Lawn Bowls Surfaces Study

ISSUES & ACTIONS

Victorian Greenkeepers Association

@leisure

Victoria
The Place To Be

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ABOUT THIS DOCUMENT

The report is presented in two volumes:

- Volume 1: Issues & Actions
- Volume 2: Appendices

The first volume summarises the findings on each of the issues identified in the brief, and reviews the distribution of synthetic and natural turf greens across Victoria.

Volume two is a reference document that provides the detailed findings of the survey of lawn bowlers and greenkeepers. It also provides an inventory of all greens and detailed information about clubs with a synthetic bowls surface.

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1 INTRODUCTION

1.1 This Project

Sport and Recreation Victoria have provided funding to the Victorian Greenkeepers Association for the promotion of excellence in green management, to raise the profile of the sport, encourage more Victorians to take up lawn bowls, and to provide safer and better quality greens. This project has been undertaken as part of the funding package.

The brief was to investigate and provide information and recommendations regarding:

- The current status of synthetic green installations in Victoria.
- The provision of synthetic and/ or natural turf greens.
- The installation and maintenance costs of synthetic and natural turf greens.
- The playing surface preferences of lawn bowlers.
- An analysis of the distribution of synthetic greens in clubs across Victoria.

Outcomes

A report providing information on the following issues concerning lawn bowls surfaces and the benefits of each, including:

1. Lifetime cost analysis of natural and synthetic greens:
   - Costs of construction of new natural turf and synthetic greens and resurfacing older ones.
   - Cost of maintenance of synthetic greens compared to maintenance expectations.
2. Life expectancy and depreciation of natural turf and synthetic greens.
3. Construction and maintenance of natural turf and synthetic greens.
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Methods

The following tasks were undertaken as part of this project:

- Interviews of 300 bowlers from throughout Victoria (stratified sample by age and RVBA group).
- Interviews of one hundred greenkeepers from throughout Victoria.
- A workshop on synthetic bowls surfaces for clubs and suppliers (approximately 40 participants).
- An interview of all suppliers of synthetic bowls surfaces in Victoria.
- Interviews with approximately 50 bowls club secretaries in Victoria.
- An email survey to all Victorian municipalities and an analysis of responses from 42 municipalities.
- A literature review.
- Interviews with a wide range of stakeholders and key informants.
- A peer review meeting with industry experts (12 participants) to discuss directions and seek feedback.
- Circulation of the draft reports for comment

1.2 Background to Bowls Surfaces

It has been suggested that lawn bowls was introduced into Australia in the 1840's, with the first green being completed in 1845 by Thomas Shaw in Parramatta[1]. For approximately the next 130 years lawn bowls was played only on natural turf greens. In the late 1970's and early 80's synthetic surfaces were introduced as an alternative to turf bowling greens[2]. Australia was an early entrant into the synthetics bowls greens market, considering that synthetic surfaces were only approved by the World Bowls in 2000.

Club's expectations of consistent, good quality surfaces with no restrictions on when bowls can be played, and with minimal maintenance, has led to the greater use of synthetic bowls greens in Victoria.

In Victoria, there are 165 bowls greens with a synthetic surface. These account for 17% of the total number of greens in the state. Approximately 5% of clubs have a synthetic green as their only playing surface, whereas 72% of Victorian clubs have only natural turf greens as their playing surface. Some 23% of clubs have a combination of natural turf and synthetic playing surfaces (figures calculated as at July 2003). The predominant natural turf species and varieties used for lawn bowls greens in Victoria are listed below.

Table: The main natural turf species and varieties used for lawn bowls In Victoria

Couchgrass	Bentgrass
Tifdwarf	Penncross
Tifgreen	1020
Santa Anna	Cobra
Wagga Couch	Seaside
South African Couch	

[1] Robin Lawn Bowls www.brookvale ps.nsw.edu.au

[2] Information supplied by David Aldous

There are two main types of synthetic surfaces used for outdoor bowls in Victoria. These are a sand filled synthetic grass and non-sand filled synthetic carpet.

In Victoria three firms supply the main synthetic green surfaces for lawn bowls:

- ProMaster Supergrasse®, (sand filled synthetic grass) manufactured by Sports Technology International/ Balsam Pacific.
- Greengauge®, (non-sand filled carpet) Tiger Turf supplied by Synthi-Grass with their product Softcrete®.
- Sportsgrass Pty. Ltd, provider of Sportsgrass Henselite Bowls 2000® (sand filled synthetic grass).

A number of other sand filled synthetic surfaces are still being used throughout Victoria including products such as: King Heylen, Williams Evergreen, Team Sport and Wimbeldon Tournament.

In the 1980's the main synthetic surface used for bowls was a 25 mm sand-filled product with a directional pile. It only stood straight when filled with sand and because of this, each hand would play differently. Now 15mm deep pile is considered the standard product in the industry for sand filled synthetic greens. This has a non-directional pile.

The original synthetic products used for lawn bowls were not specifically designed for lawn bowls. They were designed for sports such tennis where the requirements are different. There were considerable difficulties with managing the sand and keeping the surfaces level.

Suppliers suggest that in the last five years the product quality has increased dramatically, a result of manufacturers responding to issues concerning player comfort, playing oddities, seams and directional pile[3].

There have been some considerable improvements in recent years in the methods of laying synthetic surfaces for lawn bowls and in the provision of stable bases that drain well and remain flat.

One of the most significant differences between synthetic and natural turf surfaces that has provided a significant issue for lawn bowls is green speed and draw. Much of the discussion about maintenance of synthetic greens relates to reducing the speed to comply with the acceptable standards as determined by the Royal Victorian Bowls Association, and to be compatible with speeds achievable on natural turf greens.

One of the reasons for a large number of clubs moving to a synthetic surface has been the funding opportunities provided by Councils and particularly the State Government for installation of synthetic greens, whereas clubs have not generally been able to get assistance to replace the surface of a turf green.

[3] David Hopwood, Synthigrass Australia, Synthetic Seminar at Knoxfield

2. THE SUPPLY OF SYNTHETIC GREENS

There are a total of 543 bowls clubs registered with the Royal Victorian Bowls Association and these clubs have a total of 1017 greens (687 country, 330 metropolitan). The majority (852 or 83%) of greens are natural turf and 165 (17%) are a synthetic surface.

An inventory of all club greens and their surface type has been compiled by RVBA (July 2003) and is provided as Appendix 3 of the Reference Document - Volume 2).

2.1 Distribution of Synthetic Greens Across the State

The RVBA's 16 groups were used to assess the distribution of bowls surfaces throughout the state.

There are some notable differences between surface types in country Victoria compared to metropolitan Melbourne. Of the greens (330) that are located in metropolitan Melbourne (RVBA groups 9-16), 23% are a synthetic surface. This is compared to 13% of the 687 greens in country Victoria (RVBA groups 1-8).

The following table outlines the mix of surface types and numbers of greens for metropolitan and country clubs. Some key points drawn from this follow.

The four most common mix of surfaces and numbers of greens are the same in both country and metropolitan areas.

- The largest percentage of clubs in both country Victoria and metropolitan Melbourne have two natural turf greens (32% metro & 38% country). The next highest percentage of each has just one natural turf green.
- There are just over 10% more two green clubs than one green clubs in country Victoria.
- Clubs that have all natural turf greens account for 65.4% of the clubs in Metropolitan Melbourne and 82.2% of clubs in country Victoria.
- In metropolitan Melbourne there are just over 50% more clubs with two natural turf greens than those with one natural turf green.
- A significantly lower proportion of metropolitan clubs (15%) have one turf green compared with the country Victoria (30%).
- A significantly higher proportion of metropolitan clubs (17.9%) have a combination of synthetic and natural turf greens, than Victorian country clubs (7.9%).
- A lower percentage of country Victorian clubs (3.9%)have two synthetic greens compared to metropolitan clubs (8.0%).
- In total 35.6% of the clubs in metro Melbourne have at least one synthetic surface, as compared to approximately 17% of clubs in country Victoria.

Table: Number of greens and the mix of surface types

	Country Victorian Clubs		Metropolitan Melbourne Clubs	
Green Surface Combinations	**No.**	**%**	**No.**	**%**
1 natural turf green	114	30.0	25	15.3
2 natural turf greens	147	38.8	53	32.5
3 natural turf greens	39	10.3	24	14.7
4 natural turf greens	10	2.6	1	0.6
5 natural turf greens	2	0.5	2	1.2
1 synthetic green	21	5.5	14	8.7
2 synthetic greens	15	3.9	13	8.0
3 synthetic greens	2	0.5	2	1.2
1 natural turf & 1 synthetic green	16	4.2	12	7.4
1 natural turf & 2 synthetic greens	0	0	2	1.2
2 natural turf & I synthetic green	8	2.1	12	7.4
2 natural turf & 3 synthetic greens	1	0.3	0	0
3 natural turf & 1 synthetic green	5	1.3	3	1.8

Country Victoria

The country groups of clubs that have the greatest percentage of synthetic greens are:

- Group 1: Central Victoria – 25% of all greens within the group are synthetic, possible reasons being that the majority of the area lies on the Great Dividing Range that experiences large amounts of rainfall.
- Group 2: West Coast – 21% of all greens within the group are a synthetic, possible reasons being the area is south of the Great Dividing Range and it is an area that lies along the coast from Geelong to the South Australian border.
- Group 8: Gippsland – 20% of all greens within the group area a synthetic surface, possible reasons being that it is south of the Great Dividing Range and the Gippsland region is renowned as being one of the highest rainfalls areas in Victoria.

Note: Good workmanship or greenkeeper knowledge can overcome the wet/ cool climate. Eg, the Mid Gippsland Bowls Association, which is in the middle of the Gippsland RVBA group and only have two synthetic surfaces.

The Murray Mallee group has the highest percentage of natural turf surfaces in country Victoria with 99%; this figure is also the highest in the state. The Murray Mallee experiences a warmer climate than most other groups in Victoria.

Overall there are a greater percentage of synthetic surfaces within clubs that lie on or south of the Great Dividing Range. For country groups north of the Great Dividing Range, 95.5% of the greens are a natural turf however for country groups south of the Great Dividing Range this figure drops to 80.6%.

North of the Great Dividing Range the climate is much warmer and is seen as more conducive to producing a good quality natural turf surface.

Metropolitan Melbourne

Overall synthetic surfaces are more predominant in the eastern suburbs of Melbourne, while the bayside suburbs have a much higher percentage of natural turf surfaces than the other metropolitan Melbourne groups.

The three groups within metropolitan Melbourne that have the highest proportion of synthetics are in the eastern suburbs:

- Group 12: Maroondah – 46% of all greens within the group are a synthetic surface.
- Group 13: Eastern Suburbs – 42% of all greens within the group are a synthetic surface.
- Group 11: Yarra – 41% of all greens within the group are a synthetic surface.

Of the eight groups within metropolitan Melbourne, the Melbourne beaches group has the highest percentage of natural turf greens (94%).

The groups that either lie along Port Phillip Bay or in close proximity to the Bay (the Metro South East Group) seem to have a greater percentage of natural turf surfaces (88.4% of the greens are a natural turf surface and 11.6% are a synthetic surface). For metropolitan groups that are not in close proximity to Port Phillip Bay, 67.5% of the greens are natural turf while the remaining 32.5% are a synthetic surface.

