extent that it needs to be replaced/rebuilt.

6.3 Audit Findings

6.3.1 The Audit identified 72 track and field athletics facilities situated as follows:

Table 33
Track and Field Facilities Location and Condition Analysis

Facility Type	No Grade	Grade 1	Grade 2	Grade 3	Total	%
Public	0	12	20	14	**46**	62%
Secondary Schools	8	0	4	10	**22**	31%
Colleges & Universities	0	2	1	0	**3**	4%
Voluntary	0	0	1	0	**1**	1%
Total	**8**	**14**	**26**	**24**	**72**	**100%**
%		**18%**	**47%**	**35%**	**100%**	

6.3.2 In terms of surface type and condition, the Audit revealed the following:

Table 34
Track and Field Facilities Surface Types

Surface Type	No Grade	Grade 1	Grade 2	Grade 3	Total
Polymeric Surface	0	5	16	14	**35**
Mineral Surface	0	4	3	2	**9**
Grass Surface	8	5	7	8	**28**
Total	**8**	**14**	**26**	**24**	**72**

6.3.3 Of the Audit returns, 21 tracks were less than 400m while 27 met IAAF requirements. 39 tracks had full (most – very few had all) field events facilities, 30 tracks were floodlit and 19 tracks had warm up areas. The Audit aimed to assess the quality of field events facilities but the quality of many of the returns was insufficient to make judgments. However, given that the major expense involved in refurbishments and rejuvenation is in respect of the polymeric surfaces, due account has been taken of the overall needs of track and field events facilities by using an average area of 5,800m^2 for each facility and assuming that the condition of field events surfaces matches those of track surfaces.

6.3.4 The **sport**scotland data base indicates that there are 127 full circuit and 10 "J" track and field facilities nationally. This figure includes grass tracks but these have been excluded from consideration. The condition assessment of polymeric facilities undertaken in the Audit was complete

and accurate but it has been necessary to interpolate the condition of mineral facilities.

Table 34
National Stock of Track and Field Athletics Facilities - Interpolated Results

Surface Type	Grade 1	Grade 2	Grade3	Total
Polymeric	5	15	15	**35**
Mineral	17	12	8	**37**
Total	**22**	**27**	**23**	**72**

6.4 Improvement Proposals

6.4.1 A simplistic approach has been adopted in identifying improvement proposals for track and field athletics facilities. It has been assumed that all polymeric surfaced facilities are located appropriately and will be required, for the foreseeable future, in their current locations to meet the demands of the sport. The position is less certain with mineral track and field facilities in that some will be in appropriate locations to meet the future local requirements of the sport while others might not be appropriately located and it might be desirable to provide replacement facilities at alternative locations. It has therefore been assumed that all mineral surfaces will be retained and no proposals have been made to convert any to polymeric. However, indicative schedules of works and costs rates have been provided to allow the cost implications of converting existing mineral tracks to polymeric to be calculated as also the cost of constructing new community track and field facilities.

6.4.2 Tracks marked out on natural grass are not considered to be permanent facilities and no proposals for improvement have been brought forward. It is accepted that there will continue to be a considerable number of tracks marked out seasonally on school playing fields etc. and that they will require good quality surfaces. However, if the proposals made elsewhere in this report for the improvement of winter sports pitches are implemented, there will be consequential benefits, in terms of surface quality, to seasonal track and field athletics facilities marked out on playing fields.

Polymeric Surfaced Track and Field Facilities

6.4.3 The condition of polymeric track and field facilities has been assessed as:

Table 35
Polymeric Tracks and Field Athletics Facilities

Surface Type	Grade 1	Grade 2	Grade 3	Total
Polymeric Surfaces	5	15	15	**35**
%	**14%**	**43%**	**43%**	**100%**

6.4.4 Of the 35 identified polymeric surfaced track and field facilities, 5 are categorised Grade 1 Requires Replacement or Refurbishment. The following works would be required to improve a Grade 1 track to Grade 3 Satisfactory Standard where the existing surface is breaking up:

Details	**Qty**	**Cost/m^2**
Remove existing surface and replace	1	£21.75
Repair damaged areas of Bitmac allow 250 m^2 per track	1	£0.60
Power wash Bitmac prior to laying new surface	1	£1.25
Reline the track	1	£1.42
Replace equipment	1	£ 2.66
Cost per m^2		£ 27.68
Cost per 5,800m^2 track and field facility		£160,544

Based upon the above cost schedule, the cost implications of bringing all Grade 1 tracks (assuming that they are 8 lane tracks with a polymeric area of say 5,800 m^2 which allows for 1 'D' as polymeric) and field facilities up to Grade 3 Satisfactory Standard would be:

5 No. tracks of 5,800 m^2 @ £160,544 per facility **£ 802,720**

6.4.5 Where the track surface is basically sound, remedial works requirements would not be so great and it might be possible to restrict works to the following:

Details	**Qty**	**Cost/m^2**
Power wash Bitmac prior to laying new surface	1	£1.25
Rexture the track by applying spray coat of coloured polyurethane with EPDM granules	1	£9.90
Reline the track	1	£1.42
Cost per m^2		£12.57
Cost per 5,800m^2 track and field facility		£72,906

6.4.6 The interpolated Audit results identify that there are some 15 track and field facilities categorised Grade 2 Requires Rejuvenation Standard. Rejuvenation works would usually comprise the following works:

Details	**Qty**	**Cost/m^2**
Retexture worn areas of polymeric allowing 10% (580 m^2) per track	1	*£ 0.99
Power wash Bitmac prior to laying new surface	1	£ 1.25
Reline the track	1	£ 1.15
Cost per m^2		£ 3.39
Cost per 5,800m^2 track and field facility		£19,662

6.4.7 Based upon the above cost schedule, the cost implications of bringing all Grade 2 tracks (assuming that they are 8 lane tracks with a polymeric area of say 5,800 m^2 which allows for 1 'D' as polymeric) and field facilities up to Grade 3 Satisfactory Standard would be:

15 No. tracks of 5,800 m^2 @ £19,662 per facility £ 294,930

Note: * The actual cost of retexturing a polymeric surface is £ 9.90 m^2. However, only 10% of the polymeric area will need to be retextured during a periodic rejuvenation process. Therefore, in order to arrive at a m^2 cost per facility, it has been necessary to disaggregate the actual cost over the entire area to be treated. Thus, the figure is calculated by dividing the cost for retexturing a 5,800m^2 facility @ £9.90m^2 by the area to give a cost per m^2 e.g.:

Allow 580 m^2 @ = £ 5,742/5,800 = £ 0.99 per m^2

6.4.8 The total estimated costs of improving or upgrading the stock of polymeric track and field facilities would be:

Upgrade 5 Grade 1 facilities to Grade 3	£ 802,720
Upgrade 15 Grade 2 facilities to Grade 3	£ 294,930
Total cost of upgrading polymeric facilities	**£1,097,650**

Mineral Surfaced Track and Field Facilities

6.4.9 The condition of mineral track and field facilities has been assessed as:

Table 36
Mineral Track and Field Athletics Facilities - Interpolated Condition Results

Surface Type	Grade 1	Grade 2	Grade 3	Total
Mineral	17	12	8	37
%	**46%**	**32%**	**22%**	**100%**

6.4.10 As has been previously explained in the section on Winter Sports Pitches, upgrading mineral surfaced facilities is not an easy task. A facility assessed as Grade 1 might suffer from erosion and rutting caused by poor surface drainage or water run off from adjacent high land. It is very difficult to remedy these problems in mineral surfaces because the loss of fine grade surface cover materials usually results in the stone sub base rising through the surface and actions designed to maintain the surface

(light scarification, luting and brushing) exacerbate the situation by dislodging further stone materials from the base construction. The only effective remedy is to remove the top surface, reconsolidate the sub base and thereafter import and lay new top surface materials. The costs associated with this type of work are approximately £13.50 m^2. The cost for a 5,800m^2 facility would be £78,300 and to upgrade all 17 of the facilities in this category would cost £1,331,100. Given that mineral surfaces are no longer considered suitable for serious track and field athletics programmes, the cost effectiveness of up rating Grade 1 mineral facilities to Grade 3 must be questioned.

6.4.11 Those facilities which have been assessed as Grade 2 – Requires Rejuvenation could have their surface quality improved by carrying out light scarification or spiking, removal of loose stones, brushing, the application of fresh top dressing materials and light rolling. The cost for this work programmes would be approximately £1.45m^2 giving a cost of £8,410 for a 5,800m^2 facility and a total cost of £100,920 for the assumed national stock of 12 no. Grade 2 mineral track and field facilities.

6.4.12 Given that mineral track and field facilities are not considered entirely suitable for the sport, the wisdom of investing significant capital in upgrading sub standard mineral track and field facilities has to be questioned. It might therefore be more appropriate to convert mineral facilities to polymeric. However, many of these mineral based facilities might not be in the right location to ensure reasonable levels of use and it has not been possible as part of this study to assess the requirements for reconstruction or improvement as against new build at alternative locations. No costs will be carried forward in respect of the upgrading of mineral track and field facilities, but the following indicative costs have been provided for the construction of a new polymeric facility for information and to assist future planning and cost estimating.

6.4.13 The construction costs for a new 8 lane, porous polymeric athletics track with a polymeric 'D' and two sprint straights (making a total area of 5,800 m^2) including a full range of field events, infield constructed to Grade 3 standard using indigenous topsoil, built on a stable level site, would be as follows:

Details	**Cost/m^2**
Topsoil strip and store (15,000 m^2 x £ 0.75)	£ 11,250
Earthworks (assume trimming only)	£ 1,500
Drainage Track	£ 15,850
Drainage Infield (9,000 m^2 x £ 1.85)	£ 16,650
Porous Polymeric Track Const. (5,800 x £ 38.05 m^2)	£ 220,690*
Lining of track (5,800 x £ 1.42)	£ 8,236
Infield Construction (9,000 m^2 x £ 4.75 m^2)	£ 42,750**
Perimeter fencing and spectator rail (5800 x £ 10.50)	£ 60,900
Floodlighting to track and infield (5,800 x £ 15.50)	£ 89,900
Establishment of Infield (9000 x £ 0.91)	£ 8,190***
Sand slitting of Infield (9000 x £ 1.60)	£ 14,400
Total	**£ 490,316**

Notes: * This rate allows for full construction from formation up including – Geotextile, kerbing, stone layer, 2 layers open textured Bitmac, 13 mm polymeric surface and spray coat.

** This rate allows for full construction of infield to Grade 3 standard and includes – Import and respread stored topsoil, cultivations, amelioration with sand, trimming, fertilising and seeding.

*** This rate allows for grass cutting, fertilising, and top dressings with sand.

Fencing

6.4.14 Track and field facilities tend to be fenced for security and control purposes. An average facility would require to be enclosed with approximately 800 metres of 2 metre high weldmesh fencing or equal. Also required would be a 1.2 metre high spectator rail around the track. These two items would cost with the addition of gates and mowing strips etc. some £61,000 per track.

6.4.15 It is estimated that, on average fencing should last approximately 25 years. This would mean that over the course of the study period, the fencing around all tracks would need to be replaced. In view of the uncertainty over the future of mineral facilities, cost estimates have only been prepared for polymeric surfaced facilities:

Replace fencing at 35 track and field facilities @ £61,000 per facility = £2,135,000

6.4.16 Given that not all facilities would need to have fencing replaced at one time, the estimated costs have been disaggregated over 25 years:

Disaggregated costs of replacing fencing over 25 years £85,400 pa.

Floodlighting

6.4.17 The Audit has shown that 29 of the 35 polymeric track and field facilities are floodlit, and that the lighting includes the entire infield. It has been assumed that the lighting is to Club Competition standards - namely 200 Lux. It has been assumed that the six facilities without floodlights would benefit from appropriate provision. The estimated cost per facility of a 200 Lux installation is £93,000, which covers all costs including ducting, column base constructions, and provision of supply. The total cost implications would be:

Install floodlighting to club standard/200Lux at
6 facilities @ £93,000 per facility = £558,000

6.5 Combined Capital Costs

6.5.1 The combined capital costs as indicated above for bringing all polymeric track and field facilities up to Grade 3 – Satisfactory Standard are:

Upgrade 5 Grade 1 facilities to Grade 3		£802,720
Upgrade 15 Grade 2 facilities to Grade 3		£294,930
Replace fencing at 35 facilities		£2,135,000
Upgrade floodlighting at 6 No. facilities		£558,000
	Total	**£3,790,650**

6.5.2 It should be remembered that no provision has been made for the upgrading or conversion of mineral track and field facilities.

6.6 Ongoing Refurbishment and Periodic Maintenance

6.6.1 Polymeric surfaces have a reasonably long life, are quite hard wearing and require low levels of maintenance. However, as the surface is used, parts of it will become smoother and polished, which will result in some impairment of the foothold when the surface is damp, while the continuous action of spiked footwear in heavy use areas will cause the surface to deteriorate. To combat these problems, regular programmes of deep cleaning, retexturing, over lining and relining need to be carried out until such time as it becomes necessary to lay a new surface. On this basis, each polymeric facility might need to implement a periodic maintenance schedule as follows:

Year 1	New
Year 6	Retexture 10% of surface, deep clean and over line.
Year 9	Retexture and reline
Year 15	Retexture 15% of surface, deep clean and over line.
Year 18	Lay new surface and reline
Year 24	Retexture 10% of surface, deep clean and over line.

6.6.2 The cost implications of implementing the above rejuvenation and refurbishment programme for track and field facilities measuring 5,800m^2 would be:

Year 6	Retexture 10%/580m^2 @ £ 9.90 m^2	=	£ 5,742
	Deep Clean 5,800m^2 @ £ 1.25 m^2	=	£ 7,250
	Over Line 5,800m^2 @ £ 1.15m^2	=	£ 6,670
			£ 19,662
Year 9	Retexture 5,800m^2 @ £ 9.90m^2	=	£ 57,420
	Reline 5,800m^2 @ £ 1.42m^2	=	£8,236
			£ 65,656
Year 15	Retexture 15% /870 m^2 @ £ 9.90 m^2	=	£ 8,613
	Deep Clean 5,800m^2 @ £ 1.25 m^2	=	£ 7,250
	Over Line 5,800m^2 @ £ 1.15m^2	=	£ 6,670
			£ 22,533

Year 18	Replace surface 5,800 m^2 @ £21.75m^2	=	£126,150
	Reline 5,800m^2 @ £ 1.42m^2	=	£8,236
			£ 134,386
Year 24	Retexture 10%/580 m^2 @ £ 9.90 m^2	=	£ 5,742
	Deep Clean 5,800m^2 @ £ 1.25 m^2	=	£ 7,250
	Over Line 5,800 m^2 @ £ 1.15m^2	=	£ 6,670
			£ 19,662
Total 25 year periodic maintenance cost per 5800m^2 track			**£ 261,899**

6.6.3 The above 25 year periodic maintenance figure is based on the assumption that all tracks are 5,800 m^2. However, examination of the Audit results shows that the size of track and field facilities can range from 6,750m^2 for an 8 lane circuit with 10 lane straight and with both 'D' areas in full polymeric to 800 m^2 for a 'J' track. Bearing this in mind, the average area of polymeric over the 35 facilities is 4,482 m^2. Therefore, if the 25 year periodic maintenance costs are recalculated to reflect the average area of polymeric, the 25 year cost reduces to £202,385.

6.6.4 If the total 25 year periodic maintenance costs are applied to the national stock of 35 polymeric facilities, the following results:

Total 25 year periodic maintenance costs for 35 polymeric track and field facilities @ average of £202,385 per track **£7,083,475**

6.6.5 Given that periodic maintenance actions are not all carried out at the same time, the best way of identifying future annual commitments is to disaggregate the total costs over the 25 year study period:

Disaggregated annual costs over 25 years **£202,385**

6.7 Maintenance of Track and Field Facilities

6.7.1 By their nature, polymeric surfaces are extremely durable, being designed to satisfy arduous performance test criteria whilst withstanding constant spike use in varying climates. However, there is no such thing as a 'maintenance-free' sports surface, and all polymeric track surfaces will require a modest degree of maintenance. This basic maintenance is of vital importance if the surface is to remain good to look at, consistent in performance, safe for the athlete to run and jump on and long lasting. Indeed, the installer's guarantee will usually be conditional on the recommended maintenance requirements being carried out with reasonable diligence.

