



Black Rock
Primary School



Black Rock Primary School Sports Feasibility



2017

FINAL

About this document

This report outlines the feasibility of redeveloping the sports facilities at Black Rock Primary School to include either an artificial surface or upgraded natural turf multisport playing surface.

This analysis includes a review of the probable costs and benefits associated with both options.

The master plan for the oval and associated facilities can be found in Appendix 1.

Acknowledgements

Michele Rowse—Project Manager

Sam Tyndall—Assistant Principal, Black Rock Primary School

Jeavons Landscape Architects prepared the master plan for the school grounds.

Contents

The project	2
The master plan	2
Benefits of this project	3
Demand	5
Hours of use and carrying capacity	6
Choice of surfaces	7
Other considerations related to surfaces	8
The potential program of use	9
Capital cost	9
Replacement cost	9
Annual maintenance considerations	10
Appendices	11
Appendix 1. Master plan	11
Appendix 2: Oval: probable capital and recurrent costs -artificial and natural turf surface options	13
Appendix 3. Probable costs and revenue	16
Appendix 4. Images	23
Appendix 6. Community and stakeholder engagement	27
Appendix 5. SportTurf assessment	26

© All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form, by any means, without the prior written permission of Black Rock Primary and @leisure Planners Pty Ltd.



Rear 534 Mt Alexander Road Ascot Vale VIC 3032 Australia
+61 3 9326 1662 info@atleisure.com.au www.atleisure.com.au

The project

The Black Rock Primary School (BRPS) require a Master Plan and Sports Feasibility Study to determine the nature of appropriate developments in future years.

BRPS has faced a range of challenges, including high demand for use, water shortages, and the general volume of traffic that has detrimentally affected the condition of the oval, and hence has affected the safety and ability to play sports on the oval.

BRPS are seeking to identify a clear direction for the redevelopment of the oval and the advantages and disadvantage of grass or artificial turf surface.

Background

Black Rock Primary School is a popular school in the beach-side suburb of Black Rock. In recent years, additional portable classrooms have been necessary to meet the demand for students. The only suitable location for their placement has been the oval.

The smaller the size of the oval, the more intense the use and the more damage has occurred from free play, physical education and sport use.

The school has a very valuable oval with tree lined boundary, bicycle shed, practice net, Australian Rules, cricket and soccer areas. It has two groups of play equipment and a central assembly area with netball and basketball court, and an indoor recreation activity space, also used for sport.

The objective of this project is to investigate the long-term options for the development of the oval and the financial implications of each.

Process

The school appointed an Oval Sub-Committee and a project manager to oversee this project. The project manager undertook a number of interviews and discussions with potential user groups and Council and organised three open forums.

These were held at the school, with approximately 100 parents and neighbours attending. Jeavons Landscape Architects undertook site investigations and sessions with students and staff, before preparing a master plan for the whole site with input from @leisure planners concerning sports activities.

@leisure planners undertook their own investigations into demand and supply of similar facilities. SportsTurf Consultants (Aust.) Pty Ltd were engaged to assess the conditions of the oval and provide an indication of the costs of repair works and to maintain the surface in an acceptable condition for school and community sport. Appendix 6. provides a copy of their advice..

Costs associated with the artificial surface were sourced from suppliers and similar projects

The master plan

The draft master plan for the oval provides a layout that enables a range of sports to be played during school hours as well as community sport after hours.

In addition to recommending the refurbishment of the oval the plan provides for a support facility (including a gender neutral toilet/changeroom, referee and storage facility) to support the use of oval, as well as the existing indoor activity hall, and a new lit and compliant netball court.

The oval will provide for a refurbished play facility, Australian rules football, soccer-football and cricket markings for junior competition, practice cricket nets, a running track and long-jump pit.

See Appendix 1.



Benefits of this project

This project will enable the school to adequately meet its obligations regarding physical and sport education, and allow more children to play, and to participate in sport.

School physical and sport education

Currently, government schools must conduct physical and sports education for the mandated time for all students in Years P–10. The mandated times are:

- P–3: 20–30 minutes of physical education a day.
- Grade 4–6: 3 hours per week of physical education and sport with a minimum of 50% of that time for physical education.

School-aged children have the highest participation rates in physical activity of any age group. It is essential that those who want to play can. Sufficient places to play at school are also essential in being able to meet this standard.