2.2 Surface by Membership Type

The majority of clubs with a synthetic green have a membership of only 40-79 members. About half the clubs with this level of membership had one natural turf and one synthetic green and half had just one synthetic green. See the table below.

Table: Club Membership by No. of Clubs with Synthetic Greens

Number of members	Number (%) of clubs with a synthetic surface			
	Metro Clubs		Country Victorian Clubs	
0-39 members	3	5%	12	17%
40 – 79 members	17	28%	28	39%
80 – 119 members	16	27%	16	22%
120 – 159 members	14	24%	11	15%
160 – 199 members	6	10%	4	6%
200 – 239 members	1	2%	0	0%
240 – 279 members	2	4%	1	1%

When evaluating the membership levels of clubs with natural turf greens, again the most common group is 40-79 members. Within the country groups, the 0-39 member group closely follows this, and in the metropolitan areas the next most common group is the 80-119 membership cohort.

Table: Club Membership by No. of Clubs with Natural Turf Greens

Number of members	Number (%) of clubs with a natural turf surface			
	Metro Clubs		Country Victorian Clubs	
0-39 members	9	8.6	116	37.9
40 – 79 members	45	42.9	123	40.2
80 – 119 members	25	23.8	51	16.7
120 – 159 members	15	14.3	10	3.3
160 – 199 members	5	4.8	4	1.3
200 – 239 members	4	3.8	2	.7
240 – 279 members	2	1.9	0	0

2.3 Number of Synthetic Greens by Supplier

A breakdown of the companies who have installed synthetic greens is listed below.

	% of Synthetic Greens		
Synthetic Grass Manufacturer/ Supplier	Country Victoria	Metro Melbourne	Statewide
Balsam Pacific	49.5	56.3	52.0
Sport Grass	32.9	26.8	29.8
King Heylem	7.7	5.6	7.9
Synthi-grass[4]	1.1	7.0	3.7
Williams Evergreen	4.4	2.8	3.7
Team sport	4.4	0	2.4
Wimbledon Tournament	0	1.4	.6

Source: Interviews with Lawn Bowls Clubs

[4] Only been supplying synthetic greens for two years

Today there are only three major active companies in Victoria installing synthetic surfaces: Balsam Pacific, SportGrass and Synthi-grass. The main products and suppliers for each are listed below.

Table: The main synthetic lawn bowls products and suppliers

Manufacturer	Supplier	Products
Balsam Pacific	ABS	Supergrass Pro Master®
SportGrass	SportGrass	SportGrass Henselite Bowls 2000®
Synthi-grass	Tiger Turf	Greenguage® & Supergreen®

3. A COMPARISON OF NATURAL TURF AND SYNTHETIC GREENS

Neylan and Robinson undertook a review of synthetic surfaces (in 1994) based on economic and surface performance. It also compared the characteristics of several synthetic greens with couchgrass and bentgrass surfaces[5]. This was the only article found that makes comparisons between natural turf and synthetic surfaces specific to lawn bowls.

The study suggested synthetic surfaces consistently had a greater green speed and "draw" compared with natural turf surfaces.

The economic reasons for installing a synthetic green cited in this review were:

- Perceived high cost of maintaining turf greens.
- Potential for increased income from an extended playing season.
- No loss of play due to renovation and rain.

The surface performance reasons given were:

- An expected improvement in standard and pace for small clubs dependent on voluntary labour for greens maintenance[6].

This study found that these are still the key reasons why synthetic surfaces are being adopted by many clubs, however it also identified that synthetic surfaces are not without problems and that many are not favoured by players.

[5] Neylan & Robinson, 1994
[6] Neylan 2000

3.1 Hardness

Neylan found that surface hardness of synthetics is an issue (as tested by the Clegg Impact Soil Tester). The hardest of most synthetic surfaces tested was between 800 – 1000 g and the remainder of the synthetic surfaces being 250 – 525 g. This is compared to natural turf hardness of between 130 – 200 g.[7] The World Bowls Board guidelines say that a surface hardness of less than 320 g is desirable[8].

It is unlikely that some of the new non-sand filled carpet style bowls surfaces were included in this study and whilst there may be comparative data including the hardness of the bowls carpet with an underlay, it has not been identified. This information however would be useful, as players identified hardness as a major issue especially among older players.

3.2 Temperature

Synthetic surfaces are hotter to play on. In one research paper surface temperatures on a synthetic surface was shown to have risen to 60 ^{o} C or higher on a clear day (air temperatures 24 ^{o} C) whereas the maximum temperature of the natural turf was 32 ^{o} C [9].

The Neylan study indicates that on a 39.7^{o} C day – one synthetic surface registered 62^{o} C while the couchgrass registered 41.2^{o} C. On a 30^{o} C day – one synthetic surface registered 50^{o} C while the bentgrass surface was 29^{o} C[10].

Several people interviewed for this study identified that playing conditions of synthetic surfaces vary more with the changes in the weather than turf greens. In the heat, some synthetic greens tend to stretch which tends to make the bowls play slower.

The environmental properties of three natural and synthetic greens in New Zealand have been measured as part of some research[11]. Results showed that in cool to overcast, hot and clear conditions, synthetic greens were significantly hotter than natural greens, but there was no significant difference in temperature at 1.5m above ground level. Under hot days (20-25^{o} C) the natural turf greens showed a buffering effect by cooling the surface by as much as 5^{o} C lower than ambient temperature, hence making it more comfortable for bowlers.

[7] Neylan & Robinson, 1994

[8] Cited www.acoustoscan.com.au/bowls

[9] Buskirk et al, 1971 & Mecklenburg et al, 1972

[10] Neylan & Robinson,1994

[11] Gibbs, 1997

3.3 Other Costs and Benefits

Neylan mentions that synthetic greens are a lot like grass greens, "those that are good can be excellent, and those that are not are terrible".

Lower maintenance costs, no edging required, offering extra play at night and all year round, are considerable strengths of using synthetic surfaces. Advantages also cited in the Neylan article include safety to players in all weather conditions, increasing the number of days a green can be played, and opportunities to reduce volunteer workload.

Whilst many clubs identified the advantages of utilising synthetic greens as lower maintenance and uniform playing surfaces, others identified the disadvantages as the sand scratching the bowls, that the sport could no longer be regarded as lawn bowls, and the possible impact on bowler participation[12].

A variety of factors affect the performance of a synthetic surface including age, climate, level of wear, construction quality and maintenance (frequency and techniques)[13].

Some of the main problems of synthetic greens identified by players are related to the surface conditions, maintenance and installation practices. A number of these issues may be more a reflection of the older style surfaces, poor maintenance or age of the synthetic greens rather than issues with the inherent nature of current surfaces[14]. Common issues raised included:

- Hardness relative to natural surfaces.
- Glare.
- Susceptibility to tracking during windy conditions, even under low running speeds.
- Boring to play on, taking the challenge out of the game.
- The apparently hotter/ more humid playing environment on synthetics.
- Scratching of bowls (by incorrect levels of sand in sand filled surfaces).
- Various playing oddities including "straighteners".
- Variable draw on each hand.
- Variability of pace (generally slow).
- Narrowness of draw.
- Possible fire risk.

Other problems with synthetic surfaces were identified at the Artificial Greens Seminar in 1996. (RVBA conducted a survey preceding this seminar with clubs that have a synthetic surface). Results stated that synthetic greens often caused "seaming" of the bowl or caused the bowl to change direction. Uneven draw on particular hands was also noted.

The survey also highlighted that a lack of preventative maintenance had led to the creation of major problems with algae growth, poor surface

[12] Stanton Partners, 2002

[13] Cited www.sportsturf.com.au/bowls

[14] Ormsby & D New, 1993.

drainage and excessive speeds. It also said that excessive rolling was the major reason for excessive speeds. The rolling of synthetic greens is no longer generally recommended.

Clubs interviewed for this project without synthetic surfaces indicated that other clubs had an advantage in competition. This was because the green speed of synthetic surfaces could be altered quickly (by watering for example) or because specific surfaces have a different feel or properties that players on natural turf may not be accustomed to. Both these may create a competitive advantage for the club with a synthetic green.

3.4 Environmental Benefits of Natural Turf

Roberts (1985), Beard and Green (1994) and Aldous (1996) identified the following benefits derived from turf surfaces (relevant to this study):

- Improved recharge and quality protection of groundwater.
- Enhanced entrapment and biodegradation of synthetic and organic compounds.
- Carbon dioxide conversion, substantial heat dissipation-temperature moderation.
- Reduced glare, noise and visual pollution.
- Decreased noxious pests and allergy-related problems.
- Cooling the environment, reducing the area as a heat sink.

Natural turf areas synthesise carbon dioxide, water and minerals to promote green growth. In the process, grasses take pollutants from the air, reduce runoff, retard the spread of fire around buildings, and give off oxygen.

Approximately 230 sq. m. of actively growing natural turf release sufficient oxygen to meet the needs of a family of four for a day. On a block of eight average houses, front lawns have the cooling effect of 70 tonnes of air conditioning.

Grasses absorb gaseous pollutants such as carbon dioxide and sulphur dioxide, converting them to oxygen and trap an estimated 12 million tonnes of dust released annually into the atmosphere.

Recreational benefits include low-cost surface for outdoor sport and leisure activities, enhanced physical health of participants, and unique low-cost cushion against personal impact injuries for man and animal.

Aesthetic benefits include enhanced beauty and attractiveness, complimentary relationship to the total landscape ecosystem of flowers, shrubs and trees, improved mental health with a positive therapeutic impact (Bennett and Swasey 1996; Heerwagen & Orians 1986; Ulrich 1990), social harmony and stability, improved work productivity and an overall better quality of life, especially in a densely populated urban areas. Studies have shown that an attractive natural grass area can increase property values by 15 percent.

Regarding the preference of lawn bowlers throughout Victoria, 85% of the people interviewed said they would prefer to play on a natural turf green as apposed to a synthetic surface[15].

The main weaknesses of natural turf surfaces are that they need water to grow, there may be growing difficulties in low light, turf dormancy and turf

[15] Interview with bowlers, @leisure, 2003

wear and damage, variable playing surface over summer, and they may be labour intensive to keep at a high standard.

Play on natural turf can vary, the surface can be too slow to grow, and there is time out of play when resurfacing.

3.5 Player Preferences for Surfaces

The survey of 300 Victorian lawn bowlers[16] (See full results in Appendix One in the Reference Document – Volume 2), found that:

- 99% of respondents surveyed regularly play on turf greens.
- 34% of respondents play on multiple green types.
- 20% played bowls regularly on a synthetic surface as well as turf greens.

The types of green that the bowlers preferred are shown in the following table.

Table: Preferred green surface type by percentage of bowlers interviewed

Preferred Green Surface Type	Total (%)
Natural Turf Green	85%
Synthetic Green	10%
No Preference	2%
Undecided	3%

The results indicate that there was marginally higher percentage of females that prefer a natural turf green than males.

The percentage of bowlers that prefer turf greens appears to increase with age. Some 75% of bowlers under 30 years of age preferred turf, and this increased to 90% for bowlers 61 years and over[17].