6.7.2 Maintenance procedures are designed to ensure that:

- the synthetic track and field event surfaces are kept scrupulously clean

- the synthetic track and field event surfaces are safe for all standards of user
- in the case of a porous system, the free drainage of surface water is maintained throughout the life of the track
- the facility looks attractive and well-kept at all times

These objectives are achieved by:

- sweeping leaves and other detritus from the surface
- washing the surface to remove contaminants such as grime, algae, moss, sand, etc
- applying prophylactic treatments of moss-killer and/or algaecide
- periodically removing weed growth from the perimeter kerb lines

6.7.3 Leaves, tree flowers, pine needles and other detritus should not be allowed to remain on the surface for any length of time. If this does happen, they rapidly rot down, forming a contaminating 'skin' on the surface and providing a growing medium for algae and moss.

6.7.4 A mechanical leaf-sweeper or vacuum cleaner is ideal for removing vegetable matter and other rubbish. Restricted areas may have to be undertaken by hand. At least once a year, it is advisable to wash the surface with high-pressure jetting apparatus.

6.7.5 At all track venues, both pedestrians and maintenance machinery require regular access to the central grassed area. It is good practice to provide protection for the track surface at regular pedestrian crossing points, e.g. from the dressing room on to a central pitch. This protection could take the form of rollout matting to ensure that mud from football boots does not contaminate the track surface. It is wise to provide plywood or similar sheeting to allow access to the central area for grass cutting machines, etc.

6.7.6 Polymeric surfaces are comparatively easy to maintain, keeping the surface clean being the only routine maintenance that the surfaces should require. A typical routine maintenance schedule might comprise:

Daily

Check facility, fixtures and fittings.
Remove litter and debris as required.

Weekly

Remove dust, leaves, rubbish and other detritus from the surface.

Monthly (or thereabouts depending upon the cleanness of the surface).

Wash the surface if it has become stained, with a mild detergent and soft brush.

Annually

Power wash the polymeric surfaces.
Treat with fungicide and algaecide as necessary.
Check the surfaces carefully. Call in the installer if there is any cause for concern or it is suspected that the surface needs re-coating.

6.7.7 It has been assumed that each track and field facility will have on site staff to carry out these maintenance works and that the average annual costs per facility would be:

Annual cost for daily weekly and monthly tasks	£1,200
Cost for annual treatment with fungicide and algaecide	£600
*Cost for annual power wash of 5800m^2 facility @£0.15 m^2	£870
Total	**£2,670**

Note: ***This power wash differs from the deep clean wash allowed above in the 25 year cycle in that it is a light clean to soiled areas allowing say two men for a day with pressure washer.

6.7.8 If applied to the assumed stock of 35 polymeric facilities, the following annual cost implications would arise nationally:

Maintain 15 No. 8 lane polymeric facilities @ £2,670 per facility pa. =	£ 40,050
Maintain 12 No. 6 lane polymeric facilities @ £2,470 per facility pa. =	£ 29,640
Maintain 5 No. 4 lane polymeric facilities @ £2,070 per facility pa. =	£ 10,350
Maintain 3 No. J track polymeric facilities @ £1,850 per facility pa. =	£ 5,550
Total annual maintenance costs	**£85,590**

Floodlighting

6.7.9 Floodlighting needs to be routinely maintained if it to meet the performance requirements effectively over its working life. Maintenance actions should include routine work on the electrical services, cleaning of fittings and adjustment of aiming angles. When performance falls below the specified level or when individual lamps fail, all lamps should, ideally, be replaced as a complete set and not as individual units. Appendix 3 comprises a 25 year maintenance schedule and costs for a 350 Lux hockey pitch. Given the increased area of an athletics track, costs have been increased by 12.5% providing an estimated total 25 year maintenance cost of £96,630. This averages out at £3,865 a year. If applied to the 29 polymeric track and field facilities with floodlights, the total costs are:

25 Average cost per facility per year	£3,865
25 Year maintenance costs for floodlights – per facility	£96,630
Average national cost per year for all facilities with floodlights	£112,090
Total 25 year costs for all facilities with floodlights 29 facilities x £96,630 per facility	£2,802,270

6.8 Composite Revenue Costs

6.8.1 The estimated composite annual revenue costs for the nation's stock of polymeric track and field facilities are:

Polymeric surfaces	£85,590
Floodlights	£112,090
Total	**£197,640**

6.8.2 The costs for periodic maintenance of polymeric track and field facilities are estimated to be:

Polymeric track and field facilities:	
Total 25 year national cost for periodic maintenance	£7,083,475
Average annual national periodic maintenance costs	£283,339

6.9 Conclusion

6.9.1 Grass tracks have been discounted from consideration as, while they contribute to the grass roots development of the sport in schools etc., they are temporary facilities laid out on playing fields. The condition and distribution of mineral track and field facilities has been noted and the works and cost implications of bringing them up to an acceptable standard has been calculated. However, mineral track and field facilities are not considered to be entirely suitable for the practice of, and participation in the sport and it is uncertain whether all are appropriately located to warrant investment in upgrading to polymeric. The main thrust of the report on track and field facilities therefore concentrates on the 35 polymeric installations and the six "J" training tracks which presently exist.

6.9.2 Of the 35 polymeric track and field installations in Scotland, 20 (57%) fell below the Grade 3 Satisfactory Standard. Five of the 20 facilities which did not meet the Grade 3 standard were Graded 1 and require to be refurbished; 15 were Graded 2 and are in need of rejuvenation. These findings are disappointing and reinforce the general perception that insufficient attention is being paid to the maintenance of expensive facilities.

6.9.3 The total cost of upgrading sub-standard facilities to Grade 3 standard would be a quite modest £3.8m. Thereafter, annual periodic maintenance costs averaging £0.2m would need to be spent nationally on refurbishment and rejuvenation, a figure which is not currently being invested.

6.9.4 Annual routine maintenance costs have been estimated at £2,670 per facility or £0.2m nationally, and it is probable that site owners and managers are meeting this requirement.

6.9.5 A case could be made for converting some mineral facilities to polymeric and for providing new track and field complexes but no attempt has been made to assess this requirement. However, a cost indication of circa £490,000 per facility allows planners and managers to assess the viability of making a commitment to the sport as part of their local sports pitch and facility strategies.

Part 3.7

Cricket Facilities

7 Cricket Facilities

7.1 Pitch and Sports Requirements

7.1.1 For the purposes of this study, cricket pitches are defined as outdoor cricket wickets and outfields essential for the playing of cricket. Additional facilities which are usually to be found in cricket grounds are practice facilities/nets and possibly a score board/box. The study has taken no account of indoor facilities which might be used for cricket practice.

7.1.2 The prime requirement for cricket is a suitable cricket table which, for economy of land use, is usually combined with winter sports pitches although, a minority of cricket grounds have outfields which are used only for cricket. Grass hockey pitches have historically tended to provide the best outfield for cricket given the better quality of grass and truer surface usually to be found in these facilities. Football pitches can also provide suitable outfields for cricket but rugby pitches, because of the considerable disturbance to the pitch surface which can result from normal play, can not usually provide a sufficiently fast, true and safe surface.

7.1.3 Formal cricket wickets are constructed using techniques which differ greatly from most other natural grass facilities. The performance aim of a cricket wicket is for a regular surface which will have the capability to allow a ball to rebound from its surface without absorbing too much of the downward force applied by the bowler. The surface consequently must allow for a regular bounce and should be true to line and level to avoid dangerous conditions. Providing the desired playing characteristics and a natural grass surface which is capable of draining and sustaining grass growth is very difficult to achieve.

7.1.4 A new, modern wicket would be formed by excavating the area of the wicket (generally 825 square metres or thereby) and thereafter creating a construction profile which would include a drainage system below a gravel raft over which would be laid a depth of free draining sand loam and finally a depth of carefully selected clay loam which would be consolidated and seeded. Once the construction has become established, the wicket is prepared for play by watering, close cutting and rolling to produce a very firm level surface.

7.1.5 Because of the high levels of wear which cricket wickets can experience, artificial wickets are often laid alongside the natural grass cricket table to facilitate play in adverse weather conditions and for practice purposes. Artificial wickets are used extensively for junior and casual games etc. as they can sustain heavy play in even poor weather conditions.

7.1.6 Cricket practice nets are often provided on the outfield boundaries of cricket grounds and these can be of natural grass, artificial grass, polymeric and rubber or coir matting loose laid over a concrete sub-base.

7.2 Cricket Pitch Classification Grades

7.2.1 The prime assessment for cricket facilities has been assumed to relate to the condition of the wicket. For both natural grass and artificial cricket wickets, three condition classifications have been identified. These are:

Natural Grass and Wickets

Grade 1 - Requires Replacement;
Grade 2 - Requires Renovation;
Grade 3 - Satisfactory Standard.

Artificial Surfaced Wicket

Grade 1 - Requires Replacement;
Grade 2 - Requires Rejuvenation;
Grade 3 - Satisfactory Standard.

For both natural grass and artificial wickets, a Grade 3 Satisfactory Standard facility is one which has been constructed in accordance with recognised technical and performance specifications and has been maintained appropriately so that the required performance and playing characteristics have been preserved.

A Grade 2 - Requires Renovation or Rejuvenation standard facility is identified as one where the surface has deteriorated but is capable of being brought back up to Grade 3 Satisfactory Standard without the need for reconstruction.

A Grade 1 - Requires Replacement or Refurbishment standard facility is identified as one where the playing surface has deteriorated to such an extent that it requires to be resurfaced or reconstructed.

7.3 Audit Findings

7.3.1 The Audit surveyed 43 natural grass and 14 artificial cricket wickets with the following results.

Table 37
Audit Results: Natural Grass and Artificial Grass Cricket

Surface Type	Grade 1	Grade 2	Grade 3	Total
Natural Grass Squares	1	15	27	**43**
%	2%	35%	63%	**100%**
Artificial Wickets	4	4	6	**14**
%	29%	29%	42%	**100%**
Total	**5**	**19**	**33**	**57**

7.3.2 The Audit also identified 14 artificial grass cricket practice wickets. If this result is interpolated to the national stock of cricket squares, it would imply that there are some 70 twin bay cricket practice net facilities with artificial grass surfaces.

7.3.3 The audit identified that 37% of natural grass wickets and 58% of artificial wickets fell below the Grade 3 Satisfactory Standard. If the Audit findings are interpolated to the **sport**scotland data base of facility provision, the following picture emerges:

Table 38
Interpolated Condition of National Stock of Natural Grass and Artificial Grass Cricket Wickets

Facility Type	Grade 1	Grade 2	Grade 3	Total
Natural Grass Wickets	4	71	128	**203**
%	2%	35%	63%	**100%**
Artificial Grass Wickets	15	15	21	**51**
%	29%	29%	42%	**100%**
Total	**19**	**86**	**149**	**254**

7.4 Improvement Proposals

7.4.1 Proposals have been developed which relate to the improvement and upgrading of facilities used for match play and for practice. It is accepted that some outfields might be less than ideal and, in the main, problems are likely to be associated with poor drainage. In this circumstance, drainage problems are likely to be less severe in summer months and it is assumed that it will be possible to create suitable outfields on existing sports pitches. In the longer term, if the development proposals for winter sports pitches contained elsewhere in this report are implemented, the condition of those cricket outfields which are located on them should improve markedly.

7.4.2 The main problems which a cricket wicket is likely to experience are:

- Unsuitable gradient. This will be a basic construction problem and the only way of remedying it would be to reconstruct the square.

- Surface evenness. This problem will likely arise as a result of ground movement or collapsed drains and will probably require total or partial reconstruction of the cricket square. The problem can also be caused long term by poor maintenance and inadequate and inappropriate reinstatement of wickets after matches. Wicket ends and ball landing zones must be repaired thoroughly by vigorous scarification and topdressing to avoid 'breaks' or layering in the topsoil. Where these works have not been diligently carried out then over a period these areas can become unstable.

- Surface drainage. This problem is likely to be most severe where the cricket square is lower than the surrounding outfield and accepts surface water or if there is a high water table. There can also be problems caused through poor selection of topdressing materials and applications that can cause layering in the topsoil and consequently capillary breaks. Insufficient topsoil depth on the square when the square was constructed can also cause drainage problems.

- Surface quality. This problem is likely to be caused by poor or inappropriate remedial works following play (see above). Other problems can be caused by thatch build up (too much organic material in the topsoil) and this can lead to the surface breaking up quickly under play particularly, in dry conditions.

- Loss of grass cover or inappropriate grass species. There are a variety of causes of loss of grass cover. It might be related to poor drainage, lack of nutrition, inappropriate maintenance actions or regimes, disease etc. Remedial action will depend upon the causes of the problem(s) but, with the exception of poor drainage, is unlikely to necessitate the reconstruction of a square. If the square has been poorly maintained over a period, the mixture of grass species may be diluted with weed grasses. These will not have the ability to sustain play and recover or can make the surface unsuitable for high standards of play giving irregular bounce etc.

7.4.3 The problems listed above are just some which can be encountered on cricket squares and there are a number of possible remedies all of which cannot be detailed here as remedial packages will be site specific. However, in order to provide some costed solutions for this study, a range of works have been identified which could be considered, either in isolation or together, to improve standards.

7.4.4 The condition assessments from the Audit and interpolated to the assumed national stock of facilities will probably require a range of works to be carried out to bring all facilities up to the identified Grade 3 Satisfactory Standard. The actions needing to be taken might include the following:

- Reconstruction of a cricket square or, for less severe problems, the removal of the top surface then amendment of the topsoil and replacement of the clay loam. These are fairly robust actions that would only be required in the worst case scenarios. It has been assessed that 10% of those cricket squares Graded 1 will need to be completely reconstructed to bring them up to Grade 3 standard, while the remaining 90% will need to be improved by the removal of the top surface.

- Identifying the works requirements to bring cricket squares classified as Grade 2 up to Grade 3 Satisfactory Standard proved to be difficult in that the causes of the problems tended be varied. For example,

closer examination of a Grade 2 wicket with problems identified as 'surface unevenness' might reveal that the underlying problems are so severe that it should more properly have been classified Grade 1. Further examination has revealed that this might be the situation in 10% of the facilities classified as Grade 2 and the cost estimates have assumed that these facilities will need to be resurfaced as described above. It has been assumed that the balance of 90% of cricket squares will require a full programme of deep hollow coring, scarification and top dressing works.

7.4.5 Detailed below is the current best practice construction specification for a new cricket wicket which differs from older, more established facilities in that it includes a construction profile including drainage raft etc. which might not always be found in existing squares. The works detail and indicative costs of a new cricket wicket of 825m^2 would comprise:

Ref	Details	Qty	Cost/M2	Sub Total
9	Earthworks	1	£5.00	£5.00
29	Drainage	1	£3.20	£3.20
47	Gravel layer	1	£3.85	£3.85
50	Grit Layer	1	£1.95	£1.95
85	Topsoil 200mm/Clay Loam 100 mm	1	£17.75	£17.75
20	Chemical Additives	2	£0.17	£0.34
71	Seeding	1	£0.30	£0.30
58	Irrigation system - manual	1	£3.80	£3.80
42	Grass Cutting – First year	60	£0.060	£3.60
6	Annual Maintenance Programme	1	£2.850	£2.85
	Cost per square Metre			£42.64
	Cost per 825m^2 Wicket			£35,178.00

7.4.6 If a new cricket specific facility was being provided it would be necessary to provide an appropriate outfield and practice facilities. The cost of a 20,000m^2 outfield, constructed to winter sports pitch Grade 3 Satisfactory Standard, would be as described in Example 1 in the Winter Sports Section and, assuming that such a facility was constructed on a level site, indicative costs would be £2.88 m^2.

Cost of Outfield 20,000 m^2 x £ 2.88 m^2 £ 57,600

7.4.7 A new cricket facility would also be provided with cricket practice nets. It is assumed that these will be in artificial grass, although it is possible that clay loam wickets might be provided at the higher levels of the sport. A new artificial grass cricket practice facility with 2 bays would allow two wickets with a 11m x 2.74m batting end and an 8m x 2.74m bowling end.

Total cost of 2 bay cricket practice net installation £19,000

7.4.8 Based on the above estimates, the cost of providing a new cricket facility (excluding pavilion etc) would be in the order of £111,778. However, it is unlikely that a 'cricket only' facility would be constructed in Scotland at this time and it is more probable that the outfield would be purpose built winter sports pitches fulfilling a dual function.