High physical and social participation also contributes to a child's ability to concentrate and learn in the classroom and has been associated with better performance in specific disciplines such as maths.

The school will have increasing difficulty in meeting the standards for physical activity if the oval is not refurbished.

Free play

All children need opportunities for play. This includes open ended and all types of play (social, physical cognitive and creative play). These contribute to an individual's development potential and mental health. The increasing pressures on public space mean that the value of school grounds for a range of play during school hours is increasing.

Community sport

The City of Bayside has a major shortage of grounds for community sport. This shortage is highlighted in the Council's Recreation Plan. This shortage means a large number of children in Bayside either can't play sport or the amount of sport they would like, or they have to travel some distance to play.

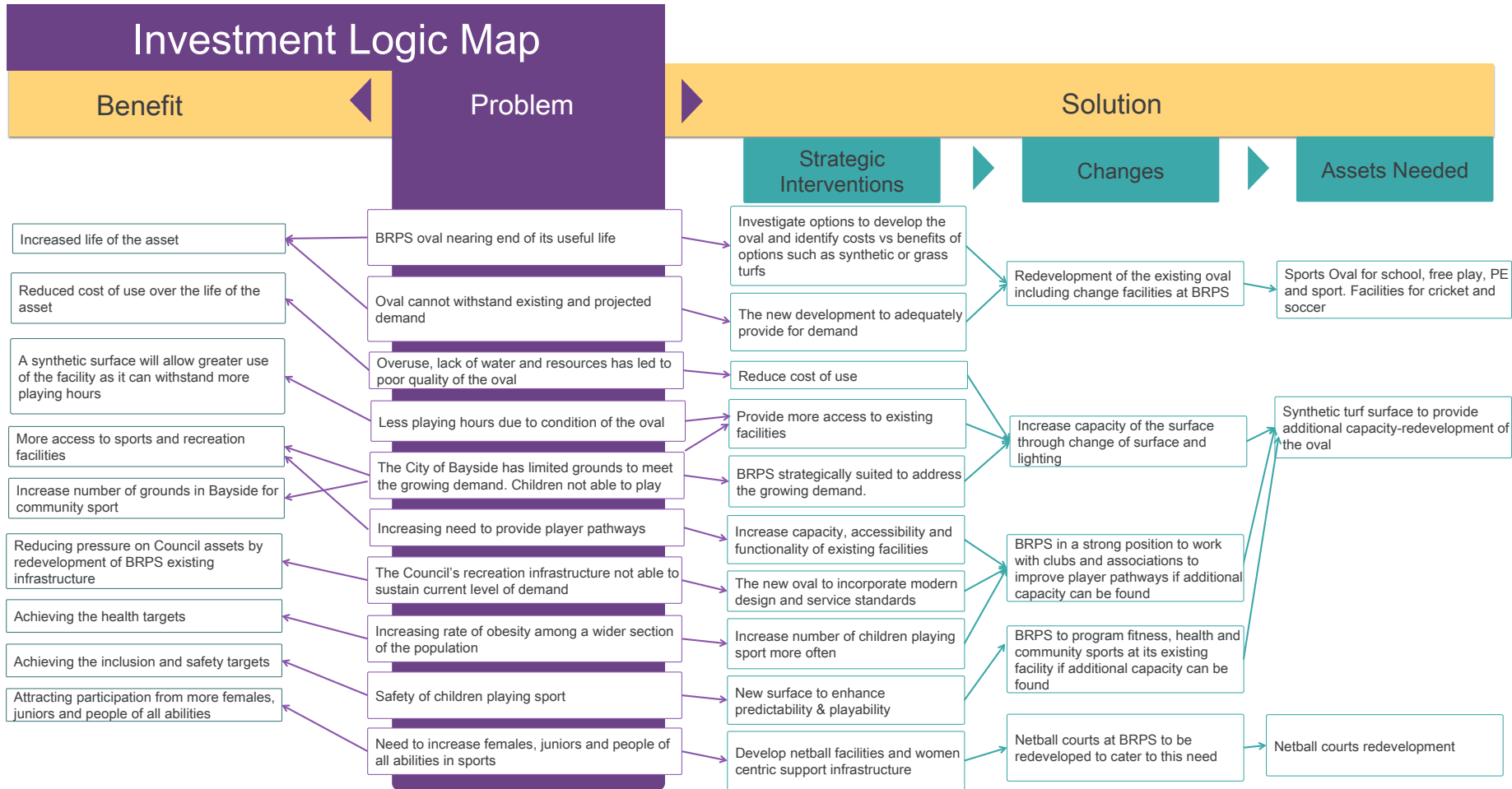
The costs to the community of the lack of physical activity (especially as a result of obesity) and social connections, and of having to travel for sport are considerable.