Key reasons for a preference of natural turf included the following:

- "It is a truer surface".
- The traditionalists, "it's called lawn bowls".
- "Is not as hard on the body (feet, legs, eyes, etc)."
- "More of a challenge (more skill utilisation)."
- "Just like it/ prefer it/ used to it."
- "Doesn't wreck your bowls."
- "Cooler."
- "More natural."

In a previous study surface hardness was found to be a major issue with synthetic surfaces as well as higher surface temperatures that could lead to physiological heat stress of the player[18].

4. OTHER KEY ISSUES

[16] Interview with bowlers, @leisure, 2003

[17] Interview with bowlers, @leisure, 2003

[18] Neylan, 2000, & Neylan & Robinson, 1994

The key issues listed as outcomes in the brief are reviewed in the following sections.

4.1 Construction and Maintenance of Turf and Synthetic Greens

Preparation of the base and installation of the surface

Construction of the base and drainage system is considered one of the most important aspects that determine quality and performance of a synthetic bowls surface[19].

In the past problems with bases related to hardness (when installed on asphalt or concrete); inability in keeping the surface flat and stable, (being installed on sand or loose materials); and poor drainage.

A number of recent improvements have been cited in interviews and in the literature, concerning developments in maintenance and construction techniques, especially in the methods of laying a stable base.

The current preferred system for sand filled synthetic products is to drain the site with agg drains, lay crushed rock over this and then a layer with a bonding agent to provide a stable base.

Specific bonded aggregate bases such as Softcrete® developed in 1980, have enabled synthetic bowls surfaces to be laid on a stable, level surface that drains well.

The carpet style synthetic greens such as Greengauge® are laid on an underlay. This type of product is more expensive than sand filled synthetic grass, but appears to be less problematic and require less maintenance than sand filled grass. The carpet (non-sand filled) style of synthetic bowls green is more specifically suited to lawn bowls and is likely to be the main product in the sport for years to come[20].

Issues concerning the quality of the base and the need to re-level the surface after the "dumping" of bowls were the subject of considerable discussion by clubs, greenkeepers and bowlers during this study.

Many clubs have adopted their own trial and error management techniques to help rectify issues concerning the base. Excessive watering and rolling were cited on a number of occasions as ways clubs had tried to rectify movement and indentations in synthetic greens – caused by a poor base system. Rolling unfortunately has made some surfaces become hard and some seams to be pronounced.

Manufacturers have shown a willingness to improve manufacturing and laying techniques, for example Hood[21] cites the example where synthetic surfaces were once laid with a straight grain however today it is recommended that synthetics are now laid diagonally to help prevent playing oddities. When greens were laid up and down in the past there was excessive rolling which led to the seams becoming pronounced.

The survey of clubs has indicated that some clubs have resurfaced over old synthetic surfaces and that the carpet has been laid the other way.

[19] RVBA Greens Committee Seminar, 1996

[20] Information supplied by David Hopwood, Synthetic Surfaces Workshop, @leisure, 2003

[21] Synthetic bowls setting the standard www.sportsturf.com.au

The literature suggests pre-handover performance testing is essential for clubs installing new greens, prior to signing off with the manufacturer/ installer, and to prevent disputes further down the track[22]. The New Zealand Sportsturf Institute has introduced a standard for facility approval, however Australia has no standard for facility approvals. Stakeholders raised the issue that there are no Australian Standards governing the manufacture or installation of synthetic surfaces for lawn bowls, nor is there an accreditation scheme for contractors in the industry.

Another issue raised by clubs was that because of the lack of familiarity with the laying of synthetic surfaces, clubs were not often in a position to assess whether their installation was a good or bad job.

Traditionally for turf greens, loamy sands provided the hard, fast surfaces required for the playing of lawn bowls. In more recent times there has been a shift towards sand based profiles along the lines of the USGA specifications. Robinson and Neylan (1994) compared the two systems and found that USGA surfaces can produce comparable greens, where the USGA sand is ideal for couchgrass and a finer sand type is better suited in managing a bentgrass surface[23].

Maintenance

Key maintenance tasks on synthetic bowls surfaces tend to be concerned with:

- Cleaning debris/ dust removal (all surfaces).
- Sand levelling/ top dressing (sand filled synthetic grass).
- Cleaning out/ removing sand (sand filled synthetic grass).
- Treatment of moss and algae infestation (sand filled synthetic grass). This is one of the main issues in sand filled products.
- Carpet-cleaning/ vacuuming weekly (carpet style surfaces).

The long-term maintenance of synthetic surfaces is a learning process and this is borne out by the increase in green speeds as the carpets age[24]. With older (greater than 10 years in age) synthetic surfaces the level of maintenance increases (moss and algal slime infestation, weed control, drainage performance), with little change in playing performance in terms of green speed and surface draw[25]. However greens tested between three and five months of age indicated differences in surface levels (only 26% of the greens tested within the recommended maximum height range of 20mm), and surface infiltration rates (only 55% of new greens could be truly categorised as "permeable" i.e. having surface infiltration rates greater than 100 mm/hr). It appears that with age, surface levels and infiltration rates on synthetic surfaces need correction[26].

At establishment, the major maintenance tasks for older types of synthetic greens involved extended periods of ironing/ rolling sand topdressing and mechanical brushing/ grooming. Day-to-day maintenance involved irrigation, double rolling, sweeping and grooming, moss and algae spraying and the occasional weed control[27].

[22] Hood, 2003.
[23] Information supplied by David Aldous
[24] Fielder, 2003.
[25] Well & Gibbs, 2000
[26] Gibbs, 2001
[27] Well & Gibbs, 2000.

For the latest synthetic carpet products (e.g. Greenguage®), recommended maintenance includes sweeping the surface clean of leaves and debris on a weekly basis and using a wet/ dry vacuum cleaning devise with a low foam fibre cleaner for general upkeep of the surface on an annual basis. The product literature further states that it does not require watering or rolling at any time, it is not affected by algae, and there is no sand in the product[28].

The Lakes Entrance Bowling Club is an example of a club that have good maintenance practises on a synthetic surface. They power broom on the diagonal every three months and broom the ends when they show wear marks. A "smudger" or mat is used as required which sometimes can be up to twice a week. Any algae infestations on the playing surface are treated with copper sulphate or Kendocide[29], or other similar chemicals.

The forums with clubs and greenkeepers[30] raised a number of issues relating to the maintenance of synthetic bowls greens. The main issues were:

- Lack of information about what maintenance is required.
- Lack of information about the skills, machinery and chemicals required.
- Lack of guidance and advice about installing and managing synthetic greens generally.

Other issues included:

- Unlike in many other sports, bowls greens are often in garden settings – with trees, garden beds and other shrubbery nearby. The nature of this setting can significantly influence maintenance. "We are vacuuming our green a lot as we have pine needles continually falling on it".
- "The biggest problem for people starting off with a synthetic green is that the maintenance involved is not simple, you need a lot of skill and knowledge with a synthetic, or its performance will suffer. "We had a synthetic green that was rolled too much, it hardened up the surface and as a result it would not drain".
- Maintenance requirements appear to vary with the climate and products installed. In sand filled synthetic greens the climate appears to affect the growth of algae in particular. However it was not possible to make direct comparisons between maintenance methods and cost between installations, due to the lack of records and consistency in age and types of product across different areas.
- The majority of stakeholders agreed with the principles that green speed increases with the age of the surface and therefore so does maintenance, (if the green is to be kept in a good quality condition) and maintenance is essential to maintain good drainage.

[28] Synthi-grass Advertising Brochure

[29] Fielder, 2002

[30] Synthetic Surfaces Forum, @leisure, 2003

- Many clubs spoke of the need to regularly water and roll their surfaces, however it appears this is mostly related to older surfaces and dependant on the quality of the base. Suppliers indicate that it is important that the base must have constant moisture content, and if synthetic surfaces aren't watered at all, movement can occur. Current surfaces do not appear to however they need regular watering or rolling.
- The maintenance of sand-filled synthetic surfaces requires not only keeping the surface clean, but keeping the sand at the correct level. The sand is generally broomed, sterilized and old sand top replaced with fresh sand. Suppliers indicate that clubs need to begin maintaining the surface within six months or the drainage will begin to slow down.
- If the sand is too high in the pile it can cause the scratching of bowls.
- Greengauge responds to temperature, on a hot day it expands and plays marginally slower.

The key maintenance issues

The key issues arising concerning maintenance of synthetic greens are:

- There is a shortage of people trained in the industry to install and service synthetic greens[31], it takes some four years to develop the necessary skills in staff[32].
- Greenkeepers appear not to be well positioned (without training) to look after synthetic greens and maintenance will be increasingly important as many of the existing greens age.
- Clubs do not expect to pay as much as it costs to maintain synthetic greens, and consider they do not have or cannot readily get adequate information about maintaining them.
- The survey of clubs indicated that maintenance methods vary considerably and can be described in many instances as "hit and miss". Some clubs have invented their own equipment in the absence of commercially available machinery to keep their greens in shape.
- There appears to be considerable variation in the advice provided to clubs about maintenance requirements and no suppliers provide standard maintenance regimes with product specifications. However, Synthigrass who supply the Tiger Turf product line of synthetic greens is offering an ongoing service contract to manage synthetic greens after installation.

[31] Personal Communication with Chris Simpson from Synthigrass.

[32] Personal Communication with Chris Simpson from Synthigrass

4.2 Lifetime Cost of Turf and Synthetic Greens

4.2.1 Life expectancy of natural turf and synthetic greens and depreciation

The life expectancy of bowls surfaces varies from green to green, club to club and state to state.

Synthetic greens

Clubs identified the following factors as influencing the life expectancy of a synthetic green:

- The standard of installation.
- Base condition/ movement.
- The level of use their green receives.
- Maintenance practices.

Most suppliers estimate a synthetic green will have a life expectancy of around 10 years. The manufacturers tend to offer seven year warranties for the actual product (pile), although one reference was made to a warranty of 10 years.

The survey of clubs indicated that the average life expectancy is 6-10yrs. There have been examples of a synthetic surface lasting 10- 20 years in Victoria (North Blackburn Bowls Club has just replaced its surface after 13 years, Heathmont Bowls Club after 10 years, Lilydale Bowls Club 15 years) however there are also cases of synthetic greens being replaced within four years. The average length of time that a synthetic surface is replaced in Victoria currently ranges from 8-10 years[33].

In 1980, synthetic surfaces were introduced to Victoria (Shepparton RSL). There have been indoor synthetic greens (e.g. Greenguage®) in Victoria that have lasted for 25 years. However the quality of the green may be an issue toward the end of this period.

The Greenguage® surface is fully guaranteed for seven years, which is subject to maintenance procedures.

Interviews with suppliers and greenkeepers revealed that the quality of synthetic surfaces declined anywhere from three to five years after their installation.

Depreciation[34]

In estimating the useful life of a depreciable asset, consideration must be given to:

- Expected physical wear and tear.
- Obsolescence.
- Any legal or other limits on the use of the asset.