7.4.9 If the surface of a cricket square is giving problems, it might be necessary to remove it, improve the drainage and resurface it with an approved cricket loam. If the square being upgraded is a first class/national standard facility, the materials used to reconstruct the square may differ slightly from those used for a club standard facility. For example, it would not be normal to ameliorate or use a sandy loam under the clay loam on a first class/national standard facility as the wickets are normally protected with covers and this form of construction may affect the bounce. However, for the majority of club standard cricket squares, given the prevailing weather conditions in Scotland, a sandy loam would be the ideal substrate to the clay loam surface in that it would improve drainage. The works specification and cost implications for this form of construction would be:

Ref	Details	Qty	Cost/M2	Sub Total
137	Remove existing surface	1	£3.75	£3.75
2	Ameliorate with sand	1	£2.85	£2.85
29	Drainage	1	£3.20	£3.20
85	Clay Loam 100 mm	1	£14.75	£14.75
20	Chemical Additives	2	£0.17	£0.34
71	Seeding	1	£0.30	£0.30
42	Grass Cutting – First year	60	£0.060	£3.60
6	Annual Maintenance Programme	1	£2.850	£2.85
	Cost per square Metre			£31.64
	Cost per 825m^2 Wicket			£26,103.00

7.4.10 Where the upgrading of a Grade 1 wicket does not require total reconstruction and a new drainage installation, the cost would be £ 28.44 m^2 or £23,463 for the complete job.

7.4.11 As stated above the works involved in upgrading a Grade 2 classified square to Grade 3 could involve reconstructive works or a very robust and intensive maintenance programme. It has therefore been assumed that 10% of Grade 2 squares will need the top surface removed as described above while the other 90% (64) would require the following programme to achieve Grade 3 Satisfactory Standard.:

Ref	Details	Qty	Cost/M2	Sub Total
146	Hollow core and remove cores	1	£0.50	£0.50
147	Scarify	1	£0.45	£0.45
148	Top dress with Cricket Loam 5 Kg	1	£1.75	£1.75
145	Apply fertiliser	1	£0.15	£0.15
17	Chemical Additives	1	£1.00	£1.00
20	Chemical Additives	2	£0.17	£0.34
71	Seeding	1	£0.30	£0.30
42	Grass Cutting – First year	60	£0.060	£3.60
6	Annual Maintenance Programme	1	£2.850	£2.85
	Cost per square Metre			£10.94
	Cost per 825m^2 Wicket			£9,025.00

7.4.12 Based upon these works programmes and cost schedules, the cost implications of bringing all natural grass cricket wickets up to Grade 3 Satisfactory Standard are:

Bring 1 No. Grade 1 825m^2 grass wickets up to Grade 3 standard by reconstruction @ £31.64 per m^2	£26,103
Bring 3 No. Grade 1 825m^2 grass wickets up to Grade 3 standard by Partial reconstruction @ £28.44 per m^2	£70,389
Bring 7 No. Grade 2 825m2 grass wickets up to Grade 3 standard by Partial Reconstruction @ £28.44 per m^2	£164,241
Bring 64 No. Grade 2 825m2 grass wickets up to Grade 3 standard by Partial Reconstruction @ £10.94 per m^2	£577,632
Total cost of upgrading natural grass cricket squares	**£838,365**

7.4.13 The interpolated Audit results identify that there are 30 artificial grass wickets falling below the recommended Grade 3 Satisfactory Standard. Replacement of an artificial grass cricket wicket carpet is quite an easy process, involving the removal and disposal of the old carpet, the levelling of the base and the fitting of a new carpet. Indicative costs for an 85m^2 carpet would be in the order of £3,500. In view of this relatively low cost, it is suggested that the most cost effective way of bringing all artificial grass wickets up to the Grade 3 Satisfactory Standard would be to simply replace the carpet surfaces:

Bring 30 No artificial grass wickets up to Grade 3 Standard by @ £3,500 per m^2	£105,000
Total cost of improving artificial grass cricket wickets	**£105,000**

7.4.14 Other capital costs which might need to be incurred could include the improvement and maintenance of security fencing and the provision of score boards/scorekeepers boxes. In respect of fencing, it has been assumed that most cricket facilities are part of larger outdoor sports complexes and that the costs of improving and maintaining fencing has been taken account of in the section on winter sports pitches.

It has been assessed from the Audit returns that 64% of cricket facilities would benefit from the provision of a score board and score box. A simple masonry structure would cost some £5,000 to install. The cost implications would therefore be:

Provide 130 No, score boards/boxes @ £5,000 per unit **£650,000**

7.4.15 It has been assumed that there is no need for floodlighting on outdoor cricket facilities in Scotland.

7.5 Combined Capital Costs

7.5.1 The combined estimated capital costs as indicated above for bringing all cricket play and practice facilities up to Grade 3 – Satisfactory Standard are:

Upgrade 75 No. natural grass cricket wickets	£838,365
Upgrade 30 No. artificial grass cricket wickets and practice wickets	£105,000
Provide or upgrade 130 No. score boards/score boxes	£650,000
Total cost of improvement to cricket squares and practice facilities	**£1,623,365**

7.6 Ongoing Refurbishment and Periodic Maintenance

Natural Grass Wickets

7.6.1 Natural grass cricket wickets have no particular periodic maintenance requirements due to the nature of their construction. This is not to suggest that problems will not arise which will require remedial works but it is not possible to predict these. If serious problems arise, they are likely to need major works to rectify as previously detailed. Minor problems should be able to be rectified by routine maintenance. This includes solid and hollow tining procedures at approximately £300 per action but the annual cost estimates identified later make provision for this.

Artificial Grass Wickets

7.6.2 Cricket wickets are subject to high levels of wear due to the intensity of use and the type of footwear used. On natural grass cricket squares, wear is mitigated by preparing wickets on different parts of the surface. However, this is not possible on artificial grass wickets and eventually they will wear out and need to be replaced. It is assumed that the life of an artificial grass wicket (and practice wicket) is about eight years although it is accepted that many are made to last considerably longer. In addition every 4 years

the ends of the wickets should be repaired. This would mean that over a 25 year time span, the periodic maintenance schedule for an artificial grass cricket wicket would be as follows:

Year 1	New
Year 4	Repair Ends
Year 8	Replace Carpet
Year 12	Repair Ends
Year 16	Replace Carpet
Year 20	Repair Ends
Year 24	Replace Carpet

7.6.3 Over the 25 year span covered by this study, each artificial grass cricket surface should therefore be repaired three times and have the carpet replaced three times. The cost of replacing an existing 85m^2 carpet is estimated at £3,500. The cost implications of this schedule for wickets and practice facilities would be:

Replace 85m^2 carpet match wicket 3 times in 25 years at £3,500 per occasion	£10,500
Repair ends 3 times in 25 years at £ 400 per occasion	£1,200
Total 25 year costs for single artificial wicket	£12,900
25 year costs for 51No. artificial grass wickets	**£657,900**
Replace 104m^2 twin bay net practice carpet 3 times in 25 years @ £4,270 per occasion	£12,810
Repair ends of twin bay net practice carpet 3 times in 25 years @ £488 per occasion	£1,464
Total 25 year costs for single twin bay artificial grass practice net wicket	£14,274
25 year costs for 70 No. twin bay artificial practice net wickets	**£999,180**
Total periodic maintenance costs for artificial wickets and nets	**£1,657,080**

7.6.4 The average annual national cost of periodic maintenance, disaggregated from the 25 year total is £66,283

7.7 Maintenance of Cricket Facilities

7.7.1 The routine maintenance of natural grass cricket square is designed to create a true, fast, even bounce surface suitable for the playing of cricket. Necessary works actions will include:

- Grass cutting by hand on the square maintaining the height at say 6 mm over the square through the season and effectively 'shaving' the surface of the wicket due to be played. Allow cutting 3 times per week April till end of September in total 80 cuts pa.
- Rolling the square 3 times per week from April till end of September and additional rolling of wicket being prepared for play.

- Setting up wickets for play weekly.
- Repairing wickets after play – scarify, top dress and over seed.

Some maintenance might be contracted out including:

- Start and end of season maintenance – aeration, scarifying, solid tining, top dressing and over seeding etc.
- Chemical treatments – including 6 No applications of fertiliser, applications of selective herbicide and fungicide as required.
- Cutting outfield, allowing for 60 cuts pa.
- Apply fertiliser – 4 applications pa.
- Aerate through tining – 4 procedures pa.

7.7.2 Indicative costs for the above outlined maintenance programme carried out on a typical ground are:

Routine maintenance on 825m^2 square and outfield	£ 27,000
Specialist Maintenance on square at the start and end of season, chemical treatments etc. -	£ 2,500
Total annual cost per 825m2 cricket square	£ 29,500
Annual cost of maintaining 203 natural grass wickets at £29,500 pa	**£5,988,500**

7.7.3 Artificial grass wickets and practice facilities are less labour intensive than natural grass wickets and require comparatively little maintenance. Care needs to be taken to ensure that detritus and decomposable materials are not allowed to build up on the synthetics and that fungicide and algaecide is applied regularly. During the off season it might be necessary to lift the carpet and level the sand base to ensure that a true surface continues to be provided.

7.7.4 The main action which would not be included in the programmes for the wider site would be the applications of algaecide and fungicide say, 2 times per annum. Cost implications would be:

Apply fungicide/algaecide to 85m2 wicket 2 times pa	£40
Total cost for 51 no artificial grass wickets @ £40	£2,040
Apply fungicide/algaecide to 104m^2 twin bay artificial grass practice net wicket @ 2 times pa	£50
Total cost for 70 No. twin bay practice net facilities @£50	£3,500
Annual cost of maintaining artificial grass wickets and practice facilities	**£5,540**

7.8 Composite Revenue Costs

7.8.1 The composite annual estimated revenue costs for natural and artificial grass cricket facilities are:

Natural grass facilities	£5,988,500
Artificial grass cricket wickets and practice facilities	£5,540
Total annual maintenance costs for natural and artificial grass match and practice facilities	**£5,994,040**

The total annual periodic maintenance costs for natural grass and artificial grass cricket facilities are estimated to be:

Average annual periodic maintenance costs	**£66,283**
Total national annual cost for maintenance and periodic maintenance of cricket facilities	**£6,060,283**

7.9 Conclusion

7.9.1 Although cricket is a minority sport in Scotland as a whole it is an activity which is pursued enthusiastically and to a reasonable standard in some areas and determined efforts are being made to raise the standards of performance at club and international level.

7.9.2 Throughout Scotland there are some 254 natural grass cricket squares and 51 artificial grass wickets. Climatic conditions in parts of the country make it very difficult to create and maintain high quality cricket squares. The interpolated Audit results indicate that approximately 37% of natural grass cricket squares and 58% of artificial grass wickets fall below the identified Grade 3 Satisfactory Standard for facilities. The capital cost implications of raising all facilities to Grade 3 standard are estimated to be £1.6m. In addition, over a 25 year period there would need to be expended approximately £1.7m (an average of £66,283 pa) on periodic maintenance and refurbishment. If taken in isolation, these costs do not seem to be too high.

7.9.3 All outdoor sports pitches and courts need to be maintained properly if they are to retain their quality and desired playing characteristics, but cricket is particularly damaging to the grass sward and high levels of specialised maintenance are necessary. The estimated annual costs of maintaining the country's stock of cricket facilities would be approximately £5.9m if all works were carried out by skilled grounds staff. However, many cricket wickets are maintained wholly or in part by club members in an effort to reduce costs and the total national annual cost is likely to be significantly less.

Part 3.8

Bowling Greens

8 Bowling Greens

8.1 Green and Sports Requirements

8.1.1 For the purposes of this study, bowling greens are defined as outdoor facilities used for flat green bowling. The principal requirements for a bowling green are a true flat surface of a minimum of 31 x 31 metres which is not too fast or too slow, which provides the correct amount of bias and resists indentation and permanent deformation. The most common dimension from the Audit returns was 34 x 34 metres although, in new constructions, greens measuring 38 x 38 metres and 40 x 40 metres are being increasingly specified. Bowling greens are predominately natural grass but a limited number of artificial surfaced facilities have been provided throughout the country. Greens are usually provided in sheltered enclosed areas and have associated changing and club house facilities. There might be between one and four greens in a bowling complex.

8.1.2 Although the minimum regulation size for a bowling green is 31 x 31m smaller and irregular sized facilities have been provided at some older locations. The minimum length for a green is 31 metres for competition however there are a number of facilities where there is a restrict width which prevents the play from being rotated.

8.1.3 The construction of natural grass greens has historically allowed for a piped drainage system below, occasionally a stone drainage raft with a blinding layer (often comprising black ash) and a layer of light sandy loam ranging from 100 – 250 mm. The main problems which can arise in the construction and performance of a green can include the collapse of the edges retaining the greens at the ditches, the fusing or degradation of the ash layer over a long period whereby it becomes impervious and the build up of silt or other materials within the rootzone which inhibit its drainage characteristics.

8.1.4 Artificial surfaced greens are still a rarity but they tend to be non-bladed synthetic textile laid on a concrete or Bitmac sub-base. The reputed advantage of artificial surfaces is low maintenance which comprises little more than regular sweeping or vacuuming, the occasional wash down and prevention of moss and algae infestation. However, the carpet surface does have to be replaced at intervals, approximately every 12 years, which can be costly.

8.2 Green Classification Grades

8.2.1 For both natural grass and artificial bowling greens, three classifications have been identified. These are:

Natural Grass Greens

Grade 1 - Requires Replacement;
Grade 2 - Requires Renovation;
Grade 3 - Satisfactory Standard.

Artificial Surfaced Greens

Grade 1 - Requires Replacement;
Grade 2 - Requires Rejuvenation;
Grade 3 - Satisfactory Standard.

8.2.2 For both natural grass and artificial greens, a Grade 3 Satisfactory Standard facility is one which has been constructed in accordance with recognised technical and performance specifications and has been maintained appropriately so that the required performance and playing characteristics have been preserved.

A Grade 2 - Requires Renovation or Rejuvenation standard facility is identified as one where the surface has deteriorated but is capable of being brought back up to Grade 3 - Satisfactory Standard without the need for reconstruction.

A Grade 1 - Requires Replacement or Refurbishment standard facility is identified as one where the playing surface has deteriorated to such an extent that it requires to be reconstructed or resurfaced.

8.3 Audit Findings

8.3.1 The Audit surveyed 378 natural grass bowling greens of which 367 were 31 x 31 metres or larger and 11 were small size.

Table 39
Audit Results: Natural Grass Bowling Greens

Surface Type	Grade 1	Grade 2	Grade 3	Unspecified	Total
Full Size Natural Grass	19	88	243	17	**367**
Small Size Natural Grass	2	1	4	4	**11**
Total	**21**	**89**	**247**	**21**	**378**
%	**6%**	**23%**	**65%**	**6%**	**100%**

8.3.2 The audit identified that overall, 29% of natural grass bowling greens fell below the Grade 3 Satisfactory Standard and are in need of remedial

treatment. However, it is thought that the Audit results do not accurately reflect the actual number of small size bowling greens in Scotland and that these probably make up some 5% of the total stock. The reason for the small sample is probably because small greens tend to have less formal infrastructures in terms of membership, secretariat etc. and this has resulted in the low response rate. If the Audit findings and the assumptions concerning small size greens are interpolated to the 1,282 natural grass bowling greens listed on the **sport**scotland data base, it would seem to indicate that 1,218 greens are full size and 64 are small size. If the condition survey results, with unspecified returns apportioned pro-rata, are applied to these figures, the following picture emerges:

Table 40
Interpolated Condition of National Stock of Natural Grass Bowling Greens

Surface Type	1	2	3	Total
Full Size Natural Grass	61 5%	305 25%	852 70%	**1218**
Small Size Natural Grass	18 29%	10 15%	36 56%	**64**
Total **%**	**79** **6%**	**315** **25%**	**888** **69%**	**1282** **100%**

8.3.3 The Audit did not allow a conclusion to be drawn about the condition of embankments surrounding greens. However, it is generally accepted that, for future maintenance purposes, it would be beneficial if all greens had their embankments replaced. Some progress has already been made in this regard and the Audit identifies that some 37% of greens (507 No.) had had artificial grass embankments installed, leaving some 63% (807 No.) of greens still in need of treatment.