There are practical problems in accounting for assets that have a very long and almost indeterminate life, for example in determining the useful life and future condition of a playing surface is going to be dependent on the design features, the quality of construction and materials, the quality and frequency of planned maintenance, the level of use, and physical wear

[33] Information supplied by Max Fielder, RVBA

[34] Information supplied by David Aldous

and tear. Implementing depreciation provides a unique set of problems by virtue of their longevity and complexity[35].

In the case of an inert playing surface, traditional methods of cost allocation may be used (eg straight line depreciation), although such a measure may not adequately report the loss of service potential of the asset. For example, given a rough construction cost of $120,000, and even with an expected life of 15 years, the synthetic surface would depreciate at $8000 per year. Similarly the installation of an irrigation system would have an initial cost and a subscribed depreciation rate[36].

Life expectancy of turf

The life expectancy of a natural turf green is infinite as the surface is perennial with actively growing shoots and roots continuously replacing themselves. Research has shown that individual tillers of perennial grasses have a limited life span, approximately one year, whereas the longevity of turfgrass roots varies with the turfgrass species and may range from six months to almost two years[37]. Therefore the longevity of the surface will largely be governed by the severity of the cultural conditions (how it is managed), the adaptability of the grass species to climatic stress and soil physical, chemical and biological conditions and the playing pressure that the surface undergoes.

From the survey with greenkeepers, the median time frame for replacing the top of a natural turf green was once every 11 years[38].

Some clubs said that while it would be nice to be able to do it every five years, they were more likely to stretch it out for a bit longer due to the costs involved. There were also greenkeepers that said the ability of the greenkeeper reflects the time between replacing the top of a green, "a good greenkeeper on a couchgrass green should not have to replace the top at all".

Grass as an asset[41]

The Office of Local Government, Victoria 1992 p 62. recognised amenity trees as assets and recommended that they be recorded and reported on the basis of standard unit costs, where the unit value reflects current costs. However for valuers (Australian Property Institute, 1999), trees, and most probably grassed areas, are not included, nor are they excluded, under Practice Standard 9 Financial Reporting of Real Property and Related Assets. [42]

In the absence of market evidence, such assets are valued at depreciated replacement cost which is based "*on the estimated current cost of replacement of the asset with a similar asset which is not necessarily an exact reproduction but which has similar service potential and function, less an amount for depreciation in the form of accrued physical wear and tear and functional obsolescence*…." (Practice Standard 9:6.1.2.1).

35 Information supplied by David Aldous
36 Information supplied by David Aldous
37 Beard,1973.
38 Figure endorsed by the VGA
39 Interview with greenkeepers, @leisure, 2003
40 Figure endorsed by the VGA
41 Information supplied by David Aldous
42 Information supplied by David Aldous

4.2.2 Construction costs

Synthetic surfaces costs

The construction of a synthetic surface, like any natural turf bowls green is a process that has many variables, based on current soil composition, how far to travel to import sand (if required), the type of synthetic that is planned to be installed, the current state of the greens drainage system, etc.

A new synthetic bowling green, constructed from scratch that would include preformed ditch units, watering system and stabilisation of the sub-base is likely to cost in the order of **$130,000 to $160,000**[43].

Another important option to review for the purpose of this study is the likely costs to a club who were considering converting from a natural turf green to a synthetic surface. In this case a geotechnical survey would need to be undertaken at the site, to determine the reconstruction requirements. If there is a drainage system already installed a further system may need to be superimposed with the drainage lines between the existing ones giving the effect of a double drainage system. The costs of resurfacing a turf green with a synthetic bowling green vary from **$90,000 to $150,000**[44].

Turf surface costs

Interviews with greenkeepers[45] throughout Victoria provided an indication of the highest, lowest and the most common costs in constructing a natural turf green. The table below indicates that probable costs reported range from as low as $20,000 to as high as $250,000 per green. The most common range reported was between $60,000-$80,000 per green.

Table: Green probable construction cost

Turf green construction component	Lowest Reported ($AUD)	Highest Reported ($AUD)	Most common Reported ($AUD)
Excavation	4,000	70,000	10 – 30,000
Drainage	1,400	70,000	5 – 8,000
Watering System	1,000	20,000	4 – 8,000
Base Preparation	1,500	20,000	4 – 10,000
Soil/ Stone	2,000	50,000	20 – 30,000
Seed Costs	300	1,000	3 - 500
Chemicals/ Fertilisers	400	20,000	1 – 3,000
Ditches	5,000	30,000	8 – 15,000
TOTAL	**20,000**	**250,000**	**60 - 80,000**

Note: Six of the highest figures were from the one greenkeeper that also included the total highest figure of $250,000

When greenkeepers were asked how much it would cost to construct a natural turf green from scratch, the median response was $70,000[46].

Another option to consider within this section would be the probable costs to convert a synthetic surface to a natural turf green. The estimated cost for such a process to take place is **$30,000 to $40,000.**[47]

[43] Information supplied by the RVBA

[44] Information supplied by Max Fielder, RVBA

[45] Interview with greenkeepers, @leisure, 2003

[46] Figure endorsed by the VGA

4.2.3 Replacement costs

Synthetic surface replacement costs

Dependant on the standard of the base and the drainage system at the time of replacement, costs can vary greatly from site to site.

For a synthetic replacement, rebuilt base and new drainage system, today, a club could expect to pay: between **$90,000 and $125,000.**

When the base is considered to be level and the drainage system is still effective, the synthetic replacement would cost **$75,000 - $90,000.**

Note: This figure is just for the carpet, it does not include any work on the base or labour costs.

Today a replacement Greenguage® surface would cost around $85,000 and a Supergreen® replacement surface would cost around $70,000[48]; both of these figures do not include any additional works on the base.

An estimation of the likely cost of a Greenguage® surface in 10 years is[49]:

New surface/ underlay (today)	$80,000
5% inflation over 10 years	$50,311
Base repair (allow)	$10,000
TOTAL	**$140, 311**

Turf surface replacement costs[50]

The resurfacing process for a couch grass green involves lowering the surface with a turf cutter, decompacting the surface, installing plinth boards two to three millimetres above the new green level, broadcasting basal fertilizer, grooving or cultivating to produce a seedbed, levelling the green, sowing stolons and rolling into loose soil surface, covering green with shade cloth, light topdressing, and adding pre-emergence herbicide[51].

The resurfacing process for a bentgrass green is to use a turf cutter to remove the grass and thatch layer. Then add fertiliser and lime if required, rotary hoe the soil to maximum soil depth to mix amendments and decompact the root zone. Then fumigate the soil to kill any weed seeds or unwanted plants. Consolidate soil and level with a laser level grader. Sow seed with turf starter fertiliser and apply fungicide to reduce the risk of disease problems.

Based on the above process resurfacing costs (minus labour depending on variable costs) could range from $7, 000/ green (1998). Recent costs for resurfacing have ranged from $17, 000 to $25, 000, and average $21,000. It should be noted that labour costs could vary considerably between location and club; in some cases the greenkeeper is a volunteer, however in other cases there could be contractors involved.

If labour costs are removed the costs of materials and equipment to resurface a natural turf green are on average $11,450.00.

47 Information supplied by Max fielder, RVBA

48 Synthi-grass Advertising Brochure

49 Synthi-grass Advertising Brochure

50 Information provided by David Aldous

51 Ormsby, 1998.

Costs will also vary on the method of resurfacing, if the club has certain pieces of equipment, and the skills and expertise of the contractor[52].

Another estimate of costs to resurface one turf green have been provided after Barrett, 2003). These include labour costs.

Table: Estimated probable costs to resurface one turf green

Item	Total ($AUD)
Labour	7000-25000 (av. 16,000)
Fertilizer	1000.00
Pesticides	450.00
Soil removal	300.00
Purchase of new soil	1500.00
Sod cutter	200.00
Bobcat removal	2000.00
Cargo/truck	1000.00
Fumigation	2500.00
Rotary hoe	400.00
Seed	450.00
Hydro-seeding	300.00
Spreader fertilizer	250.00
Laser level	900.00
Miscellaneous	200.00
SUBTOTAL	27700.00
Contingency (10%)	2800.00
TOTAL	**$30,500.00**

However the interviews with greenkeepers as part of this project found that the costs to replace the top of a natural turf green mainly fell between $0-10,000 and then between $10-12,000 with the overall median figure being $11,000[53]. The Victorian Greenkeepers Association state that the costs involved with the resurfacing of a green can vary anywhere between $7,500 and $17,000.

As mentioned previously in this report one of the reasons for a large number of clubs moving to synthetic surfaces has been the funding opportunities provided by Councils and particularly the State Government for installation of synthetic greens, whereas clubs have not generally been able to get assistance to replace the surface of a turf green. Given the significant cost to clubs of providing and maintaining surfaces, and the different circumstance of each club, future schemes should ensure the surface type matches clubs ability to pay, levels of management expertise and other relevant criteria.

[52] Information supplied by David Aldous

[53] Interview with greenkeepers, @leisure, 2003; figure endorsed by the VGA

In some instances investment in turf management/ greenkeepers expertise (even if only a pay as you go basis) may be as beneficial as changing the surface. Some consideration should also be given to funding, or providing existing clubs with the older, often poorly constructed, poor quality synthetic surfaces, with incentives or support to fund the replacement of these greens.

4.2.4 Maintenance Costs

Synthetic surface maintenance costs

Contrary to public perception, a synthetic surface requires regular maintenance to keep it in good playing condition, which includes keeping the green speed at an acceptable level.

The wide range of costs in maintaining a synthetic surface are likely to be a reflection of the:

- Range of types and ages of surfaces.
- Varying budgets to maintain greens.
- Differences in climate across the state.
- Lack of consistency in views about what maintenance is required.

An estimation of the annual maintenance costs for a Greenguage® synthetic surface (based on a functional life of 10 years)[54] is shown in the following table.

Table: Maintenance costs for a Greenguage® pre annum

Component	Probable Cost
Vacuum	$1,850
Depreciation (15%)	$0,278
Labour $15/hr p.w. @ $15 = $75 x 52	$3,900
Electricity	$150
Algae spray	$200
Annual service	$500
TOTAL	**$5,028**

Note: this does not include machinery costs, and is likely to be an underestimation due to the low labour costs used.

[54] Synthi-grass Advertising Brochure

Turf surfaces maintenance costs

Factors such as climate, club budgets and experience of the greenkeeper have a strong bearing on the costs associated with maintaining a natural turf green.

An evaluation of bowls in the Northern Territory[55] stated that the cost savings to offset the large initial capital outlay from the utilisation of the low maintenance synthetic surface as compared to the high maintenance natural turf green is dependant upon the individual club. Some are able to significantly reduce the maintenance labour component to a negligible amount by utilising volunteer/ part-time greenkeepers.

The following table illustrates the likely cost of maintenance per annum for natural turf including average labour costs.

Table: Probable costs of maintenance per annum for natural turf greens

Item	New Zealand ($AUD)	Victoria ($AUD) Composite	Victoria ($AUD) Average
Labour (wages, training, greenkeeping Association membership)	6348 (1)	16500 (1)	16500 (1)
Fertiliser/pesticides	796	250 1000 2000	1083
Soil/sand (topdressing/ditches)	91	175 300 150	208
Fuel	23	87 150 67	100
Machinery maintenance	438	700, 1000 400	700
Irrigation (maintenance & water)	350.00	100 125 1000	400
Subcontractor/hire	286.00	250 1300 700	750
Plants (annuals)/mulch	130	25 200	112
Miscellaneous	175	50	50
SUBTOTAL	8,637		20,653
Contingency (10%)	870		2065
TOTAL	**$9,507**		**$22,720**

Notes

(1) Wages for one green employing greenkeeper for 10 hours (Ormsby 1992) and 40 hours per week respectively.

(2) Cost of items have been rounded up to the nearest dollar and have been averaged.

[55] Stanton Partners, 2002.

Notes (cont'd)

(3) Machinery maintenance allows for materials to service the surrounds mower, roller and a new bed knife/back lap for the reel mower

(4) Miscellaneous covers the small extra items such as paint, nails, etc

(5) The inclusion of a contingency provides an allowance for unforeseen items. For example an increase in prices, extra items required, etc.

Note: Yearly maintenance costs will vary from green to green and club to club. Greens managed in rural areas often do not have the resources to manage compared with city or suburban greens. Within items there can also be differences. For example fertilizer costs could range from $500.00 to $2,000 per green and machinery maintenance from $300.00 to $2500.00. If labour costs are taken out, the average maintenance costs to manage an existing natural grass green and surrounds in Victoria is $3,400.00, and a non-graminaceous grass green, such as L.dioica, in New Zealand, $2,300.00[56].

The majority of greenkeepers said that the probable cost was between $39,000 – 50,000 per annum to maintain two natural turf greens and the median figure for maintaining one natural turf green per year (including labour costs) was $19,750.

4.2.5 Overall costs

There are many different scenarios to take into consideration when comparing costs of synthetic and natural turf greens. The three most common scenarios are; constructing a green from scratch, a club transferring from a natural turf green to a synthetic green, (the most common scenario), and continuing to maintain a turf green over the same time period. Costs for these three scenarios are outlined in the following pages.

Scenario 1: Installing a New Synthetic or Turf Green[57]

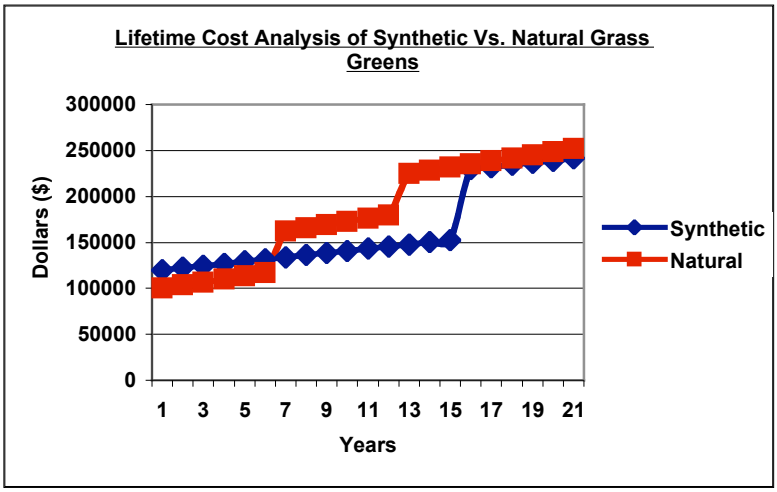
One likely cost scenario provided by Aldous, using a life expectancy of synthetic surfaces of 15 years is provided below and illustrated in the following graph. These figures don't include labour costs for maintenance and differ from @leisure's findings in that the calculations provided elsewhere are based on replacement of synthetic surfaces at 10 years, and a slightly higher annual maintenance cost for synthetic greens than is shown here. The example below is based on resurfacing a turf green at six and 12 years.

Cost	Synthetic green	Turf green
Construction/Installation	$120,000	$100,000
Annual Maintenance (excluding labour costs)	2,315.00	$3,400.00[58]
Resurfacing (in years 6 & 12)	-	$42,000.00
Resurfacing (in year 15)	$75,000.00	-

[56] Information supplied by Dr David Aldous

[57] With this option another resurfacing is required to continue

[58] Excluding labour costs



The above graph shows the scenario where a synthetic surface is replaced only every 15 years.

Costs over 20 years

Synthetic Surface		**Estimated Probable Cost over 20 years**
Initial Installation		$145,000[A]
Maintenance (over 20 years * $5,028)	$100,560[B] (inc labour)	
Resurface after 10 years		$102,500[C]
TOTAL		**$348,060**
TOTAL Including Interest		**$470,328[D]**

Turf Green[59]		**Estimated Probable Cost over 20 years**
Initial Installation		$ 70,000[E]
Maintenance (over 20 years * $19,750)	$390,000[F] (inc labour)	
One resurfacings after 11 years	$ 11,000[G]	
TOTAL		**$471,000**
TOTAL if including interest		**$502,772[H]**

Note: the costs for machinery are not included and watering costs have not been included in either of the surfaces and for the synthetic to continue a replacement would be required.

[A] Mid figure from section 4.2.2. in the report

[B] From section 4.2.4 of the report

[C] Mid figure from section 4.2.3

[D] Interest paid on loan for $145,000 and $102,500 (resurfacing) over 10 year period at 8% interest rate

[59] Note that the costs are averages based on the figures that have been supplied, if a club knows the exact figures they can be replaced and the sums can be recalculated.

[E] From section 4.2.2 in the report

[F] From section 4.2.4 in the report

[G] From section 4.2.3 in the report

[H] Interest paid on loan for $70,000

If the club had to take out a loan for 10 years at 8% pa interest to cover the initial installation cost of $145,000, and to resurface the green (at a cost of $102,500):

- Clubs would pay an additional $122,268 for a synthetic surface ($55,134 on the initial installation and $67,134 on the replacement surface) making the total cost $470,328.
- For a turf green clubs would pay an additional $31,772 interest on the loan taking the total to $502,772.

The following very simple case (using cost provided from clubs) in a 10-year life cycle shows the similarities in maintenance cost from one surface to the other. Note no depreciation is accounted for in this example.

Costs over 10 years[60]

Synthetic Green	
Life expectancy: 6 - 10yrs+	
Probable Cost of Construction: $130,000 - $160,000	
Probable Cost of Resurfacing at 10 years: $90,000 - $115,000	
Probable Cost of Maintenance pa: $2,000 - $5,000 (Including labour)	
Probable Cost Over 10 years	**$261,000**

Turf Green	
Life expectancy: 6yrs -indefinite	
Probable Cost of Construction: $60,000 - $70,000	
Probable Cost of Resurfacing at 10 years: $10,000 - $12,000	
Probable Cost of Maintenance pa: $18,000 - $20,000 (including labour)	
Probable Cost Over 10 years	**$261,000**

These probable costs over ten years are in the ballpark for other sports using synthetic grass such as hockey that have been estimated at around $30,000 per annum to cover replacement and maintenance. However in most instances hockey clubs share their surface with other clubs, and in some instance with other sports. This is unlikely to be the case in lawn bowls.

[60] Figures taken from the medians from the interviews with greenkeepers and clubs

Scenario 2: Replacing a turf green with a synthetic green

Situation: A club has a natural turf green that is poor quality. Clubs may want move to a synthetic surface, others want to renovate and stay with turf.

Note: the peer review panel indicated that the base construction for both natural turf and synthetics surfaces would be much the same.

Cost over 20 years

Synthetic Green	Estimated Probable Cost over 20 years	
Replace turf with synthetic	$120,000[I]	
Maintenance (20 years * $5,028)	$100,560[B]	(inc labour)
Resurface after 10 years	$140,311[C]	
TOTAL	**$360,871**	

Note: For this club to continue after 20yrs they will need to spend another $140,311 on resurfacing.

Retain as Natural Turf Green	Estimated Probable Cost over 20 years	
Initial resurfacing and one after 11 years:	$22,000[G]	
Maintenance (20 years * $19,750)	$390,000[F]	(inc labour)
TOTAL	**$412,000**	

Note: In two years time the club will need to spend $11,000 on replacing the top of the green to continue beyond 20 yrs.

Note: Costs do not include any interest payable, water costs, maintenance of equipment, or any increases in labour costs over the 20-year period.

Cost over 25 years

Looking at the costs of the above two options, over 25 years the club would have out laid the following amounts:

- If they switched to a synthetic green it would cost them: $501,182[J.].
- If the club had stayed with a natural turf surface: $423,000[K.].

[I] Mid figure from section 4.2.2 of the report
[B] As previous page
[C] As previous page
[G] As previous page
[F] From section 2.2.4 in the report
[J.] Amount includes an additional resurfacing
[K.] Amount includes an additional resurfacing

Key issues In relation to costs

The costs over the lifecycle for a synthetic and natural turf green are very similar. However we recognise that the cost of labour varies considerably across clubs. Some use only voluntary labour, others a combination of paid and volunteer labour. Some employ their own greenkeeper and others contract these services as required.

The survey of clubs indicates that the highest proportions of clubs with a synthetic green are those with a membership under 70 people. The concern that the probable cost of greens raises is that most clubs of this size are not likely to be able to find the $20-30,000 per year necessary to maintain a green in good condition over the long term.

There have been a number of instances cited in this study of small clubs spending all their available cash to move to a synthetic green and with little likelihood that could fund replacement costs let along adequate maintenance. One greenkeeper suggested that if a club saved its $100,000 the interest they would earn off this sum would allow the club to successfully manage a natural turf green and allow for resurfacing every 10 or so years that would cost a maximum of $11,000.[61]

4.3 Number of Days Synthetic and Turf Greens Can Be Used

One of the major benefits of a synthetic surface is that they can be played on all year round and do not require a period of time to rest. Some 67% of greenkeepers interviewed[62] said they rest their natural turf greens between 10-20 weeks per year. This seems to be a major reason why many clubs with a small number of greens are moving to synthetic surfaces, to increase their playing time. However it appears this rest period indicated by greenkeepers is not just because the turf green needs to be rested but mainly due to the designated season.

Traditionally turf greens in Victoria are renovated and rested over April until late August, providing a use period of approximately 245 days (eight months) i.e. close on Anzac Day and open again in early spring. However with the increased demand for winter play and the need to compete with synthetic surfaces this timeline has extended to a larger part of the year. The main constraint is often the inability of the bent grass surface to sustain a hard and fast surface, particularly over summer. A synthetic surface can be used 12 months or 365 days per year.

Results from this study indicate that 79% of respondents agree or strongly agree that playing time can be extended on a synthetic surface, however 47% do not bowl during the bowling off-season. This suggests that a synthetic (or a natural turf green for that matter) may not always be used over the off-season.

Specific levels of use of individual greens couldn't be identified from information provided by clubs in this study. However further research would be beneficial to determine the actual use of turf greens throughout the year and the carrying capacity of different species in different climatic zones.

[61] Personal communication Andrew Kent (VGA)

[62] Interview with greenkeepers, @leisure, 2003

The peer review group suggested that some natural turf greens can be used all year, that a standard measure of use be adopted by clubs, and clubs be asked to compile this information.

Usage would best be compared using persons/ per green/ per hrs/ per annum. This then should be compared to surface type, cost of maintenance, and location (RVBA group).