8.3.4 Only one artificial surfaced green was surveyed and its condition was found to be a Grade 2. It is obviously not possible to apply the results to the assumed national stock of 12 artificial grass bowling greens but, because the numbers of greens involved is so small, the cost implications of bringing them up to Grade 3 Satisfactory Standard have not been calculated. However, if the required regular programme of annual maintenance including treatment with algaecide and fungicide and clearing of vegetation is carried out, the carpet surface of an artificial green should last for approximately 12 years and these cost implications have been taken account of in the periodic maintenance requirements section. The replacement cost of the carpet is £25 per m^2 including the cost for disposal.

8.4 The Upgrading Process

8.4.1 Where a green has deteriorated over a period it is unlikely that there has been a catastrophic failure that would require the green to be completely rebuilt. The problems most often encountered on natural grass bowling greens in Scotland are typically one of the following:

- Loss of surface levels – caused by the collapse of ditch boards, poor initial construction, collapse of green formation or drainage system.
- Loss of surface drainage - due to failure of piped drainage system, compaction of stone or blinding layer, collapse of the topsoil structure and/or surface contamination.
- Poor sward vigour – due to poor surface water drainage, poor maintenance, loss of structure, disease etc.
- Need to replace soil/turf green embankments with artificial embankments.

8.4.2 While it is not possible to provide a single simple explanation for the deterioration of a natural grass bowling green, the following works programmes might reasonably be expected to cope with the most common problems which arise.

Reconstruction of Existing Green

8.4.3 If the problem is a structural one such as a collapse of the green due to the failure of the drainage raft, the drainage system or some other default which will require intrusive works, this may make it necessary to disturb the entire green. Works involved would include removal and disposal of the existing turf, amelioratation of the topsoil with approved sand, replacement of ditch boards if required, installation of new drains if required, agitation of the drainage raft, returfing or seeding of the green. If the actual topsoil is found after testing to be unsuitable then the entire green profile would require to be replaced.

8.4.4 The cost implications of this work schedule for a 34 x 34 metre (1156m^2) green would be as follows:

Table 41: Indicative Costs for the Reconstruction of an Existing Green

Ref	Details	Qty	Cost/M2	Sub Total
8	Earthworks	1	£6.00	£6.00
25	Drainage	1	£5.62	£5.62
47	Gravel layer	1	£3.85	£3.85
49	Grit Layer	1	£1.95	£1.95
66	Sand layer	1	£6.50	£6.50
62	Rootzone layer	1	£8.10	£8.10
16	Chemical additives	1	£0.80	£0.80
54	Irrigation system - automatic	1	£5.20	£5.20
51	Install artificial bankings	1	£7.45	£7.45
94	Trimming surface	1	£0.30	£0.30
96	Turfing with rootzone turf	1	£5.00	£5.00
139	Top dress with rootzone	2	£ 1.05	£2.10
5	Maintenance programme	1	£2.85	£2.85
140	Roll with turf iron	2	£0.20	£0.40
41	Cut grass	6	£0.06	£0.36
	Cost per square Metre			£56.18
	Cost per 1,156m^2 Green			£64,944

Partial Reconstruction of Existing Green

8.4.5 There is the slightly less obtrusive scenario where the underlying drainage system and layers are intact and the problems are caused by the build up of impervious layers within the topsoil / rootzone. There are ongoing maintenance works which can assist in relieving these problems and these are described below under the second option. There can be stages reached however where the problem has degenerated to an extent that the only solution is to partially reconstruct the green by removing the contaminated layer and amending it before reinstatement. In such scenario the following works would have to be required:

Table 42: Indicative Costs for the Partial Reconstruction of an Existing Green

Ref	Details	Qty	Cost/M2	Sub Total
101	Stripping existing turf	1	£0.80	£0.80
94	Remove contaminated topsoil	1	£1.00	£1.00
3	Amelioration with sand	1	£3.20	£3.20
54	Install irrigation system - automatic	1	£5.20	£5.20
51	Install artificial bankings	1	£7.45	£7.45
94	Trimming of surface	1	£0.30	£0.30
16	Chemical additives	1	£0.80	£0.80
96	Turfing with rootzone turf	1	£5.00	£5.00
139	Top dress with rootzone	2	£ 1.05	£2.10
5	Maintenance programme	1	£2.85	£2.85
140	Roll with turf iron	2	£0.20	£0.40
41	Cut grass	6	£0.06	£0.36
	Cost per square Metre			£29.46
	Cost per 1,156m^2 Green			£34,056

Rejuvenation

8.4.6 If the problem is an agronomic one where there has been a failure of the topsoil/rootzone causing poor surface water drainage or sward vigour, less intensive and intrusive rejuvenation works may be appropriate. In such cases, remedial works may comprise drilling through the turf and topsoil with specialised machinery and backfilling the cores to allow surface water to infiltrate, carrying out robust maintenance including hollow coring, scarifying, top dressing and chemical treatments to promote the sward and finally reinstatement.

8.4.7 The cost implications of this work schedule for a 34 x 34 metre (1,156m^2) green would as follows:

Table 43: Indicative Costs for the Rejuvenation of an Existing Green

Ref	Details	Qty	Cost/M2	Sub Total
141	Drill and Fill	1	£1.85	£1.85
142	Hollow Core and clear cores	1	£0.35	£0.35
143	Topdress with sand	2	£1.70	£1.70
144	Scarify	1	£0.30	£0.30
19	Chemical additives	2	£0.17	£0.34
145	Apply fertiliser	3	£0.15	£0.45
70	Seeding	1	£0.30	£0.30
140	Roll with turf iron	1	£0.20	£0.20
41	Cut grass	6	£0.06	£0.36
	Cost per square Metre			£5.85
	Cost per 1,156m^2 Green			£6,763

8.5 Improvement Proposals and Capital Cost Implications

8.5.1 The interpolated audit results identify that 35% of full size bowling greens fall below the Grade 3 – Satisfactory Standard. It has previously been indicated that the range of works required to bring a Grade 1 or Grade 2 green up to the Grade 3 standard is difficult to predict and might range from complete reconstruction to rejuvenation of the growing medium. A simplistic approach has therefore been adopted and it has been assumed that all greens which fall with the Grade 1 category will need to be reconstructed or rejuvenated by one of the means identified above. It is estimated that nine greens will require full reconstruction and 52 greens will require partial reconstruction. All 298 existing Grade 2 greens will need to be rejuvenated. The capital cost implications would be:

Full Reconstruction of 9 no. 1156m^2 greens @ £ 64,944per green	£ 584,496
Partial Reconstruction of 52 no. 1156m^2 greens @ £34,056per green	£1,770,912
Rejuvenate 298 no. 1156 m^2 greens @ £ 6,763 per green	£2,015,374
Total	**£4,370,782**

8.5.2 The position concerning small size greens is a little more complicated. While, in an ideal situation, all bowling greens should meet the minimum

standard for club play (31 x 31m), in some situations it might not be practicable to increase their size due to site constraints and in others the levels of use might not justify the necessary capital expenditure. It has therefore been assumed that 50% of the assumed stock of 64 small size bowling greens should be reconstructed to minimum standard and 11 of the remaining 32 small size facilities should be subject to rejuvenation works.

8.5.3 The cost of extending a small size green to full size is higher than the cost of reconstructing an existing full size green due to the need for additional earthworks, peripheral drainage, footpaths etc. Therefore, an additional £11.75 per m^2 would need to be added to the previously used figure of £56.18 m^2 for these additional works when extending a small size green, bringing the rate per m^2 up to £67.93 and a total reconstruction cost of £78,527 per 600m^2 green. The cost implications for the stock of small size greens would be:

Reconstruct 32 No. 1,156m^2 greens @ £ 78,527 per green	£2,512,864
Rejuvenate 11 No. (600m^2 @ £ 5.85 m^2) = £ 3,510 per green	£38,610
Total	**£2,551,474**

8.5.4 The cost of replacing the natural grass embankments around a 34 x 34 metre bowling green with concrete block and artificial grass is approximately £8,750. Some 37% of the greens surveyed had artificial bankings. If this figure is interpolated across the national stock of bowling greens, some 807 greens would benefit from the installations of artificial embankments. The cost implications would be:

Replace the embankments on 807 no. greens @ £ 8,750 per green	**£ 7,061,250**

8.6 Combined Capital Costs

8.6.1 The combined capital costs of the works as identified above for the improvement of the nation's stock of bowling facilities are:

Improve Grade 1 & 2 full size greens	£4,370,782
Improve Grade 1 & 2 small size greens	£2,551,474
Replace embankments on 807 greens	£7,061,250
Total	**£13,983,506**

8.7 Ongoing Refurbishment and Periodic Maintenance

8.7.1 Given the nature of the construction of natural grass bowling greens and their usual locations, it has been assumed that there are no periodic maintenance costs which will arise during their life time. It has also been assumed that there is no need to budget for the replacement of fencing and no need to budget for the renewal of fencing.

8.7.2 The periodic maintenance requirements of artificial grass bowling greens are simple in comparison with other artificial grass surfaces given that the carpet surface is not sand dressed. Therefore, provided that routine maintenance actions are carried out diligently, the only periodic requirements are for the replacement of the carpet approximately every 12 years.

Year 1	New
Year 12	Refurbishment/replace carpet
Year 24	Refurbishment/replace carpet

8.7.3 Using the rates of £25m^2 for replacement of a bowling green carpet and assuming an area of 1156m2, the following periodic cost implications would arise over 25 years:

Refurbish/replace carpet on each 1156m^2 artificial grass bowling green @ £25 per m^2	£28,900
Refurbish/replace carpet twice in each 25 year cycle	£57,800

If these costs are disaggregated over 25 years, the average annual cost for periodic maintenance will be £2,312 per green per annum.

8.7.4 When applied to the national stock of 12 artificial grass bowling greens, the cost implications would be:

Refurbish/replace carpet on 12 No. artificial grass bowling greens twice in 25 year cycle @ £57,800 per green	£693,600
Total of periodic maintenance costs over 25 years	**£693,600**

If these costs are disaggregated over 25 years, the average annual national cost for periodic maintenance would be £27,744 per year.

8.8 Maintenance of Bowling Greens

8.8.1 Bowling greens are high quality natural grass facilities and, as such, require regular and specialised maintenance. It is becoming the norm now for Bowling Clubs to split their maintenance into two parts:

Daily and Regular Maintenance

8.8.2 This is usually carried out by either a part time employee or a club member and the maintenance actions include:

Daily
- Check facility, fixtures and fittings.
- Remove litter and debris as required.
- Switch/brush the green to remove moisture.

Thrice Weekly
- Clear leaves and rubbish from ditches.
- Cut grass to maintain sward at 8-10mm from April to September

September to April
- Cut grass as required to maintain sward at 8-10mm.

8.8.3 The costs involved in such a programme are difficult to calculate given the manner in which these are often carried out. However, it is estimated that for a single green, where the works are carried out in house with a part time employee and allowing costs for machinery, that an annual charge of £7,680 should be allowed.

Specialised Maintenance

8.8.4 These works might be carried out under an annual agreement with a specialist Contractor and should include the following:

Pre-Season and End of Season as required

Scarification, tining/hollow coring, top dressing.
Applications of fertilisers, fungicides and other chemicals.

The annual cost of such a programme for a standard sized single green would be £4,800 pa.

8.8.5 Taking into account routine and specialised maintenance, the total annual costs per green would be:

Daily and Regular Maintenance	£7,680
Specialised Maintenance	£4,800
Total annual maintenance costs per green	**£12,480**

8.8.6 If the above costs are applied to the national stock of natural grass bowling greens, the following cost implications would arise:

Maintain 1,218 Full size greens @ £12,480 per green	£15,200,640
Maintain 64 small size (70% of full size) greens @ £8,736 per green	£559,104
Total annual maintenance costs for natural grass greens	**£15,759,744**

8.8.7 The maintenance requirements for artificial grass bowling greens comprise:

Daily
- Check facility, fixtures and fittings.
- Remove litter and debris as required.

Monthly
- Clear leaves and rubbish from area and ditches.
- Remove stains

Six Monthly
- Treat surface with algaecide and fungicide.

Annually
- Pressure wash.

8.8.8 It is assumed that the daily and monthly maintenance works will be carried out by on-site club members or staff and that the pressure washing and algaecide treatments will be carried out by specialist contractors. The cost implications would be:

Treat 1,156m2 green with algaecide and fungicide twice pa @ £0.12m2 = 1156 x 2 x £0.12m2	£277
Power wash 1,156 green once pa @ £0.35m2	£404
Total annual maintenance costs per artificial grass green	**£681**

8.8.9 The total annual maintenance costs for the 12 artificial grass bowling greens are:

Maintain 12 No. bowling greens @ £681 per green pa.	**£8,172**

8.9 Composite Revenue Costs

8.9.1 The composite annual estimated revenue costs for bowling green facilities are:

Natural grass bowling greens	£15,759,744
Artificial grass bowling greens	£8,172
Total	**£15,767,916**

8.9.2 The total annual periodic maintenance costs for bowling green facilities are estimated to be:

Bowling green facilities annual periodic maintenance costs	**£27,744**

8.10 Conclusion

8.10.1 It is estimated that there are more than 1,282 natural grass and 12 artificial grass bowling greens in Scotland. Only 5% of bowling greens fail to meet the minimum requirements in terms of size. Encouragingly, 71% of bowling greens are of satisfactory standard.

8.10.2 The stock of artificial grass bowling greens is small (12 in total).

8.10.3 The cost implications of bringing the 371 greens which do not meet the Satisfactory Standard up to Grade 3 are estimated to be £6.9m. In addition, it would be beneficial if grass embankments surrounding the playing areas were replaced with concrete block and artificial grass embankments at a cost of £7.1m. The total cost implication of improving the nation's stock of bowling greens therefore totals £14.0m.

8.10.4 In general, bowling greens are maintained well and maintenance arrangements and practices comprise a mixture of self help by club members and specialised works carried out by contractors. Given these arrangements, the total amount which should be spent on routine maintenance is in the order of £15.8m. To this should be added the disaggregated annual costs over 25 years of £27,744 for the periodic maintenance of artificial grass greens.

Part 3.9

Outdoor Sports Changing Facilities

9 Outdoor Sports Changing Facilities

9.1 Outdoor Sports Changing Requirements

9.1.1 For the purposes of this study, outdoor sports changing facilities are deemed to be stand alone premises designed primarily for use by outdoor sports teams and players that are adjacent to the outdoor sports facilities which they are intended to serve. It is acknowledged that many outdoor sports pitches are served by changing accommodation within multi-use sports centres, schools etc. but these provisions are not included in this study.

9.1.2 Changing pavilions and facilities are provided by, and to serve, local authority, school, college and university, private voluntary sports club and commercial sector facilities. Many have facilities additional to the basic changing, shower, toilet and storage accommodation facilities including meeting rooms, bars and cafeterias, fitness training facilities, sports injury treatment rooms and office accommodation. Only those elements of changing pavilions which are crucial to the playing of sport are considered by this study. Social facilities such as bars and lounges have been excluded from the condition and cost calculations but club rooms and waiting rooms in say, bowling, cricket and tennis pavilions, and which are an integral part of the sport have been included.

9.1.3 The age of facilities can vary considerably; some having been created before the Second World War, others being recent provisions. Construction methods also vary considerably. Construction types include traditional bricks and mortar construction; modern steel framed constructions with steel cladding; various forms of total or partial timber construction; and adaptations of various forms of lightweight and temporary buildings.

9.1.4 The changing requirements for different sports uses can vary. Team sports usually require individual team changing rooms, showers and toilets while bowling requires individual personal lockers for bowls/shoe storage and space to change shoes but only limited changing and shower facilities. Cricket usually requires changing rooms with a club room/waiting area attached which looks out over the wicket and which is used by the batting team and sometimes the scorer. Tennis has similar requirements to cricket – there being a need for more limited changing than for winter team sports but with a need for a club room/waiting area looking out over the courts.

9.1.5 Historically, the prime users of outdoor sports team changing pavilions have tended to be males but, in the recent years, there have been increased demands from female players as interest has increased, particularly in football and rugby, as a result of various sports development initiatives. Unfortunately the quality of changing accommodation provided for many outdoor sports is sadly lacking and this has been identified as a hindrance

to sports development and a disincentive to continued participation by females.

9.1.6 **Sport**scotland has produced *Technical Digest 110 – Sports Pavilions and Team Changing Accommodation* to assist in the planning and improvement of outdoor sports changing facilities. The guidelines contained in *Technical Digest 110* and updated advice from **sport**scotland has been used as a basis for identifying spatial requirements for different types of pavilion and for the evaluation of audit returns.