Clubs also could be encouraged to record levels of usage in a standard format so some comparisons could be made.

A number of greenkeepers made the point during the study that good greenkeepers can keep turf greens going all year.

4.4 Good Practice Regarding Maintenance, Usage, and Types of Greens

A true benchmark is a qualitative fact. Following a systematic study of several methodologies, one method is assessed as providing a more satisfactory result than the others. This practice becomes the benchmark, and the methodology used to produce the benchmark is known as the best (good) practice[63]. At present there are no true benchmarks relating to installation and maintenance of bowls greens – especially synthetic greens. However there are some practices that can be identified as preferred.

USGA specifications were the preferred construction methods about 10 years ago and generally have been rejected by Victorian greenkeepers because of problems associated with poor surface hardness resulting in slower green speeds, poor nutrient retention and increased disease problems.[64]

Turf green construction

The sand based construction method is the preferred construction method for natural turf greens as it extends the playing season of bowls. The construction technique should be benchmarked against the USGA specifications. Robinson and Neylan (1994) compared the systems and found that USGA surfaces can produce comparable greens, where the USGA sand is ideal for couchgrass and a finer sand type is better suited in managing a bentgrass surface. Sand based construction requires a change in the management of the greens. For example there is a need for more regular nutrient testing[65].

It is recommended that suppliers and installers of turf bowling greens use the sand based construction method as it has been shown over time to the preferred construction method and be benchmarked against the USGA specifications, especially for couchgrass. Clubs may need however to seek paid professional advice to ensure the best turf management methods are being employed.

In the context of current weather patterns and water restrictions, the use of warm season grasses on at least one green, could also be considered preferred practice.

63 Report by Dr David Aldous

64 Personal Communication VGA 2003

65 Information provided by Dr David Aldous

Performance

In 2001 The NZ Sports Turf Institute published a performance standard for synthetic surfaces. This standard enabled the club to gain confidence that they have bought a green to meeting a recognized standard and provided the installer with an independent evaluation of the quality of their construction[66]. Some 31 clubs were performance tested for green speed, surface draw, surface levels and surface infiltration rate. In more recent years, the majority of the clubs have come very close to meeting all tests in the performance standard.

For turf surfaces performance standards for playing good practice lawn bowls surface have been developed[67]. In Victoria, the standard recommended green speed advised by the RVBA is 14.5 seconds. Surface evenness (Standard deviation of profile gauge measurements) was given as <1.5 mm as the preferred range and <2.0mm for an acceptable range.

Developing an equivalent performance standard for turf surfaces in Victoria should provide similar benefits to players and spectators.

Suppliers and installers of synthetic surfaces should develop a similar set of standards that can be benchmarked against a worldwide standard on their construction.

Optimum number and mix of greens

Due the different nature of clubs, size of land, climate, funding sources, membership, and numbers and types of greens, it is not possible to determine what the optimum number, and mix of greens should be for any bowls club. However taking into account player preferences for turf, viability issues and clubs views about flexibility, competitiveness etc, it is generally desirable for new clubs to have a minimum of two greens. Where a club has more than two greens, there may be an advantage of one of those greens being a couchgrass green or a synthetic surface.

Research into the development of good practice techniques of green keeping should be supported as well as agencies undertaking research into natural turf varieties, nutrition, irrigation and plant protection. Greenkeepers and especially those in a voluntary capacity should be encouraged to keep abreast of new technologies and developments that lead to good practice[68]. Best practice management should include clubs accessing greenkeepers advice. This does not necessarily have to be in the form of a fulltime paid greenkeeper. Services may be acquired on an "as required" basis.

Mesh-amended root zones

Inclusion of mesh-amended root zones in turf have provided increased traction, improved gravimetric soil moisture and reduced devoting, an increase in shear resistance and improved infiltration rates in sport fields and golf courses. Mesh elements have shown no significant effect on ball rebound, ball roll, and traction, sliding resistance and surface hardness. Many sports fields now use a combination of synthetic and natural turf systems to reduce compaction and reduce wear. In the early 1990s mesh reinforced root zones on turf greens were trialled in Victoria at Auburn, Essendon, Traralgon, Bentleigh, Seaford and Dandenong RSL Bowls Clubs. The cost per green was approximately $120,000 that included a complete rebuild.

[66] Gibbs, 2001

[67] Bell and Holmes, 1988

[68] Information supplied by David Aldous

These trials were not successful due to the sand based turf being too fast draining (placing the turf under a lot of stress), and the excessive cost, when a good soil profile was suggested as being able to provide the same level of reinforcement.[69]

4.5 Access to Greens for People with a Disability

The majority (41%) of bowlers interviewed as part of this study thought that synthetic greens make bowls more accessible to people with a disability, although 28% disagreed and 31% of people said they didn't know.

Greenkeepers perceived synthetic surfaces to be more accessible for people in a wheelchair. A common response in the survey of greenkeepers was "a synthetic green would be more accessible however I have had people on my greens in the past and have experienced no problems[70]". The same proportion of greenkeepers said both surface types were accessible, as those who said synthetic surfaces are more accessible.

The majority of greenkeepers generally indicated that surface type makes no difference for people in chairs, people with vision impairment, people with limited use of their arms or hand, or people with an intellectual impairment.

Some points of interest from the survey include:

- Greenkeepers thought turf is more accessible for people with a vision impairment because of the glare that comes from a synthetic green.
- A large majority of people disagreed with the statements about natural turf being more accessible for people with limited use in their arms due to arthritis, mainly because they thought that on average a synthetic surface runs quicker and as a result it requires less force than natural turf, to deliver the bowl to the other end.
- Many bowlers also thought that it requires less effort to deliver the bowl to the other end on a synthetic green, however bowlers also said that synthetic greens are too hard on the body, are hotter and reflect too much glare.
- For older bowlers who dump their bowls, some clubs considered it more difficult to repair damage from repetitive dumping on a synthetic surface than on a natural turf green.
- Some clubs did not allow people in chairs on greens unless the chairs had slicks (wider smooth tyres). These are apparently preferred on both synthetic and natural turf surfaces as they reduce the likelihood of wheel marks being left by the chair.
- A selection of clubs indicated that some manufacturer warranties would be voided if a wheelchair were used on the surface.
- Synthetic surfaces probably have less of a compaction problem at the point of entry for people with disabilities in chairs.
- Natural turf surfaces are cooler, inviting and may place less stress on older frail people or those with disabilities.

4.6 Issues Regarding Vandalism for Natural Turf and Synthetic Greens

[69] Personal Communication Ron McCartny

[70] Interview with greenkeepers, @leisure, 2003

The common sources of damage of bowing greens from vandalism include:

- Graffiti.
- Fire.
- Tyre marks from cars.
- Digging holes and tearing the surface (natural turf).

Storm damage is also not uncommon and appears to be more of a concern with the increased frequency of storm events. Dumping of bowls by older players can also cause considerable damage to greens.

Most people interviewed indicated that synthetic surfaces are less susceptible to, or are more difficult to damage, however once they are damaged, it was commonly stated that they are more difficult and expensive to rectify.

Greenkeepers suggested that damage like digging holes and tearing of the natural turf can easily be rectified within a week. With a synthetic surface vandalism or damage can occur in a range of forms and if extensive damage occurs, considerable cost may be involved with re-installation or repairing of the surface.

A Comparison of the Playing Characteristics of Synthetic and Natural Bowling Greens in New Zealand[71] found that once completed, it is much more difficult to remedy construction faults in a synthetic surface than with a natural turf green.

The Greenguage® carpet surface can be hand stitched to rectify a small hole or where major damage occurs, a panel can be replaced.[72]

4.7 Alternative Types of Turf not Currently Used in Victoria[73]

Grass selection for a natural turf bowls green requires the species to have a fine leaf texture, high shoot density, a high wear tolerance, low mowing height and high mowing frequency. In the southern hemisphere the predominant species maintained on bowling greens belong to the grass genera of *Agrostis* spp. and *Cynodon* spp. Bentgrass cv. SR 1020 or Cobra, and Creeping bentgrass (*Agrostis palustrus*) cv Penncross are the predominant bentgrass species managed on bowling greens.

In the warmer parts of northern Victoria selections of the naturalised *C. dactylon* ecotypes, *C. transv*aalensis, and the interspecific *C. dac*tylon x *C. transvaalensis* hybrids Tifdwarf, Tifgren and Santa Anna can be grown. These hybrid couchgrasses are gaining prominence as they have better summer performance.

In the more frost-free areas outside Victoria, *Digitara didactyla* (Queensland blue couch) is used as a bowling green surface in Queensland, and *Paspalum vaginatum* (*Paspalum vaginatum*) in South Australia and Western Australia.

Throughout Europe, Canada and New Zealand monostands of bentgrass or creeping red fescue or a polystand of bentgrass/ creeping red fescue have shown potential as a bowls surface.

71 Gibbs, 1994

72 Personal Communication with David Hopwood from Synthigrass

73 Information supplied by David Aldous

Neylan (2003) carried out bentgrass and couchgrass trials maintained at greens height and found that Penncross, Egmont, Penn A1 and A4 were outstanding bentgrasses for Victorian conditions over summer growing conditions, and Penn G2, Tifeagle and Tifdwarf suitable warm-season grasses. In addition *Poa supina* has been shown to provide an ideal playing surface during winter in overseas locations.

Recent work with Associate Professor David Huff, from Penn State University, has demonstrated that Victoria has a number of "perennial" winter grass (*Poa annua*) selections that could adapt and fit the above criteria.

In New Zealand non-gramineous species are used on bowls greens. The most common plants are two species of *Leptinella* spp. *L. dioica* and *L. maniatota*. The reasons for their use is their ability to remain relatively drier, produce a greater green speed under poor weather conditions and require fewer resources in their maintenance.

Other plant species used in New Zealand include Plantago triandra (Starweed), Pratia angulata, Hydrocotyle spp. Crassula spp. (Tillaea) and Colobanthus spp. Hydrocotyle spp. are found in cool temperate Victoria.

Another non-grass is Dichondra (D. repens or Mercury Bay weed), is popular lawn cover that can be grown and maintained throughout temperate Victoria. All these potential species require learning about a different management regime[74].

There are several trials being conducted on turf species in Australia and USA that have relevance for lawn bowls. These include work at Redcliffe in QLD, and by the Victorian Golf Association Turf Research and Advisory Board and the Northern Metropolitan Institute of TAFE in Melbourne (trials on bentgrass. Whilst this has been directed towards golf greens it may have applications for lawn bowls).

The peer review group for this study suggested that some further research be undertaken on turf species/ varieties and in strategic management of surfaces specific to bowls, to accommodate desired levels of use and types of play. This should better inform clubs (especially those with small memberships and with volunteer greenkeepers) of techniques to extend and manage use, extend the season, and retain quality surfaces over the long term. One option for this would be to create a partnership between Government (Sport and Recreation Victoria), the Greenkeepers Association of Victoria and a University to engage a student to take out further studies.

The interviews with greenkeepers reinforced the view of the peer review group that in many instances natural turf has the capacity to be grown and used all year for lawn bowls. Also the group made the point that the life expectancy of a surface can be 30- 50 yrs as evidenced by bowls greens such as at Foster. Club culture and the need for more greenkeeper expertise at some clubs are key issues that the industry needs to address to ensure that the natural turf is used to its full potential.