9.2 Changing Pavilion Classification Grades

9.2.1 The wide range of building types that were encountered in this study made it very difficult to classify the condition of buildings on the basis of individual elements. For example, it is difficult to assess a timber construction with a flat felt roof against a modern construction with an engineered roof or an amended temporary building which has been adapted over a period. What might prove to be a catastrophic problem with one building type is one which can be isolated and dealt with rather more efficiently with another. Similarly, while boiler, heating and ventilation problems might be serious in a large winter sports pavilion, in say, a small tennis pavilion with the equivalent of a domestic boiler providing heating and hot water, a failure of the system would be far less serious.

9.2.2 Buildings are made up of many elements, some of which might comprise major components, others of which might be less important individually but, when combined with other elements, achieve greater importance. To enable assessment of condition and works required, a scoring system was devised for each element of the Audit and which can be applied to the individual elements of a building - roof, exterior walls, internal walls, floor, heating and ventilation and lighting/electrical. Cumulatively, these scores allow an overall assessment of a building to be made and for it to be classified.

9.2.3 Notwithstanding the wide variations in size, construction type and condition of pavilions and changing facilities, five grades of pavilion were identified against which to judge condition and assess the cost implications, if any, of making necessary improvements or replacing the facility completely.

Grade 1	Requires replacement
Grade 2	Requires major refurbishment
Grade 3	Requires moderate refurbishment
Grade 4	Requires minor refurbishment
Grade 5	Satisfactory standard – no works required.

The rationale for these grades is explained below:

Grade 1 – Requires Replacement

A Grade 1 – Requires Replacement building is identified as one where the building fabric has been deemed to have deteriorated beyond repair. The main reasons for this might be structural problems in brick or block buildings, roof failures leading to rot problems in timber constructions or a structure which is vulnerable to persistent vandalism and is unsustainable. In all cases where replacement has been identified as necessary, it has been assumed that the new building would be a sustainable modern construction suitable for the purpose and not a like for like replacement. For example, it is not recommended that a timber construction pavilion or a modified temporary building be replaced on a like for like basis.

Using the grading system, a pavilion might be classified as Grade 1 – Requires Replacement even if some elements of the construction are assessed as being of a higher standard. For example, where the roof of a pavilion is scored as Grade 2 (Requires Major Refurbishment) and the supporting walls are scored as Grade 1 (Requires Replacement) this would justify an overall classification of the pavilion as Grade 1 and earmark it for complete replacement as it would not be viable or cost effective to replace the walls. If, however, the walls were scored as Grade 2 (Requires Major Refurbishment) and the roof scored as Grade 1 (Requires Replacement), the overall assessment of the building might be Grade 2 (Requires Major Refurbishment) because it would be possible to re-roof the building and repair the walls.

It is possible that, using the grading system, a building might fall within the Grade 2 – Requires Major Refurbishment classification even though a considerable amount of work is required. If the cost of major refurbishment exceeds 70% of the cost of a new build, site managers are recommended to revisit the assessment and findings as it might be more economic to replace the structure with a new building.

Grade 2 – Requires Major Refurbishment

A Grade 2 building is identified as one where the main structure is sound but where say, the roof has reached a point where replacement is necessary and/or the mechanical and electrical systems have reached a stage of dilapidation where replacement is necessary. A building which is too small to meet the user load demands or unable to meet the requirements of male and female users might also be classified as Grade 2 - in need of major refurbishment and possibly extension.

Major refurbishment might typically require some, or all, of the following works:

Re-roof
Repair external walls (roughcast, remove graffiti etc.)
Repair internal walls (plasterwork/board etc.)
Install new windows, doors and grilles
Replace electrical wiring and fittings

Replace heating system
Replace plumbing and sanitary ware
Re-tile all shower etc. areas
Install hygienic non-slip flooring
Decoration

Where, using the grading methodology, the cost of major refurbishment exceeds 70% of the cost of new build, it is recommended that site managers revisit the assessment and findings as it might be more economic to replace the structure with a new building.

Grade 3 - Requires Moderate Refurbishment

A Grade 3 Requires Moderate Refurbishment pavilion is identified as one where, for example, the electrical system needs to be rewired or where the heating and ventilating system needs to be overhauled. It has been assumed that intrusive works such as this would be allied to a major redecoration (tiling to shower areas and repainting of building etc.).

Moderate refurbishment might typically require some or all of the following works:

Roof repairs
External walls (some repairs and repainting or coating)
Internal walls and doors (repair and replace as required)
Replace electrical wiring and fittings
Replace heating boiler (radiators and pipe work possibly satisfactory)
Plumbing replace showers and some sanitary ware
Re-tile all shower etc. areas
Install hygienic non-slip flooring
Decoration

Grade 4 - Needs Minor Refurbishment

A Grade 4 pavilion is identified as one where the structure of the building is sound and only minor repairs and internal decoration is required.

Minor refurbishment might typically require some or all of the following works:

Roof - minor repairs (replace missing tiles etc.)
External walls (isolated repairs - repainting or coating not required)
Internal walls (isolated repairs.)
Re-tile all shower etc. areas
Repair existing flooring
Decoration (individual rooms as required)

Grade 5 - No Works Required

A Grade 5 pavilion is deemed to be a building which is relatively new and is in good condition or an older building which has been well cared for. It has been assumed that if proper maintenance regimes are put in place, Grade 5 pavilions will continue to provide satisfactory service for a considerable period although elements such as heating and ventilation,

electrics, decoration, tiling etc. will need to be attended to at appropriate times in the life cycle of buildings.

9.3 The Upgrading Process

9.3.1 Using the gradings and classifications identified in 9.2, it is possible to approximate the costs of carrying out replacement, refurbishment and repair. Table 44 provides indicative m^2 costs for carrying out works on winter sports pitch and bowling, cricket and tennis pavilions and which can be aggregated up to the appropriate pavilion size/area. Tables 45 and 46 provide indicative floor areas for the spaces which might make up pavilions of various sizes and which can be used to estimate broad costs for different replacement or refurbishment scenarios.

Table 44: Indicative m^2 Costs for Pavilion Replacement, Refurbishment and Repair

	Winter Pitches Football, Rugby, Hockey, Etc.	**Others** Bowling, Tennis, Cricket
Pavilion Grade	**Rate/m^2**	**Rate/m^2**
Grade 1 – Total Replacement Demolition & Disposal of existing facility, New Build including all statutory and professional fees etc.-	**1420.00**	**1130.00**
Grade 2 – Major Refurbishment		
Re-roof	53.80	53.80
Repair external walls (roughcast, etc.)	17.70	17.70
Internal wall repairs (plasterwork/board)	17.50	17.50
Install new windows & grilles	33.30	33.30
Replace electrical wiring & fittings	60.80	54.30
Replace heating system	75.40	30.20
Replace/Install ventilation system	68.80	27.50
Replace plumbing & sanitary ware	89.80	35.90
Re-tiling all shower areas	70.40	20.30
Install hygienic non-slip flooring	45.40	45.40
Complete redecoration (int. & ext.)	29.80	29.80
	562.70	**385.70**
Grade 3 – Moderate Refurbishment		
Roof repairs	15.40	15.40
External walls – some repairs, repainting	6.30	6.30
Internal walls – some repairs	5.60	5.60
Replace electrical wiring & fittings	31.80	22.90
Replace heating boiler etc.	29.50	15.60
Upgrade ventilation system	41.50	12.50
Plumbing – replace showers & some sanitary ware	55.20	15.30

Re-tiling all shower areas	69.90	20.30
Install hygienic non-slip flooring	45.40	45.40
Complete redecoration	29.80	29.80
	320.40	**189.10**

Grade 4 – Minor Refurbishment		
Roof – Minor repairs (replace missing tiles, etc.)	6.20	6.20
External walls – isolated repairs (repainting not required)	6.30	6.30
Internal walls – isolated repairs	4.80	4.80
Replace electrical fittings	10.70	6.20
Partial re-tiling shower areas	21.10	6.10
Repair existing flooring	22.70	22.70
Complete redecoration	29.80	29.80
	101.60	**82.10**

Grade 5 – No Works Required		
No works	**0**	**0**

9.3.2 The above indicative m^2 cost estimates for different elements of building works include sums for bringing buildings up to the current Building Regulation standards in respect energy 'u' values (insulation, double glazing etc); providing individual pressure switches on shower heads; provision of emergency lighting, fire detection and fire alarm systems; the provision of roller shutters on doors and screens on windows etc.

9.3.3 When planning improvement works, site managers might care to consider the installation of CCTV systems to help protect facilities from vandalism and abuse.

9.3.4 While the works schedules include sums for meeting statutory minimum standards for energy conservation, no provision has been made in the costs for installing renewable energy systems. Renewable energy is derived from inexhaustible sources such as the sun, wind, water and plant materials. Using renewable energy reduces dependence on energy sources that contribute to climate change and can help to make a big difference to the energy efficiency of buildings. A wide range of renewable energy technologies are currently available including:

- Solar photovoltaic panels (PV)
- Wind turbines
- Solar water heating
- Ground source heat pumps
- Small scale hydro power
- Biomass.

Despite the range of technologies available, not all systems are cost effective at present although this position could change with technological developments, reduced costs arising from increased volume production of renewable energy systems and increases in energy costs. Biomass and ground source heat pumps are considered to be the most cost effective at present when compared with electric heating systems. Small scale wind turbine technology is developing rapidly and, given the Scottish Climate, is worth considering on a site by site basis. In view of the land area which sports pitch sites occupy, potential might exist for suburban drainage systems (SUDS) etc. to be created. Site managers are urged to consider the potential for including micro generation renewable energy systems and SUDS in new build and refurbishment projects, having regard to both cost and the potential for installations to be subject to vandalism. Appendix 11 provides further information on this matter.

9.3.5 In order to allow the indicative m2 costs identified in Table 44 to be applied to the assumed national stock of pavilion facilities, model sizes for pavilions have been identified based on the guidance contained in **sport**scotland's *Technical Digest 110 – Sports Pavilions and Team Changing Accommodation* and as detailed in Tables 45 and 46 below.

Table 45: Indicative Floor Area Requirements for Winter Sports Pitch Pavilions

Number of Pitches	1Pitch m^2	2 Pitches m^2	3 Pitches m^2	4 Pitches m^2
Number of Team Rooms	2	4	6	8
Team Room Area	52 m^2	104 m^2	156 m^2	208 m^2
Office and first aid	-	8 m^2	13 m^2	13 m^2
Store	2 m^2	4 m^2	6 m^2	8 m^2
Plant	6 m^2	8 m^2	10 m^2	14 m^2
Male Toilets	-	6 m^2	8 m^2	10 m^2
Female Toilets	-	6 m^2	8 m^2	10 m^2
Disabled Toilets	-	3 m^2	3 m^2	3 m^2
Officials	5 m^2	7 m^2	11 m^2	13 m^2
Sub Total	**65** m^2	**146** m^2	**215** m^2	**279** m^2
Corridors (10%)	7 m^2	14 m^2	21 m^2	28 m^2
Total m2	**72 m^2**	**160 m^2**	**236 m^2**	**307 m^2**

Notes: Changing space requirements varies for football, hockey and rugby. Average of 16m^2 used.
For showers, 2m^2 per unit has been allowed.
For WC, 2m^2 allowed.
Office has been sized to double as a first aid/treatment room in pavilions serving 1 and 2 pitches. In pavilions serving 3 or more pitches, it has been assumed that separate office (6 m^2) and first aid room (5 m^2) will be provided as pavilions of this size might possibly be staffed.

Table 46: Indicative Floor Area Requirements for Bowling, Cricket and Tennis Pavilions

Sport	Cricket m^2	Tennis m^2	Bowling m^2
Playing Facilities	1 Pitch	3 No. Courts	1 No. Green
Male Changing	21 m^2	16 m^2	10 m^2
Female Changing	21 m^2	16 m^2	10 m^2
Locker Room	-	-	25 m^2
Club Room	64 m^2	64 m^2	96 m^2
Kitchen	12 m^2	12 m^2	16 m^2
Office	6 m^2	6 m^2	6 m^2
Store	6 m^2	6 m^2	8 m^2
Plant	6 m^2	4 m^2	4 m^2
Male Toilets	8 m^2	8 m^2	8 m^2
Female Toilets	8 m^2	8 m^2	8 m^2
Disabled Toilets	3 m^2	3 m^2	3 m^2
Officials	6 m^2	-	-
Total m2	**161 m^2**	**143 m^2**	**19 m^2**

Notes: Pavilions have been sized to reflect national average requirement based on available data.
Changing rooms comprise changing space and minimal shower areas.
Office sized to double as a first aid/treatment room.

9.4 Audit Findings

9.4.1 The Audit of pavilions was conducted in two ways. Firstly, a detailed inspection of a representative sample of pavilions was carried out by professional building surveyors and secondly, by analysis of self completion questionnaires from site owners and managers.

9.4.2 The professional survey was carried out by W S Millar Associates, Consultants and the evaluation comprised a survey of twenty six changing pavilions from 11 council regions and on five types of property. These assessments were compared with the self completion returns from site managers and owners.

9.4.3 The detailed site surveys carried by W S Millar Associates would seem to indicate that the self completion survey returns had a relatively high level of inaccuracy and that those completing the forms tended to underestimate the amount of work/maintenance required to both maintain premises in a reasonable condition and to bring them up to an acceptable standard. The building surveyors also opined that, in many cases, local authorities were not carrying out the necessary levels of general maintenance and repair.

9.4.4 Out of the twenty six surveys carried out, five (19%) varied from the overall self completion assessment of the building condition; one self completion assessment indicated that major refurbishment was required while the survey indicated that moderate refurbishment was required. The others all under estimated the amount of refurbishment required. While

many of the variations were either minor or due to a combination of finishes (timber and concrete flooring), 50% of the questionnaires had three or more variations. Of the 58 variations listed only nine indicated the condition as being worse than the survey report. In three cases the self completions assessments indicated that the heating and ventilation installations were in good order but the detailed site audit found them to be in need of replacement. All other variations listed were either minor or were one step (e.g. "very good" as against "good") away from the surveyed condition. Some of the variations were due to omissions and others due to changes taking place within the time difference between the questionnaires being returned and the survey date.

9.4.5 Specific points made by the surveyors included:

- The council operated football pavilions surveyed were mostly of a similar age, 1945-1969, and it was found that none of these had adequate ventilation or shower facilities. Newer pavilions were all equipped with extract ventilation and adequate shower facilities, but, in many locations, due to vandalism, the extract system was often in need of repair. In some premises the extract capability was inadequate for the room usage.

- In the older team changing pavilions, the number of showers available tended to be limited to one per changing room whereas in newer facilities, there was on average four showers per team changing room. In older facilities hot water was mainly supplied by electrically heated domestic hot water cylinders and there were no energy saving measures in place. In these facilities, control of the amount of hot water available was invariably at the discretion of the attendant/caretaker. In newer facilities, hot water and heating was generally provided by gas fired boilers with automatic controls. Insulation was generally present but was often in poor condition.

- The bowling premises surveyed did not have shower facilities and thus did not have a requirement for a ventilation (supply and extract) system. This will have a major impact on maintenance costs.

- Of the 26 premises surveyed only 2 had supply air and only one of these tempered the supply air.

- In the majority of the 26 pavilions surveyed, the amount of services equipment and facilities did not match with the current requirements for sports pavilions.

- The replacement of services and the fitting of additional showers and heating and ventilation may be hindered by space restrictions.

- The majority of premises surveyed did not have Emergency Lighting and Fire Alarms and these will require to be added whenever a refurbishment is required, however annual maintenance costs will be reduced until this is carried out.

- None of the premises surveyed had electrical notices attached to the distribution boards indicating the date of the last inspection and test.

9.4.6 Tables detailing the building surveyor's findings are included in Appendix 9.

9.4.7 Self completion questionnaires (Appendix 10) were sent out to site managers and they were requested to provide Overall Condition Assessments of the suitability of buildings and Condition Assessments of the various building construction elements. A total of 322 responses were received. Analysis of the self completion returns, adjusted to reflect the W S Millar Associates findings, reveals the following condition results when applied to the five classification grades identified above:

Table 47: Pavilions and Outdoor Changing Accommodation Audit Findings

Pavilion Type	Grade1	Grade2	Grade3	Grade 4	Grade5	Total
Pitch Sports	39	79	40	24	9	**191**
%	20.8%	40.9%	20.8%	12.8%	4.7%	100%
Cricket	0	4	4	4	0	**12**
%	10.0%	30.0%	30.0%	30.0%	0.0%	100%
Tennis	6	10	10	6	10	**42**
%	14.7%	23.5%	23.5%	14.7%	23.6%	100%
Bowling	12	35	11	13	6	**77**
%	15.3%	45.8%	13.6%	16.9%	8.4%	100%
Total	**57**	**128**	**65**	**47**	**25**	**322**
%	**17.5%**	**39.5%**	**21.0%**	**14.5%**	**7.5%**	**100%**

9.4.8 The rate of response was not as high as was hoped although returns generally reflected the numeric distribution of pavilions between the various sports. The condition assessment findings have been used in the next section to identify the position and cost implications for the assumed total national stock of pavilions.

9.4.9 Interpolating the audit survey results to reflect the national picture proved to be extremely difficult because of the limitations of the returns and the lack of detailed information held in **sport**scotland's database. The returns received tended to be mainly from well organised bodies and probably did not reflect the large number of small pavilions provided in a variety of locations throughout the country. The low response from small pavilions might have skewed the results as observation seems to suggest that small facilities are generally in worse condition than larger managed facilities. Notwithstanding this observation, no attempt has been made to mitigate

the survey results and cost calculations to reflect this possible scenario. Furthermore, it was considered unwise to use the results as a basis for assuming the number of large pavilion serving 5 or more pitches as this would have skewed the calculations considerably.

9.4.10 As will be appreciated, there are significant differences in the pavilion requirements for pitch sports and bowling, cricket and tennis. Separate assessments and calculations have therefore been carried out for different types of sports. Finally, due to deficiencies in the database on pavilions, it was decided to calculate an average cost per pavilion for each sport and apply it to the number of sports facility sites believed to exist in Scotland. This approach is explained in greater detail below.

9.5 Improvement Proposals and Capital Cost Implications

Pavilions Serving Winter Sports Pitches

9.5.1 There is no national record which records precisely the number, size and condition of pavilions associated with winter sports pitches in Scotland. Examination of the **sport**scotland Masterfile database indicates that, excluding schools, there are 1,856 sports pitch sites in Scotland of which 505 do not have pavilions. This means that 1,351 winter sports pitch sites have pavilions. However, the database has limited information on the size of pavilions. In order to overcome this knowledge gap it was decided to identify an average pavilion size based on the number of sites with pavilions and the assumed number of pitches across the country. This calculation identifies that the average number of pitches per site is 2.05 and therefore the average dressing room requirement is for a 4 team pavilion. Using this methodology it is possible to calculate the number of pavilions and dressing rooms required across the country and, by interpolation of the Audit survey results detailed in Table 47, their condition. Table 48 below details the outcomes of this interpolation.

Table 48: Sports Pitch Site Pavilions Condition Analysis

Type of Site	No Pavilions	Grade1	Grade2	Grade3	Grade4	Grade5	Total
Condition of Pavilions	505	281	553	281	173	63	1,856
Changing Rooms Required	2,020	1,124	2,212	1,124	692	252	7,424

9.5.2 The pavilion area calculations detailed in Table 45 indicates that the area of a 4 changing room winter sports pitch pavilion should be in the order of 160m^2. In order to allow a cost per changing room, including all associated areas and services, to be calculated, the cost model for each of the Grades of work has been applied and then divided by 4. This cost has then been applied to the identified number of changing rooms to provide an overall picture of the capital costs of rebuilding, refurbishing and repairing the assumed national stock of winter sports pitch pavilions.

Table 49: Sports Pitch Site Pavilions Condition Analysis

Site Grade	Cost per Pavilion	Cost per changing room	No. of changing rooms	Total Cost
Sites with no Pavilions	N/A	N/A	(2,020)	N/A
Grade 1 Pavilions	£227,200	£56,800	1,124	£63,843,200
Grade 2 Pavilions	£90,032	£22,508	2,212	£49,787,696
Grade 3 Pavilions	£51,264	£12,816	1,124	£14,405,184
Grade 4 Pavilions	£16,256	£4,064	692	£2,812,288
Grade 5 Pavilions	Nil	Nil	252	Nil
Total			**5,404**	**£130,848,368**

9.5.3 It can be seen from the foregoing that the estimated cost of bringing existing pavilions up to the Grade 5 Satisfactory Standard would be in the order of £130,848,368. There might be a case for providing pavilions at those sites which presently do not have such facilities but this would be at considerable expense and might be difficult to justify in the majority of locations. Therefore, each site would need to be considered on its merits based on local assessments and possibly as part of the development of local sports pitch strategies.

Pavilions Serving Tennis Facilities

9.5.4 Pavilions serving tennis facilities have a slightly different purpose and use pattern to those serving winter sports pitches. In the first instance they tend to cater for fewer people changing at any one time and hence the demand for changing space and showers is usually less than for a pitch sports pavilion. Secondly, pavilions frequently serve as spectator areas for those waiting to play. Where provided, these waiting areas or club rooms tend to overlook the courts and are often used as social areas and for meeting purposes. Club rooms in tennis pavilions tend to be the biggest single space and all other facilities are frequently accessed from them. This configuration has been used to calculate the spatial requirements for a typical tennis pavilion as detailed in Table 46.

9.5.5 Using the same methodology as for pitch sports, it has been calculated that on average, each tennis court site comprises three courts although it is acknowledged that many will be single court sites and a few will have six or more courts.

9.5.6 The **sport**scotland Masterfile database identifies 595 tennis sites in Scotland excluding schools and higher education establishments. It is believed that 113 of these sites have no changing facilities. Interpolation of

the Audit survey results provides the following condition analysis for tennis pavilions.

Table 50: Tennis Pavilions Condition Analysis

	Sites with no Pavilions	Grade1	Grade2	Grade3	Grade4	Grade5	Total
Number of Pavilions	113	71	113	113	71	114	595

9.5.7 The pavilion area calculations detailed in Table 46 indicates that the area of a changing pavilion to serve an average complex of three tennis courts should be in the order of 143m^2. This area calculation has been applied to the cost model and the condition analysis detailed in Table 50 above to provide an overall picture of the capital costs of rebuilding, refurbishing and repairing the assumed national stock of tennis pavilions.

Table 51: Tennis Court Sites Pavilion Condition Analysis

Site Grade	No. of Pavilions	Cost per Pavilion	Total Cost
Sites with no Pavilions	(113)	N/A	N/A
Grade 1 Pavilions	71	£161,590	£11,472,890
Grade 2 Pavilions	113	£55,155	£6,232,515
Grade 3 Pavilions	113	£27,041	£3,055,633
Grade 4 Pavilions	71	£11,740	£833,540
Grade 5 Pavilions	114	Nil	Nil
Total	**482**		**£21,594,578**

9.5.8 It can be seen from the foregoing that the estimated cost of bringing existing pavilions up to the Grade 5 Satisfactory Standard would be in the order of £21,594,578. Most sites without pavilions tend to be unmanned and usually do not have a club operating from them. It is therefore doubtful if there would be any justification in providing pavilion facilities in the majority of these sites. Any requirement for such should be identified locally and dealt with exceptionally

Pavilions Serving Cricket Facilities

9.5.9 The pavilion requirements for cricket differ from those required for other pitch sports in that fewer people change and shower at any one time. Space allocations for these purposes have therefore been reduced accordingly in the Required Floor Area table in Table 46. Cricket, like tennis, has a requirement for a waiting area/club room which is used by the team waiting to bat and for 'kitting up'. This area, if directly overlooking the field of play, is often used by the 'scorers'. Club rooms in cricket pavilions can also serve as social facilities for providing tea and refreshments between innings etc.

9.5.10 Interpretation of the **sport**scotland Masterfile database indicates that there are 102 cricket sites. There is limited information on the availability and

size of pavilions and so it has been assumed that all have a changing facility of some sort. Interpolation of the Audit survey results provides the following condition analysis for cricket pavilions.

Table 52: Cricket Pavilions Condition Analysis

	Grade1	Grade2	Grade3	Grade4	Grade5	Total
Number of Pavilions	11	31	3	30	0	102

9.5.11 The pavilion area calculations detailed in Table 46 indicate that the area of a changing pavilion to serve a single cricket wicket complex should be in the order of 161m^2. As with tennis pavilions, it has been assumed that the minor rooms in a cricket pavilion are accessed from the club room and circulation space has been kept to a minimum in the calculation. The area calculation has been applied to the cost model and the condition analysis detailed in Table 52 above to provide an overall picture of the capital costs of refurbishing and repairing the assumed national stock of cricket pavilions.

Table 53: Cricket Sites Pavilion Condition Analysis

Site Grade	No. of Pavilions	Cost per Pavilion	Total Cost
Grade 1 Pavilions	11	£181,930	£2,001,230
Grade 2 Pavilions	31	£62,098	£1,925,038
Grade 3 Pavilions	30	£30,445	£913,350
Grade 4 Pavilions	30	£13,218	£396,540
Grade 5 Pavilions	Nil	0	Nil
Total	**102**		**£5,236,158**

9.5.12 It can be seen from the foregoing that the estimated cost of bringing existing pavilions up to the Grade 5 Satisfactory Standard would be in the order of £5,236,158.

Pavilions Serving Bowling Facilities

9.5.13 As with tennis and cricket, the pavilion requirements for bowling differ from those required for pitch sports. A 6 rink green can accommodate large numbers of people (up to 48 per session) and there can be an equal number of players waiting for the next game to commence. However, comparatively few players change their clothes completely and shower after a game. Private changing and shower requirements are therefore much less than for pitch sports and this is reflected in the indicative space requirements identified in Table 46. Although few players have a need for dedicated dressing room facilities, large numbers have a requirement for shoe and bowls storage and cloakroom facilities, the space requirements of which can be considerable.

9.5.14 Bowling pavilions therefore, have a requirement for waiting/club rooms which can serve as partial changing rooms/cloakrooms, waiting areas and

for providing post game refreshment and hospitality. This working arrangement should not be confused with the bar and lounge facilities which exist in many clubs and which no account has been taken of in this exercise. .

9.5.15 Interpretation of the **sport**scotland Masterfile database indicates that there are 1,090 bowling green sites. There is no indication if any of these sites is without a pavilion although it is likely that there are a few. The Audit has identified that there are 1,282 bowling greens in Scotland. The difference reflects the number of sites with more than one green. Sites with more than one green might have a requirement for a larger pavilion space than those with only one green. For the purposes of this costing exercise it has been assumed that each of the 1,090 bowling green sites has a pavilion of 194m^2. Where a site has more than one green there might be a requirement for a larger pavilion than the 194m^2 model but no account has been taken of this in this costing exercise.

9.5.16 Interpolation of the Audit survey results provides the following condition analysis for bowling pavilions.

Table 54: Bowling Pavilions Condition Analysis

	Grade1	Grade2	Grade3	Grade4	Grade5	Total
Number of Pavilions	172	499	148	184	87	1,090

9.5.17 The pavilion area calculations detailed in Table 46indicates that the area of a changing pavilion to serve a single bowling green should be in the order of 194m^2. This area calculation has been applied to the cost model and the condition analysis detailed in Table 54 above to provide an overall picture of the capital costs of refurbishing and repairing the assumed national stock of bowling pavilions.

Table 55: Bowling Green Sites Pavilion Condition Analysis

Site Grade	No. of Pavilions	Cost per Pavilion	Total Cost
Grade 1 Pavilions	172	£219,220	£37,705,840
Grade 2 Pavilions	499	£74,826	£37,338,174
Grade 3 Pavilions	148	£17,285	£2,558,180
Grade 4 Pavilions	184	£15,927	£2,930,568
Grade 5 Pavilions	87	108	Nil
Total	**1,090**		**£80,532,762**

9.5.18 It can be seen from the foregoing that the estimated cost of bringing existing bowling pavilions up to the Grade 5 Satisfactory Standard would be in the order of £80,532,759.

9.6 Combined Capital Costs

9.6.1 The combined total capital cost of the works identified as necessary to bring the nation's stock of outdoor sports pavilion facilities up to an acceptable standard are:

Table 56: Summary of Capital Costs

Type of Site	Grade1 £	Grade2 £	Grade3 £	Grade4 £	Total £
Pitches	63,843,200	49,787,696	14,405,184	2,812,288	130,848,368
Tennis	11,472,890	6,232,515	3,055,633	833,540	21,594,578
Cricket	2,001,230	1,925,038	913,350	396,540	5,236,158
Bowling	37,705,840	37,338,171	2,558,180	2,930,568	80,532,759
Total	**115,023,160**	**95,283,420**	**20,932,347**	**6,972,936**	**238,211,863**

9.7 Annual and Periodic Maintenance

9.7.1 It is important that once construction or refurbishment is complete, pavilions are maintained in good condition thereafter. To achieve this, it is suggested that site owners and managers adopt standard operating and preventative maintenance routines. For these to be successful, forward maintenance plans need to be prepared which identify routine annual maintenance and periodic maintenance requirements. Annual maintenance usually comprises minor repairs as a result of daily use whereas periodic maintenance requirements are more intensive. Common practice suggests that periodic maintenance additional to routine annual maintenance should be carried out at 5 year intervals with additional works being carried out at years 25, 40 and 60.

9.7.2 The works additional to routine annual maintenance undertaken at year 5 might include 5 yearly electrical testing, painting of internal and external walls and inspections of brickwork, cladding and timber etc. Included in the works undertaken at year 25 might be the replacement of boiler plant and domestic hot water calorifiers, electrical circuits and final outlets. At 40 years, works items might include replacement of timber cladding or the overhauling of steel profile roofing. It has been assumed that the life of a pavilion would be no more than 60 years and that it would be replaced at that time. This study only concerns the requirements for the next 25 years and so no costs calculations for years 40 and 60 have been included.

9.7.3 The above theoretical maintenance regime presents a number of problems when used to assess annual costs on a national basis. The structures of buildings, materials used, levels of use (and abuse), location and exposure will all contribute to dilapidation and the need to incur expenditure on maintenance. Some pavilions will be constructed to high standards and if maintained properly, will have a life in excess of 60 years, while others will be constructed with low quality materials and consequently will have

a much shorter life expectation. Similarly, some pavilions will be supervised and respected by users and consequently, annual and periodic maintenance requirements might be less than the model suggests will be required. Other facilities might be located in remote sites, be unsupervised for much of the time and be subject to considerable levels of vandalism resulting in a need to incur higher levels of annual and periodic maintenance than suggested by the model. The impacts of thee variables is evidenced by the detailed site surveys and analysis of self completion questionnaires.

9.7.4 In light of the above, estimating the annual maintenance cost requirements of the current national stock of pavilion facilities proved to be very difficult. Despite the information gathered, there is still a vast gap in knowledge of the precise condition of the total national stock of outdoor sports pavilions. Notwithstanding this information gap it was decided to use the data and approach adopted for assessing capital costs to estimate routine and periodic maintenance costs.

9.7.5 Capital costs were identified assessed on the basis of the assumed number of pavilions existing in Scotland, an average m^2 requirement for pavilions serving particular sports, and an average m^2 cost using traditional construction materials and techniques. The calculations used previously to identity the area and numbers of pavilions or changing rooms have been used to calculate building maintenance costs based on the m^2 costs for different elements as detailed in Tables 57 and 58 below.. The sums indicated in year 1-25 column are the sums which it is estimated need to be spent every year. The figures indicated in year columns 5 and 25 are the sums which it is assessed need to be spent in these years additional to the annual costs indicated in the year 1-25 column.