[74] Information supplied by David Aldous

4.8 Chemical Use On Turf And Synthetic Greens, And Environmental Impact

Interviews with clubs, greenkeepers and suppliers have indicated that there is no standard recommended chemicals or doses provided to clubs to control moss and algae, and hence little consistency in what is being applied.

Clubs interviewed as part of this study are spending between $300 - $6000 on chemicals for algae removal per year. One club has algae problems "every six weeks[75]."

In New Zealand moss and algae were the dominant problems on synthetic surface with 60% of greens between one and three years of age having no moss infection. The extent of algal slime infestation increased with the greens' age, and most clubs (60%) were using a preventative spray program for moss and algal control. Light weed infestations also increased with the age of the surface and were usually confined to the ditches and controlled on an "as required" basis[76]. Drainage performance was an issue with synthetic surfaces in that as the extent of moss and algal slime infestation increased, so the drainage performance was assessed to decrease. No long-term effect of chemical use on the environment was reported[77].

The chemicals clubs cited as being used on synthetic surfaces include:[78]

- Kendocide®- applied at the rate recommended for natural turf.
- Copper sulphate- at rates varying from 500 gms up to 10 kg's to a green applied with water. This does not appear to permanently stain the carpet.
- A mixture of copper sulphate and pool chlorine- (proportions were not known).
- Sandaken®- used on an annual basis including all surrounds. It was reported that it penetrates through the carpet and also improves the drainage.
- Bleaches and pool chlorine- used at various rates with varying results.

The use of copper sulphate is of some concern. The product Cupricide is a mixed copper alkanomine complex that is suitable for use as an algicide on synthetic bowls greens. It is registered with and approved by National Registration Authority (NRA) and approved for use by the Environmental Protection Authority. With the development of Cupricide, the NRA and the EPA have prohibited copper sulphate. Copper sulphate is toxic to fish and aquatic invertebrates. Product brochures suggest that Cupricide is 5-10 times more active than copper sulphate as an algicide. [79]

No literature concerning recommended doses-or impact of these chemicals specifically for synthetic surfaces has been able to be sourced.

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[75] Interview with bowls clubs, @leisure, 2003.

[76] Gibbs and Wells, 2001

[77] Information supplied by David Aldous

[78] RVBA Greens Committee Seminar, 1996

[79] AGMIN Newsletter No. 224. AGMIN CHELATES Pty Ltd. Supplied by Orica.

High calcium levels in water in WA, were mentioned in the forum for this project as being problematic and it was suggested that clubs should therefore be encouraged not to use calcium hypochloride in controlling moss and algae.

As the techniques, doses and use of chemicals is not consistent across all synthetic surfaces, it has not been possible to determine whether there is a significant difference between the amount of chemicals used on natural turf and that on synthetic surfaces. It has also not been possible to ascertain whether there is a significant environmental problem being created by the use, run off or disposal of these chemicals.

Clubs stressed that after algae had been treated and dried off it must be removed with brooming, brushing or vacuuming.

The effect of chemicals on synthetic surfaces over any period of time is also not currently known. This appears to be the reason why manufacturers of synthetics do not specify chemicals for cleaning and the control of algae.

It is a concern that there is not more of a consistent approach to chemical use and doses on synthetic surfaces, to guide clubs. It would be advantageous for the RVBA in conjunction with the synthetics industry, and possibly an industry partner such as Orica to brief clubs on the recommended chemical use, and discuss the impact of chemicals on specific synthetic bowls surfaces, recommend some specific environmentally preferred chemicals to control moss and algae growth, and recommend doses, handling, storage and application procedures.

4.9 Watering Synthetic Surfaces

Most of the clubs interviewed with a synthetic surface said they water their greens once a week heavily and every day before and after play. However some clubs only water when the green is dry.

Watering of synthetic greens is reported for two primary reasons:

"[We] water every day in summer **to keep the base wet** so it doesn't move", and "**to keep the sand down**."
For those who do not water, often watering mostly occurred "for tournaments (we have four a year) and after major grooming", and "If it has been dry for a week with wind, we would water for 20 minutes to keep the sand down".

Some clubs also commented, "The more it (synthetic green) is watered the faster it will run."

The frequency of watering a synthetic surface appears to vary considerably and as most clubs have their synthetic on the same meter as their natural turf green, or that they may only have one green, no direct objective comparisons can be made about water use on different surfaces.

One greenkeeper said that they used 20% less water on synthetic than what they did on the turf green[80]. Others indicated that they use as much water on synthetic greens as they use on turf greens.

For the purposes of assisting clubs to use water only as necessary, the RVBA should request key clubs with one turf and one synthetic green to carefully record water use per rink, by surface type, method of irrigation, year of surface installation and location (by RVBA group), and have this information analysed.

[80] Interview with greenkeepers, @leisure, 2003

Use of recycled water on natural and synthetic greens

A number of city parks and golf course agencies are using grey water where it is available and demonstrably economic. Recycled water is of variable fertility and is often saline in nature. The bentgrasses (*Agrostis spp*.) as a group are slightly more sensitive to saline conditions than the warmer-season grasses (*Cynodon spp*.)[81] There are trials currently underway at the Barwon Heads Golf Club to investigate the effects of high salinity effluent and potable water on bentgrass growth and development under local conditions[82]. The following table indicates relative tolerances of grasses to soil salinity.

Table: Relative Tolerance Of Grasses To Soil Salinity[83]

Sensitive <3 dS/m-1	Moderately Sensitive 3-8 dS/m-1	Moderately Tolerant 6-10 dS/m-1	Tolerant >10 dS/m-1
Winter grass	Italian ryegrass	Bent cv. Seaside	Alkaligrass
Colonial bentgrass	Chewing's fescue	Perennial ryegrass	Couchgrass
Kentucky bluegrass	Creeping bentgrass	Tall fescue	Seashore paspalum
Rough bluegrass	Hard fescue	Buffalograss	St. Augustinegrass
Centipedegrass	Bahiagrass	Zoysiagrass	

Greenkeepers interviewed said that if such water could be made available and was safe to use that it would be acceptable as an irrigation source. Some felt however that recycled water may provide sufficient nutrients to encourage moss and algal growth on synthetic greens.

Because of the considerable variation in water quality across the state, depending on its source, it is not possible to make generalisations about this issue. As bowls greens are however considerable users of water, the use of recycled water should be encouraged where it can be tested and analysed prior to applying it to synthetic or natural turf greens, and shown to have no detrimental effect.

High calcium levels in water in WA, were mentioned in the forum for this project as being problematic[84]. Clubs should therefore be encouraged not to use calcium hypochloride in controlling moss and algae.

[81] Harlvandi et al., 1992

[82] Neylan 2003

[83] after Harlvandi et al., 1992

[84] Synthetic Surfaces Workshop, @leisure, 2003.

4.10 Changes to the Sport and the Game

Other sports have found that there are changes to the way the sport is played as a result of the introduction of synthetic surfaces. Synthetic surfaces some times require changes to footwear, (soccer) and rules to prevent injury, and the scheduling of games often changes. Changes experienced by the sport of hockey these include for example the high cost of field usage to juniors, and the loss of the social aspect to the game as a result of teams no longer playing on a number of fields at the one time and meeting afterwards, but playing one after another on the one synthetic field.

The introduction of slim line bowls is likely to have been influenced by the increasing prevalence of synthetic greens.

Slim Line Bowls

Narrow bias bowls or "Slim line" bowls are becoming a greater issue among greenkeepers and bowlers throughout the state. The introduction of minimum bias bowls are demanding faster greens so their bowls draw which is adding more pressure to the greenkeeper and stressing the greens at a time when they can be easily damaged[85].

Bowlers throughout Victoria[86] expressed their thoughts on slim line bowls in the survey for this project:

- "They are better played on faster greens/ synthetic surfaces."
- "It's a marketing ploy by the bowls companies."
- "They should be banned."
- "There should be a separate competition."
- "You have to keep up with the times, your opponent holds the advantage if you to don't have the slim line bowls."
- "I prefer the older style."
- "I prefer the newer bowls."

Generally speaking there was a mix of feelings about the newer bowls. Many however, either hadn't tried them or didn't want to comment. Several people suggested that Bowls Australia should consider specifying a minimum bias on bowls for competition play on turf greens to decrease the demand for faster greens which places extensive stress on the greens and greenkeepers.

[85] Fielder, M, Bowls in Victoria, July/ August 2003

[86] Interview with Victorian Bowlers, @leisure 2003

4.11 Professional Development and use of Greenkeepers

Most bowlers prefer to play on a well maintained natural turf bowling green however when the a turf green is in poor condition and the synthetic is in a better condition, previous research suggests that bowlers prefer the green in better condition[87].

Many clubs suggested that they could only afford to pay a limited amount for a greenkeeper. On one hand greenkeepers are not being paid well, and on the other hand, clubs do not want to spend their limited income on greenkeepers. This has meant that volunteers, apprentices or contract greenkeepers who may have to look after several clubs (and therefore may not visit the site regularly) look after many club's greens.

RVBA and the Victorian Greenkeepers Association need to investigate the issue of club costs, funds available for turf management services, strategies to enhance the standard of greenkeeping, and deliver these services in more cost effective ways, at acceptable pay rates.

This might require looking at the whole fee structure and financial capacity of clubs to pay for these services.

There may also be a need to include maintenance skills of a synthetic surface as a part of greenkeepers duties.

[87] Knox, 1997

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions and Recommendations by Issue

Distribution of synthetic greens

Climate appears to play a role in whether clubs have synthetic surfaces with more 95% of greens being turf north of the Great Dividing Range, where the climate is much warmer and is seen as more conducive to producing a good quality natural turf surface. Central Victoria, west coast and then Gippsland have the highest percentages of synthetic greens in the Country Victoria. These areas tend to be cooler or have high rainfall.

In metropolitan Melbourne synthetic bowls greens are more prevalent in the eastern suburbs, while the beach groups have a much higher percentage of turf surfaces that the other metropolitan groups.

The majority of clubs with a synthetic green have a membership of only 40-79 members.

Clubs indicated that one of the major incentives to move to synthetic greens has been the availability of local and state government grants not available to clubs wanting to renovate turf greens.

Player preferences

Eighty five percent of bowlers prefer to play on natural turf. The survey of bowlers indicated that the percentage of bowlers who prefer natural turf increases with age. 75% of bowlers interview under 30 prefer natural turf, and this increases to 90% for those over 60 years of age.

Whilst the quality of newer synthetic greens is better than even five years ago, surface hardness of synthetic greens is a big issue, as is glare and heat. Players also mentioned a number of other issues they have with synthetics, although many of these reflect older products or perhaps greens that may have been poorly laid or maintained. These issues include:

- Sand (too high) scratching bowls.
- Susceptibility to tracking.
- Playing oddities "Straighteners."
- Variable draw on each hand.
- Narrowness of draw.
- Variability of pace.
- "Seaming."