Table 57: Winter Sports Pitch Pavilions m^2 Maintenance Costs

Maintenance period years **Building fabric element**		**1-25** **£ /m2**	**5** **£ /m2**	**25** **£ /m2**
Pitches roof	Roof tiles	0.324	1.851	0
External walls	Facing brick	0	0.410	0
Internal walls	Masonry	0.122	3.511	0
Internal walls	Tiled (showers)	0.612	2.360	140.140
External openings	Doors & openings	0.188	2.530	33.710
Internal openings	Doors	0.165	2.810	26.020
Floors	Concrete	0.539	0.688	0
Floors	Tiled (showers)	0.612	2.360	140.140
Heating & Ventilation	Gas	3.910	5.864	210.190
Heating & ventilation	Electrical	1.090	2.700	53.570
Total		**7.562**	**25.084**	**603.770**

Table 58: Bowling, Cricket and Tennis Pavilions m^2 Maintenance Costs

Maintenance period years Building fabric element		1-25 £ /m2	5 £ /m2	25 £ /m2
Pitches roof	Roof tiles	0.324	1.851	0
External walls	Facing brick	0	0.410	0
Internal walls	Masonry	0.140	4.037	0
Internal walls	Tiled (showers)	0.153	0.590	35.035
External openings	Doors & openings	0.217	3.093	37.787
Internal openings	Doors	0.165	2.810	26.020
Floors	Concrete	0.619	0.791	0
Floors	Tiled (showers)	0.153	0.590	35.035
Heating & Ventilation	Gas	1.955	2.932	105.095
Heating & ventilation	Electrical	1.090	2.700	53.570
Total		**4.816**	**19.084**	**292.542**

9.7.6 The variations in the m^2 maintenance costs tables above reflect the differences in building construction elements. For example, pavilions serving bowling, cricket and tennis tend to have bigger windows, smaller tiled areas (because of fewer shower areas) and smaller heating and ventilation systems. In respect of heating and ventilation, maintenance costs for bowling, cricket and tennis pavilions are likely to total 15% of total building maintenance costs as against 35% in pavilions serving pitches.

9.7.7 The foregoing m^2 maintenance costs have been applied to the assumed national stock of facilities to provide 25 year life costs for each pavilion type. The following tables assume that all pavilions have been brought up to the Grade 5 Satisfactory Standard and are maintained to the standard dictated by the above m^2 costs.

Table 59: Winter Sports Pitch Pavilions Maintenance Costs

Year	Area	Number of Dressing Rooms	Cost per m2	Total annual cost	25 Year Total Life Cost
1	$38m^2$	5,404	7.562	1,552,872	31,057,440
5	$38m^2$	5,404	25.084	5,151,050	20,604,200
25	$38m^2$	5,404	603.770	123,985,377	123,985,377
Total	$38m^2$				**175,647,017**

Table 60: Cricket Pavilions Maintenance Costs

Year	Area	Number of Pavilions	Cost per m2	Total annual cost	25 Year Total Life Cost
1	161m^2	102	4.816	79,088	1,581,760
5	161m^2		19.804	325,221	1,300,884
25	161m^2		292.542	4,804.125	4,804,125
Total	161m^2				**7,686,769**

Table 61: Tennis Pavilions Maintenance Costs

Year	Area	Number of Pavilions	Cost per m2	Total annual cost	25 Year Total Life Cost
1	143m^2	369	4.816	254,125	5,082,500
5	143m^2		19.804	1,044,997	4,179,988
25	143m^2		292.542	15,436,563	15,436,563
Total	143m^2				**24,699,051**

Table 62: Bowling Pavilions Maintenance Costs

Year	Area	Number of Pavilions	Cost per m2	Total annual cost	25 Year Total Life Cost
1	194m^2	1,090	4.816	1,018,391	20,367,820
5	194m^2		19.804	4,187,753	16,751,012
25	194m^2		292.542	61,860,931	61,860,931
Total	194m^2				**98,979,763**

9.7.8 The above annual and periodic maintenance cost estimates will not all be incurred at one time and to gain a picture of the likely revenue cost estimates over the 25 year period which this study covers it is necessary to disaggregate them. Table 63 below shows the individual facility type and total costs for maintenance:

Table 63: Cumulative and Disaggregated 25 Year Maintenance Costs

Year	25 Year Total Life Costs £	25 Year Disaggregated Annual Cost £
Winter sports pavilions	175,647,017	7,025,880
Bowling pavilions	98,979,763	3,959,190
Cricket pavilions	7,686,769	307,470
Tennis pavilions	24,699,051	987,962
Total 25 year life costs	**307,012,600**	
Total disaggregated annual cost		**12,805,502**

9.7.9 It can be seen from the foregoing that over the next 25 years, if sports pavilions are to be maintained in good order, there needs to be spent approximately £307m which averages out at approximately £12.8m per year.

9.4.10 Although efforts have been made to provide guidance on maintenance spend and estimate the maintenance costs which require to be incurred for each type of sports pavilion over the 25 year period covered by this study, caution needs to be exercised in the application of the findings. The calculations are based on limited base data in terms of numbers of facilities, size and condition. The costs estimates for maintenance need therefore, to be treated with great caution.

9.5 Conclusion

9.5.1 Outdoor sports changing facilities not only provide spaces to change clothes and shower but for some sports, particularly tennis and cricket, provide necessary accommodation for players waiting to play or bat. Some changing facilities form part of larger sports complexes or club houses with bar and catering services although this study is only concerned with the basic changing elements.

9.5.2 Estimating condition and costs for improvement and ongoing maintenance of changing facilities proved to be the most difficult aspect of the National Audit of Scotland's Outdoor Sports Facilities due to the considerable differences which exist in respect of age, size, construction type, standards of construction, standards of care, location and the varying requirements of different sports. The number of self completion audit returns returned in respect of pavilions was disappointing and this factor, when combined with the limited information held on the **sport**scotland Masterfile database, made it necessary to make some 'heroic' assumptions about numbers, condition and costs. While the consultants undertaking this study are reasonably confident about the conclusions drawn about condition and the general levels of capital and revenue expenditure required to upgrade and maintain the existing stock of facilities, it should be noted that, in view of the wide differences and variations identified above, the only way to get a really accurate picture of condition and costs would be to carry out a further condition analysis survey of all sites in Scotland, preferably using building specialists. This would be very costly and time consuming and would probably provide no great benefits.

9.5.3 The Audit results suggest that only 7.5% of the nation's stock of approximately 3,694 outdoor sports changing facilities is in good condition while 17.5% require to be rebuilt and 39.5% require major refurbishment. The remaining 34.5% are assessed to be in need of moderate or minor refurbishment. The capital cost implications of bringing all changing facilities up to acceptable standards is estimated to be in the order of £238m.

9.5.4 Observation, anecdotal evidence and analysis of the condition assessment returns seems to indicate that those changing facilities which are in the poorest condition tend to be small pavilions serving say, one or two pitches, located in remote or unsupervised locations. Vandalism and abuse was a common problem in many sites and reportedly absorbed considerable resources each year. This observation leads to the conclusion that in many locations, large sports pitch sites which are used seven days a week and which have a permanent staff presence have the best chance of being protected from expensive vandalism and abuse and are consequently, the most economical to operate.

9.5.5 Analysis of the Audit results suggests that in the great majority of changing facilities, standards of routine and periodic maintenance fall far below those which are necessary to maintain them in a proper condition. This under investment in annual or revenue expenditure results in quite serious dilapidation which necessitates high levels of expensive remedial works being carried out periodically. This view is supported by the findings of the perception interviews carried out with local authority officers responsible for the management and maintenance of sports pitches across Scotland. It is estimated that if the nation's stock of changing facilities is brought up to the Grade 5 Standard (no works required), it would be necessary to spend over the next 25 years approximately £307m on routine annual maintenance and periodic maintenance. This equates to a national average annual spend of £12.8m.

9.5.6 Changing facilities are an essential part of the outdoor sports package and it is therefore important that they enhance the experience; the sense of enjoyment and achievement deriving from participation. This is particularly important in the case of younger sports people and females who can be discouraged from participating if they have to make regular use of poorly designed, built and maintained changing rooms, showers and toilets. Poorly constructed and maintained pitches and changing facilities combine to discourage participation and can do much to discourage participation and negate the effects of the many sports development programmes being promoted throughout the country and the efforts of the army of volunteers working to maintain the sports infrastructure in Scotland.

Part 4

Summary and Conclusion

4 Summary and Conclusion

1 Summary

1.1 Sport is an important part of the social and economic fabric and structure of society in Scotland and is being increasingly recognised as an important driver in the achievement of policy and strategic objectives in a wide range of national and local initiatives. However, despite this recognition, delivery of opportunities faces a number of challenges ranging from lack of funds and inadequate facilities to changing trends in participation and increased competition for people's leisure time.

1.2 Planning for the future of sports participation is complicated by changes to demographic structures throughout the country (reducing numbers of young people and an increasingly aged population) and the population is predicted to fall by a quarter of a million in the next 10 years. Regional variations also make planning difficult with the populations of the West of Scotland and the Islands of Scotland predicted to fall and those of the East of Scotland, particularly in Lothian, Fife and Aberdeenshire to increase. In areas where populations are predicted to fall there may well be less demand for schools and sports facilities, while, in those areas where populations are predicted to increase, there will be increased demands for all services and facilities.

1.3 The 'health improvement agenda' has caused there to be a greater appreciation of the benefits of participation in sport and physical exercise and this has given credence to the long view that the provision of high quality and accessible facilities is an important factor in attracting and retaining participants of all standards and at all levels of sport. Despite this, there is constant pressure on the public sector and voluntary clubs in particular to upgrade and maintain outdoor sports pitches, courts and greens to an acceptable standard. Lack of funds for maintenance has caused many facilities to become dilapidated and this has resulted in pressures to close them as a cost saving measure or to put the land to other uses and generate capital receipts. Local authorities are encouraged by planning guidance and **sport**scotland to evaluate their pitch and court requirements through the preparation of local pitch strategies. Ideally, this process should be completed before any consideration is given to the closure or disposal of any pitch, court or green.

1.4 Climate change is also having an impact on outdoor sports facility provision and requirements in that many older facilities not only fail to meet current quality standards but are unable to cope with the high levels of rainfall currently experienced and which is predicted to increase. These problems can be overcome by new and developing construction techniques and by increased provisions of synthetic surfaces, including artificial grass and polymeric surfaces. Some progress has been made in upgrading existing facilities and providing new or replacement facilities, not least through the schools PPP/PFI programmes, but many facilities, even some

recently constructed facilities, fail to meet desired specifications and standards. While there are some fine examples across Scotland of school PPP/PFI projects delivering wide ranging, high quality sports facilities the impression has been gained that in some instances PPP/PFI programmes have failed to provide an adequate range of outdoor sports facilities capable of meeting the needs of schools and wider communities. This is unfortunate in that in those areas where opportunities have been squandered, achieving the nation's sporting and health improvement objectives will be much more difficult.

2 Audit Findings

2.1 The interpolated results of the detailed site surveys and self completion survey questionnaires has enabled an assessment of the condition of the nations stock of pitches, courts, greens and tracks to be made. The overall picture is as revealed in Tables 64 to 71 below.

Table 64
Interpolated Condition Analysis of Assumed National Stock of Natural Grass Winter Sports Pitches

Facility Type/Condition	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
Full-size Natural Grass Winter Sports Pitches	400 10%	2,923 73%	400 10%	240 6%	40 1%	**4,003** 100%
Small-size Natural Grass Winter Sports Pitches	96 20%	346 72%	34 7%	5 1%		**481** 100%
Total **%**	**496** **11%**	**3269** **73%**	**434** **10%**	**245** **5%**	**40** **1%**	**4,484** **100%**

Note: Natural Grass Winter Sports Pitches Classification Grades

Grade 1 – Undrained/unimproved pitch
Grade 2 – Pipe drained pitch
Grade 3 – Pipe drained sand slit pitch
Grade 4 – Sand rootzone pitch
Grade 5 – Reinforced sand rootzone pitch (suspended water table)

Table 65
Interpolated Condition Analysis of Assumed National Stock of Mineral Winter Sports Pitches

Facility Type/Condition	Grade 1	Grade 2	Grade 3	Total
Full-size Mineral Winter Sports Pitches	351 44%	303 38%	143 18%	**797** 100%
Small-size Mineral Winter Sports Pitches	145 52%	108 39%	25 9%	**278** 100%
Total **%**	**496** **46%**	**411** **38%**	**168** **16%**	**1,075** **100%**

Note: Mineral Winter Sports Pitches Classification Grades

Grade 1 – Requires reconstruction
Grade 2 – Requires renovation of the playing surface
Grade 3 – Satisfactory Standard

Table 66
Interpolated Condition Analysis of Assumed National Stock of Artificial Grass Sports Pitches

Facility Type/Condition	Grade 1	Grade 2	Grade 3	Total
Full-size Artificial Grass Sports Pitches	24 20%	42 35%	54 45%	**120** 100%

Note: Artificial Grass Winter Sports Pitches Classification Grades

Grade 1 – Requires refurbishment
Grade 2 – Requires rejuvenation
Grade 3 – Satisfactory Standard

Table 67
Interpolated Condition Analysis of Assumed National Stock of Multi-sports Areas and MUGAs

Facility Type/Condition	Grade 1	Grade 2	Grade 3	Total
Multi-sports Areas and MUGAs	103 11%	232 17%	675 72%	**1,010** 100%

Note: Multi-sports Areas/MUGAs Classification Grades

Grade 1 – Requires replacement or refurbishment
Grade 2 – Requires patching or rejuvenation
Grade 3 – Satisfactory Standard

Table 68
Interpolated Condition Analysis of Assumed National Stock of Tennis Courts

Facility Type/Condition	Grade 1	Grade 2	Grade 3	Total
Tennis Courts	589 26%	568 25%	1,092 49%	**2,249** 100%

Note: Tennis Courts Classification Grades

Grade 1 – Requires replacement or refurbishment
Grade 2 – Requires patching or rejuvenation
Grade 3 – Satisfactory Standard

Table 69
Interpolated Condition Analysis of Assumed National Stock of Polymeric Track and Field Athletics Facilities

Facility Type/Condition	Grade 1	Grade 2	Grade 3	Total
Polymeric Track & Field Facilities	5 14%	15 43%	15 43%	**35** 100%

Note: Polymeric Track & Field Athletics Facilities Classification Grades

Grade 1 – Requires replacement or refurbishment
Grade 2 – Requires patching or rejuvenation
Grade 3 – Satisfactory Standard

Table 70
Interpolated Condition Analysis of Assumed National Stock of Cricket Facilities

Facility Type/Condition	Grade 1	Grade 2	Grade 3	Total
Natural Grass Cricket Wickets	4 2%	71 35%	128 63%	**203** 100%
Artificial Grass Cricket Wickets	15 29%	15 29%	21 42%	**51** 100%
Total **%**	**19** **7%**	**86** **34%**	**149** **59%**	**254** **100%**

Note: Cricket Facilities Classification Grades

Natural Grass Wickets

Grade 1 – Requires replacement
Grade 2 – Requires renovation
Grade 3 – Satisfactory Standard

Artificial Grass Wickets

Grade 1 – Requires replacement
Grade 2 – Requires rejuvenation
Grade 3 – Satisfactory Standard

Table 71
Interpolated Condition Analysis of Assumed National Stock of Bowling Greens

Facility Type/Condition	Grade 1	Grade 2	Grade 3	Total
Bowling Greens	79 6%	315 25%	888 69%	**1,218** 100%

Note: Natural Grass Bowling Greens Classification Grades

Grade 1 – Requires replacement or refurbishment
Grade 2 – Requires patching or renovation
Grade 3 – Satisfactory Standard

2.2 From the foregoing, it can be seen that more than half of all natural grass, mineral and artificial grass winter sports pitches, tennis courts and track and field facilities fall below the Grade 3 Satisfactory Standards identified for this study. Some 72% of multi-courts and MUGAs meet the Grade 3 standard but this is probably a result of the high proportion of bituminous hard surfaces. The highest quality facilities surveyed were multi-courts and

MUGAs (72% meet Grade 3 standard), bowling greens (69% meet the Grade 3 standard) and cricket wickets (59% meet the Grade 3 standard).

2.3 By virtue of the great range in building construction methods, size and age of outdoor sports changing pavilions and the limited information obtained from the audit and held on file, the audit methodology employed for changing pavilions was less robust than for pitches, courts, greens and tracks. The consultants who undertook the study are confident that the broad position and cost implications are reasonable estimates although, because of the many differences, the only way to get a really accurate picture would be to carry out a survey of all sites and buildings in Scotland. Given that the purpose of this study is to provide a broad picture of the current position and to identify those works and costs associated with making necessary improvements, the Audit findings can be considered to be fit for purpose.

2.4 The Audit site survey findings, when interpolated to the assumed national stock of outdoor changing facilities (Table 72), indicates that overall, only 23.8% of buildings are in a satisfactory condition or in need of minor refurbishment. Some 17.8% of buildings are deemed to be in need of replacement and the remaining 58.4% are estimated to be in need of major or moderate refurbishment. Changing facilities associated with pitch sports and bowling were found to be in the poorest condition with some 60% in need of rebuilding or major refurbishment.