Management of greens

The report found that there are a number of issues related to clubs moving to and managing synthetic greens. These include:

- Many clubs have moved to a synthetic surface primarily because they could obtain assistance to do this, but can't for the restoration of natural turf greens. As the move to synthetic greens for small clubs appears to be symptomatic of other management issues these clubs face, close attention needs to be paid to the criteria used to give grants for the installation of a synthetic surface.
- There appears to be a number of small clubs who go to synthetic surfaces for the wrong reason- due to desperation and use all available cash when this is may not viable in the longer term.
- There is a major lack of information and advice about maintenance of synthetic greens and perhaps about new base construction techniques and species, and managing turf for the long term.
- Life expectancy of a synthetic bowls green is likely to be in order of 10 years.
- Issues related to the number of greens clubs have, the number of members, and club management, are key issues exacerbated by a change of green surface.
- The technology in synthetics is increasing which is leading to better quality surfaces that will be easier and more cost effective to maintain.
- There appears to be a considerable variation in the advice provided to clubs about maintenance requirements and no suppliers provide standard maintenance regimes with product specifications. One supplier is however offering an ongoing service contract to manage synthetic greens after installation.
- More research and more rigour are needed in maintaining synthetic greens to ensure the quality of surfaces are maintained. There seems to be a lack of information and expertise amongst clubs and greenkeepers in maintaining synthetic surfaces, and this needs to be addressed by the industry and clubs.
- As there appears to be a number of management issues facing clubs that are compounded by high management cost of greens, it may be beneficial for government authorities offering grants to clubs for green development, include management criteria in grant approval processes.

Management Recommendations

- Clubs should ensure they have an endorsed maintenance schedule from suppliers for their synthetic surface before accepting a quote, or plan to pay for a buy-in service to ensure the product is maintained to manufactures specifications.
- The VGA could work with the industry to provide training for its members in the maintenance of synthetic bowling greens.
- RVBA and the VGA could work with suppliers to develop some basic principles concerning management of synthetic greens (by product) for each club, as well as a checklist of things to ask a supplier, budget for works and the like.

Costs

- There is evidence that the whole cost structure of clubs and sources of revenue may need to be looked at due to the high costs of greens management and the aging of members.
- Synthetic greens are not maintenance free, as many clubs expect. However they may be cheaper to maintain than a natural turf green if human resources are limited and clubs have personnel with skills to do it themselves.
- Synthetic greens are more expensive to install and replace- and will not be viable for many clubs.
- Overall the probable costs of natural turf and synthetic greens are likely to be much the same over a 10 or 20-year life cycle. Although it is recognised that the cost of labour varies considerably between clubs.
- The cost in the order of $20-30,000 pa that clubs with a synthetic would have to raise is substantial for most clubs who unlike hockey rarely share with other clubs or sports (to raise extra revenue). The concern that the very high probable costs of synthetic and other green surfaces raises is that most clubs of this size are not likely to be able to find $20-30,000 per year for maintaining any green.
- Clubs need to address costs, average player age etc. Surfaces are not a solution to poor financial and turf management.
- Other sports have found that there are social costs associated with the introduction of synthetic surfaces. For hockey these include for example the high cost of field usage to juniors, and reduced social focus as a result of teams no longer playing on a number of fields at the one time and meeting afterwards, but playing one after another on the one synthetic field.

Recommendations regarding costs

- Councils and the RVBA should help clubs with financial and business planning and ensure that prior to resurfacing works a plan is in place to address the cost of surface replacement.
- Councils could assist clubs by giving them business support and planning to raise the estimated $30,000 a year to cover the costs involved with maintaining a green.
- Councils and State Government should rigorously evaluate the ability of clubs to pay for synthetic surfaces prior to giving clubs grants for a synthetic surface and consider giving clubs assistance to replace natural turf greens.
- RVBA should also monitor the social costs that the introduction of a synthetic surface may have on a club.

Green keeping expertise

- The quality of the clubs greenkeeper is likely to directly correlate with the quality and longevity of the both a natural turf and synthetic surface. Clubs need to invest in more strategic turf management advice, but feel that they can't afford to. Many clubs are not in the best position to make strategic decisions about greens resurfacing, development or management.

Greenkeeping Recommendations

- Clubs should be encouraged to call on the services of a trained greenkeeper if only for strategic advice or to contract such a service on an "as needs" basis.
- The VGA should address the low level of professional guidance sought by many clubs, through marketing, and by providing more cost benefit information about such advice, as well as encouraging clubs to investigate fees and revenue streams.
- The VGA should make it easy for clubs to obtain the services of a turf/ greenkeeper consultant to advise the clubs with strategies to maintain their greens over the long term.

The VGA (Victorian Greenkeepers Assoc.) should take this opportunity to:

- Market this "pay as you go" turf management system that may help in increasing the standard of natural turf greens as well as synthetic greens.
- Market the opportunities to grow natural turf all year round.
- Suggest clubs separate out some tasks such as mowing (which could be undertaken by volunteers) from turf management.
- Work with the industry to develop training programs on the maintenance of synthetic bowling greens.
- Provide some strategies or a program of professional development for members and clubs to extend the life/ use of a natural turf green.

Further research on turf and usage

The interviews with greenkeepers reinforced the view of the peer review group that in many instances natural turf has the capacity to be grown and used all year for lawn bowls.

A standard measure of use should be adopted so as to make some more direct comparisons between uses on different surfaces. Clubs should be asked to compile this information. This might be person hours, per rink, per annum. This then should be compared to surface type, cost of maintenance, and location (RVBA group).

Further research should be undertaken (specific to bowls) on turf species/ varieties and in strategic management of surfaces to accommodate desired levels of use and types of play.

Turf Recommendations

- RVBA should encourage the development of a partnership between government (SRV, The Greenkeepers Association of Victoria and a University) to have a student undertake some further research into natural turf management for lawn bowls including turfgrass varieties, nutrition, irrigation, plant protection and capacity to with stand use.
- RVBA should encourage suppliers to continue to research and further address issues of player comfort on synthetic bowls greens.

Chemical use

- There isn't a consistent approach to chemical use and dosages on synthetic surfaces. It would be advantageous for the RVBA in conjunction with the synthetics industry, and possibly an industry partner such as Orica to investigate the impact of chemicals on synthetic bowls surfaces, recommend some specific environmentally preferred chemicals to control moss and algae growth, and recommend doses, handling and application methods.

The installation and performance of synthetic greens

There appears to be a considerable variation in the quality of installation and the performance of synthetic surfaces (as there is with natural turf).

There are no Australian Standards concerning the manufacture, installation and performance of synthetic green products.

There are a number of synthetic surfaces installed in Victoria that by the nature of their age and poor installation, are a poor quality. Many of these clubs are unlikely to be able to fund a replacement in the medium term.

The RVBA should encourage clubs that have multiple greens, not to have a synthetic green unless they have a sound membership base, and a financial plan that shows they can raise at least $30,000 per annum.

Recommendations

Bowls Australia and the RVBA should investigate the development of a set of standards for the installation and performance of synthetic greens that can be benchmarked against standards worldwide.

Sport and Recreation Victoria in partnership with the industry and Councils could investigate a scheme to selectively upgrade the poor quality synthetic bowls surfaces or convert them back to turf.

Water use

- Water is used to control speed, sand and movement of the base of synthetic greens. It has not been possible however to compare water use on natural turf with that on synthetic surfaces.
- For the purposes of assisting clubs to use water only as necessary, RVBA should request key clubs with one turf and one synthetic green carefully record water use per green, by surface type, method of irrigation, year of green installation and location (by RVBA group), and have this information analysed.
- The impact of grey water use and chemical use generally on synthetic greens should also be further investigated.

Accessibility of greens

- It is unclear whether synthetic greens offer considerable accessibility benefits for people with a disability other than that a synthetic surface may make it easier to send a bowl down the green.
- RVBA could encourage VicNord and Wheelchair Sports Victoria to work closely with synthetic suppliers and determine some guidelines about what is use is acceptable use on a synthetic green.

5.2 Recommendations by Organisation

Recommendations for Clubs:

- Clubs should embark on some financial planning that ensures the club will be able to raise $26 - $30,000 a year to cover the maintenance and replacement of a synthetic surface.
- Clubs should plan for a replacement synthetic surfaces once every 10 years.
- Clubs should ensure an engineers survey has been completed on the site prior to installation.
- All clubs should ensure they have an endorsed maintenance schedule from suppliers for their synthetic surface before accepting a quote, or budget for the use of a buy-in maintenance service from an approved supplier to implement the maintenance regime provided with the product.
- Clubs also could be encouraged to record levels of usage in a standard format such by person hours by green, per annum by surface type and cost of maintenance than can be analysed by location so comparisons could be made.
- Clubs with voluntary greenkeepers should be encouraged to call on the services of a trained greenkeeper, if only for strategic advice or to contract such a service on an "as needs" basis.

Recommendations for Councils:

- Councils and the RVBA may need to help clubs with some financial and business planning and should ensure that prior to resurfacing works a plan is in place to address the cost of surface replacement.
- Councils could assist clubs by giving them business support and planning to raise $30,000 a year to cover the costs involved with a synthetic surface.
- Councils, under the initial guidance of the RVBA, should rigorously evaluate the ability of clubs to pay for synthetic surfaces prior to giving clubs grants for a synthetic surface.
- Councils should consider giving clubs assistance to replace natural turf greens.

Recommendations for VGA:

- The VGA should address the low level of professional guidance sought by many clubs through marketing, by providing more cost benefit information about such advice, as well as encouraging clubs to investigate fees and revenue streams.
- Make it easy for clubs to obtain the services of a turf/ greenkeeper consultant to advise the clubs with strategies to maintain their greens.
- RVBA and the VGA should work with suppliers to develop some basic principles concerning management of synthetic greens (by product) for each club, as well as a checklist of things to ask a supplier, budget for works and the like.

- Work with the industry to develop training programs for clubs about the maintenance of existing synthetic bowling greens.

Recommendations for the RVBA:

- Bowls Australia and the RVBA should consider specifying a minimum bias on bowls for competition play on turf greens that is in line with the carrying capacity of turf, as determined by the Greenkeepers Association of Victoria.
- RVBA should encourage the development of a partnership between Government (Sport and Recreation Victoria), the Greenkeepers Association of Victoria and a University to have a student undertake some further research into turf management for bowls including natural turf varieties, nutrition, irrigation, plant protection and capacity to with stand use.
- RVBA should monitor the social impacts that the introduction of a synthetic surface may have on a club.
- RVBA should encourage suppliers to further address issues of player comfort on synthetic bowls greens.
- RVBA, Sport and Recreation Victoria in partnership with the industry and Councils could investigate a scheme to selectively upgrade the poor quality synthetic bowls surfaces or convert them back to turf.
- RVBA should request key clubs with a natural turf and a synthetic green carefully record water use per green, by surface type, method of irrigation, year of green installation and location (by RVBA group), and have this information analysed.
- RVBA could encourage VicNord and Wheelchair Sports Victoria to work closely with synthetic suppliers and determine some guidelines about what is use is acceptable use on a synthetic green.
- The RVBA in conjunction with the synthetics industry, and possibly an industry partner such as Orica should further investigate the impact of chemicals on synthetic bowls surfaces, recommend some specific environmentally preferred chemicals to control moss and algae growth, and recommend doses, handling and application methods.

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