Table 72: Interpolated Outdoor Sports Changing Facilities Audit Findings

Pavilion Type	Grade1	Grade2	Grade3	Grade 4	Grade5	Total
Pitch Sports	281	553	281	173	63	**1351**
%	20.8%	40.9%	20.8%	12.8%	4.7%	100%
Cricket	11	31	30	30	0	**102**
%	10.0%	30.0%	30.0%	30.0%	0.0%	100%
Tennis	71	113	113	71	114	**482**
%	14.7%	23.5%	23.5%	14.7%	23.6%	100%
Bowling	172	499	148	184	87	**1090**
%	15.3%	45.8%	13.6%	16.9%	8.4%	100%
Total	**535**	**1196**	**572**	**458**	**264**	**3025**
%	**17.8%**	**39.5%**	**18.9%**	**15.1%**	**8.7%**	**100%**

Note: Outdoor Sports Changing Facilities Classification Grades

Grade 1 – Requires replacement or refurbishment
Grade 2 – Requires major refurbishment
Grade 3 – Requires moderate refurbishment
Grade 4 – Requires minor refurbishment
Grade 5 – Satisfactory standard.

2.6 The Audit surveys have revealed that the nation's stock of outdoor sports facilities is generally in poor condition and concern should be felt for the resources which have been wasted over many years through failure to maintain expensive facilities adequately.

3 Financial Implications

3.1 The cost implications of bringing all existing facilities up to acceptable standards have been identified as:

Winter Sports Pitches:		
Full size natural grass pitches	£98,482,200	
Small size natural grass pitches	£7,606,410	
Full size mineral pitches	£23,300,325	
Small size mineral pitches	£5,285,250	£134,674,185
Artificial Grass Sports Pitches:		
Refurbish 24 Grade 1 pitches	£3,708,000	
Rejuvenate 42 Grade 2 pitches	£1,096,200	£4,804,200
Multi-courts and MUGAs:		
Bitmac surfaced courts	£1,227,024	
Convert mineral surfaced courts to polymeric/artificial grass	£1,975,740	
Porous concrete surfaced courts	£629,750	
Polymeric surfaced courts	Nil	
Artificial grass surfaced courts	£558,122	
Replace/repair fencing	£4,046,900	
Repair/replace floodlighting	Nil	£8,437,536
Tennis Courts:		
Bitmac surfaced courts	£7,088,248	
Porous concrete surfaced courts	£440,220	
Polymeric surfaced courts	£ 69,630	
Sand filled artificial grass courts	£644,730	
Mineral surfaced courts	£10,175,550	
Fencing	£9,209,655	
Lighting	£3,515,000	£31,430,033
Polymeric Track and Field Facilities:		
Upgrade 5 Grade 1 facilities to Grade 3	£802,720	
Upgrade 15 Grade 2 facilities to Grade 3	£294,930	
Replace fencing at 35 facilities	£2,135,000	
Upgrade floodlighting at 6facilities	£558,000	£3,790,650
Cricket Play and Practice Facilities:		
Upgrade 75 No. natural grass cricket wickets	£838,365	
Upgrade 30 No. artificial grass cricket wickets	£105,000	
Provide or upgrade 130 No. score boards/score boxes	£650,000	£1,623,365
Bowling Facilities		
Improve Grade 1 & 2 full size greens	£4,370,782	
Improve Grade 1 & 2 small size greens	£2,551,474	
Replace embankments on 807 greens	£7,061,250	£13,983,506
Estimated total capital costs of improving playing facilities		£198,743,475

Outdoor Sports Changing Facilities

Rebuild or improve:

Pitch sports changing facilities	£130,848,368	
Tennis changing facilities	£21,594,578	
Cricket changing facilities	£5,236,158	
Bowling changing facilities	£80,532,759	£238,211,863
Estimated total capital cost of improving changing facilities		£238,211,863
Total estimated cost of improving playing and changing facilities:		**£436,955,338**

3.2 The estimated £199m costs for the improvement of outdoor sports playing facilities identified above are basically for reinstating that which already exists to acceptable standards, although, where facilities are in need of reconstruction, costs for replacement with a more suitable surface have been incorporated. There are of course, many scenarios which could be adopted locally and nationally, to improve facilities. For example, given the unsuitability of mineral surfaces, one scenario might be to convert all mineral pitches to Grade 3 natural grass (see paragraph 2.7.2), at a net additional cost of £66m. Another scenario might be as identified in paragraph 2.7.3, whereby all existing natural grass pitches are improved to Grade 3 standard; no action is taken in respect of 50% of all mineral pitches; 30% of small size (83 pitches) and full size (239 pitches) mineral pitches are converted to Grade 3 standard natural grass; and 20% of small size (56 pitches) and full size (160 pitches) mineral pitches are converted to sand filled artificial grass. The capital cost implications of this scenario would be an additional £55m on the £199m cumulative costs identified above.

3.3 The estimated £238m costs for the improvement of changing facilities exceeds the estimated costs for improvements to playing facilities but these are important facilities. Some changing facilities are in very poor condition and are subject to considerable abuse and vandalism due largely to the fact that they are located in unsupervised locations and are used comparatively infrequently. Facilities which are staffed and used regularly seem to be subject to far less abuse. Changing facilities should also be recognised as part of the participation experience and poor quality buildings can act as a disincentive, particularly to female players. Playing facilities and changing facilities should therefore, be considered to be a part of the total package.

3.4 The estimated overall costs of £437m or more, of bringing the nation's pitches, courts, greens tracks and associated facilities up to acceptable standards are considerable and it will not be possible to tackle the problems identified within a short timescale. It will also be necessary to prioritise improvement and redevelopment programmes. Given the problems identified and the numbers of facilities involved, winter sports pitches might be deemed to be the national priority but the preparation of local sports pitch and facility strategies will assist the identification of priorities at a local level.

3.5 Once facilities are created, it is essential that they are maintained properly. Maintenance can comprise two elements; ongoing refurbishment/periodic maintenance and routine maintenance. Ongoing refurbishment/periodic maintenance comprises works which are outwith the scope of routine maintenance and which might be required to be carried out at intervals to ensure the longevity of facilities such as replacement of artificial grass carpets, replacement of fencing around pitches and courts, renewal of floodlights, replacement of heating and ventilation systems, rewiring, renewal of floor coverings, redecoration etc.

3.6 The cumulative refurbishment and periodic maintenance costs for all pitches, courts and greens over the forward 25 year period covered by this study are estimated to be:

Artificial grass pitch facilities	£59,037,340
Multi-courts & MUGAs	£16,486,244
Tennis court facilities	£55,828,470
Polymeric track & field facilities	£7,083,475
Cricket facilities	£1,657,080
Bowling facilities	£693,600
Estimated national 25 year refurbishment & periodic maintenance costs	**£140,786,209**

No separate periodic maintenance costs have been calculated for natural grass pitches etc. because of the difficulties associated with predicting the deterioration rates of natural living media. If routine maintenance is carried out to appropriate standards and timescales, periodic costs such as sand banding will need to be carried out less frequently than if the routine maintenance is skimped on. Levels of use can also impact on periodic maintenance requirements. Because of these uncertainties, a cost element has been built into the m^2 costs for routine maintenance to allow for periodic maintenance costs such as regular top dressing, sand banding etc.

3.7 The cumulative refurbishment and periodic maintenance costs for changing facilities associated with pitches, courts and greens over the forward 25 year period covered by this study are estimated to be:

Pitch sports changing facilities	£144,589,577
Tennis court changing facilities	£19,616,551
Cricket changing facilities	£6,105,009
Bowling changing facilities	£78,611,943
Estimated national 25 year refurbishment & periodic maintenance costs	**£248,923,080**

3.8 The combined 25 year refurbishment and periodic maintenance costs for playing facilities and associated changing accommodation are in the order of £390m are considerable and, for facilities such as artificial grass sports pitches, the investment required over a 25 year period can be equal to the original construction costs.

3.9 If the 25 year refurbishment and periodic maintenance costs are disaggregated to provide an average annual cost, some £15.59m needs to be spent annually to ensure that facilities are kept in good order. Failure to incur this expenditure can result in the early deterioration of facilities, particularly artificial grass surfaces and the need to incur even higher capital sums on reconstruction much earlier in the life of facilities than would have otherwise have been necessary.

3.10 If the improvement option in respect of mineral pitches and their partial conversion to artificial grass, as identified in the section on winter sports pitches and summarised in paragraph 2.7.3, are implemented, total 25 year periodic maintenance costs will increase by approximately £71m to £461m. This disaggregates to an average cost of £18.44m per annum.

3.11 If the life of facilities is to be maximised, it is also essential that appropriate routine maintenance is carried out. Indicative routine maintenance schedules for each type of playing and associated changing facility have been prepared and the estimated national annual cost implications are:

Playing facilities

Winter sports pitches	£46,465,805	
Artificial grass pitches	£45,300,000	
Multi-courts & MUGAs	£3,390,157	
Tennis courts	£10,692,034	
Polymeric track & field facilities	£197,640	
Cricket facilities	£5,994,040	
Bowling green facilities	£15,767,916	
Estimated total national annual routine maintenance costs		£127,807,592

Associated changing facilities

Pitch sports changing facilities	£1,552,872	
Tennis court changing facilities	£254,125	
Cricket changing facilities	£79,088	
Bowling changing facilities	£1,018,391	
Estimated total national annual routine maintenance costs		£2,904,476

3.12 The combined annual maintenance costs for playing facilities and associated changing pavilions are estimated to be £131m which is believed to be considerably more than is actually spent on maintenance. If the improvement options and proposals made in respect of mineral and artificial grass facilities are implemented, the annual maintenance cost requirements for playing facilities will increase by some £74,635,352 to circa £202m and the combined costs to £209.4m.

4 Conclusions

4.1 It is generally accepted that the provision of quality facilities is crucial to fostering and retaining high levels of participation in sport and the development of standards of performance and excellence. Unfortunately, the quality of much of Scotland's stock of outdoor pitches, courts, tracks, greens and ancillary accommodation does not meet performance and user requirements and expectations.

4.2 The audit process developed for this study has established a framework and methodology for evaluating the nation's stock of outdoor sports facilities against a set of basic but essential criteria, identified processes whereby facilities might be brought up to acceptable standards, identified desirable maintenance regimes and estimated the capital and revenue costs associated with these proposals. The capital sums required to put the nation's stock of facilities in good order is considerable, as are the annual cost implications of maintaining facilities in good condition thereafter. It is disappointing that the condition of facilities in many areas has been allowed to deteriorate and that insufficient sums are being spent on maintenance. As a nation we cannot continue to incur expenditure on creating new facilities or refurbishing existing facilities, only to see them be allowed to deteriorate through inappropriate and inadequate periodic and routine maintenance.

4.3 The technology relating to the construction of natural and synthetic surfaced facilities is steadily developing and improving so that performance specifications better meet the demands of the various sports, and the facilities have greater longevity. The result of this is that there is a steady increase in the provision of high quality natural grass facilities and facilities with synthetic surfaces, particularly artificial grass pitches and tennis courts.

4.4 The provision of artificial grass pitches can have the effect of increasing demands for training, practice and casual play and, at the same time, in view of their higher user load capacity, reducing wear of natural grass pitches. There might be a tendency for leisure planners and policy makers to consider a reduction in the levels of provision of natural grass pitches and courts as a result of increased artificial grass provisions but, this should not be undertaken in isolation and should be part of wider sports planning policy, including the preparation of local sports and pitch strategies. It may be that such strategies will identify opportunities to abandon some small, underutilised sites and to concentrate facilities in larger, better quality complexes where economies of scale might allow costs to be reduced and maintenance standards to be improved. While such considerations might be sensible, the strategic planning process should take into account the place which pitches, courts and greens play in the wider community as formal sports facilities, public open spaces and play facilities.

4.5 The growth of PPP/PFI projects across the country, particularly in respect of schools provision, presents opportunities to widen community access to quality facilities. This is to be welcomed, but care needs to be taken to ensure that the facilities created are able to sustain the high levels of demand and use which will be placed upon them and that the management and maintenance regimes put in place are adequate to allow the facilities to be utilised to their maximum but not allowed to deteriorate. Clearly, the balance is difficult to achieve and will require sensible management and detailed knowledge of maintenance requirements.

4.6 The increased user and wear capacity of artificial grass and synthetic sports surfaces might also encourage school planners to reduce the number of outdoor sports pitches on school sites. If this option is contemplated, great care needs to be taken to ensure that the reduced level of facilities provided is capable of meeting curricular and extra-curricular demands and community use requirements. It should also be noted that the provision of artificial grass surfaces on restricted school sites can reduce sporting opportunities by making it difficult or impossible to mark out facilities for athletics and cricket. Planners should therefore, pay close attention to the recommendations contained in **sport**scotland's Guidance on the Planning and Design of School Playing Fields.

4.7 Sports pitch managers often find it difficult to maintain high standards of provision because of the diverse uses which many sites are put to. Sports pitches which are located in public parks used for play, casual recreation, dog walking etc. frequently suffer from problems such as high wear in goalmouths, litter and broken glass, dog fouling, vandalism and abuse. Observation would suggest that those sports pitches which are able to be maintained to the highest standards are those which are located in a secure dedicated sports park with a permanent staff presence to control use. Large dedicated sports pitch sites seem to provide the best opportunities to control use and achieve economies of scale. This being the case, sports planners are recommended to investigate the possibility of creating strategically placed 'honey pot' facilities to meet the outdoor sports needs of an area as part of the sports pitch strategy process. The creation of such facilities might be achieved by abandoning small or run down sites but due cognisance would need to be given to the community open space, casual recreation and informal sporting purposes which such sites serve. Abandoning sports pitch sites and disposing of them for development is not necessarily in the best interests of the community or of sport – casual, unstructured participation being an important part of skills development and encouraging healthy lifestyles.

4.8 It will be noted that those sports which require fine turf facilities have a much greater maintenance requirement, and thus revenue cost implication, than those facilities with less exacting demands.

4.9 While there are many fine examples of modern changing pavilions across Scotland, there are also many facilities which are severely dilapidated and unfit for purpose. Changing pavilions on small, unsupervised sports pitch

sites seem to be the most susceptible to vandalism and abuse and ongoing maintenance tends to be below that required to keep them in satisfactory condition. Pavilions located on larger supervised sports pitch sites seem to be less susceptible to abuse and are able to achieve economies of scale which make them more cost efficient. Poor quality changing facilities can be a disincentive to participation.

4.10 Playing facilities and changing facilities should be considered to be part of the total package and quality standards for both should be aimed for if the nation's sporting and health objectives are to be achieved.

4.11 While quality is important, so is quantity. It is important that local communities have adequate access to facilities to meet sporting demands. Artificial grass surfaces and the creation of large 'honey pot' facilities can be beneficial but local needs for casual and informal participation should be given due priority. The disposal of sports pitch etc. sites to generate capital should only be undertaken following thorough evaluation of the options and implications. Once sports pitch etc. sites have been disposed of, opportunities for participation may well be lost forever and be to the detriment of current and future generations.

4.12 The following recommendations are made to outdoor sports site providers and managers:

- Local authorities should be encouraged to hasten the preparation of local pitch etc. strategies and to protect sporting open space vigorously.

- Providers and managers of outdoor sport sites should seek to provide quality facilities which meet current and future requirements having regard to national and local trends, local gaps in provision and levels of participation.

- Providers and managers should ensure that use of facilities is maximised by the provision of appropriate playing surfaces and ancillary facilities for outdoor sports and by the establishment of user friendly management and access arrangements.

- Site managers should ensure that appropriate maintenance arrangements are put in place to ensure that playing surfaces and ancillary facilities are kept in good order and not allowed to deteriorate unnecessarily or unreasonably.

sportscotland is recommended to:

- Consider reviewing its awards and grants criteria to ensure that support is only given to appropriate quality facilities which are able to enhance participation, sports development and healthy lifestyles objectives.

- Require that any funding award is linked to guarantees concerning the introduction and continuation of maintenance arrangements and practices deemed appropriate by **sport**scotland. Failure to implement and/or maintain appropriate maintenance schedules should result in action being taken to recoup any funding awarded.

- Seek to have greater influence and control over applications and proposals to redevelop, abandon or dispose of outdoor sports sites.

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The Sport and Play Construction Association

Officers of **sport**scotland

Reference Sources

The following references sources were used in the execution of this study:

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