If the oval is refurbished and the carrying capacity of the ground is increased to allow community sport to share this resource, then the broader community and Council benefits.

The oval needs to be refurbished as it is not in a safe and playable condition. The condition of turf influences the nature and frequency of injury.

The goal is to upgrade the oval space, not only to provide for student's daily play needs and school physical and sport education lessons but to include more community sport, that many of the students play.

The investment logic diagram following summarises the benefits, problems and strategy to address these.



BRPS = Black Rock Primary School

Demand

During the master planning process, a range of activities was investigated as to:

- Those that should be accommodated during school hours and by the school
- Sports with playing fields of an appropriate dimension to fit the available space
- Those in greatest demand
- Those that could share the space- in terms of seasonal use, pitch layout and distribution of wear.
- Those with compatible turf requirements such as short and long turf, and playability requirements.

The principal activities that need to be accommodated on the oval areas during the school day include:

- Australian rules football
- Soccer-football
- Cricket
- Free play including nature play (on the edges of the oval)
- Running
- A range of other physical education, sports and activities that may be played such as diamond sports, touch rugby, etc.

The oval also currently accommodates other school activities including fundraisers and events (e.g., camp out, movie nights, fete). Note: the suitability of an artificial surface for these uses would need to be reviewed).

The principal activities that are desirable to accommodate on the oval (after school hours) are cricket, soccer-football and junior Australian Rules football.

Example: Soccer-Football Demand

Soccer –football has the largest demand for any sport for children aged 6-13 yrs.¹

In the City of Bayside, there is a major undersupply of soccer- football facilities for club use.

Bayside has the largest number of registered soccer-football members of any LGA in Victoria.

With an additional 9500 additional residents projected, additional places to play are required.

Table 1. Bayside City Council soccer-football pitches and demand

Bayside City Council	
Current Full-Size Equivalent (FSE) Pitches / Pitches with lighting	20/16 Pitches
Increase in population projected 2016-26	9500 Residents
Existing number of FFV registered members in Bayside	3394 Members
Increase in FFV Membership 2009-2016	473 Players
Additional FSE Pitches required to meet demand (FFV@ carry cap. 26hrspw)	10.4 Pitches

¹

Roy Morgan Research 2015

Hours of use and carrying capacity

The main issue with the refurbishment of the oval is that if considerable additional resources are not allocated to maintenance, the existing use cannot be sustained, let alone additional sports use accommodated.

Additional community use of the oval is desirable for health benefits, and therefore the carrying capacity of the existing ground needs to increase. Provision of lights and enhancement of the surface will enable the additional use of the oval.

All surfaces have a carrying capacity that when exceeded, will impact on the life of the surface. Carrying capacity is the amount of use that can be accommodated at a given level of maintenance for a specific type of activity facility, in a given climatic zone, for a particular level of performance.

The average grass sports playing field in Melbourne can withstand around 22 hours of sports use per week, to maintain a good quality turf suitable for community level sport.

However, the exact hours of use depend on soil and turf type, weather, the intensity of use and intensity and quality of maintenance.

Most sports fields in Melbourne are used around 26-29 hrs. per week, because of the high demand and a general acceptance of the importance of use over pristine turf quality.

Overuse of natural turf for sport leads to deterioration of the turf cover and density as evident on the school oval. While a grass surface can recover after it is worn (unlike an artificial surface), it will require remediation works and rest to enable it to re-establish. Additional time will be required for intensive maintenance works to be undertaken. These activities reduce the available hours that a sports field can be used.

Artificial surfaces also have a carrying capacity. For an accredited FIFA soccer –football pitch, this carrying capacity (for the FIFA Quality standard pitch suitable for recreation and community standard soccer-football) is up to 60 hours a week and an average life of 8yrs. The life may be longer if use is less.

For the highest level of football turf used in elite games (for example the World Cup) a FIFA Quality Pro pitch has a carrying capacity of only 20 hours per week.

In this case, it is assumed the surface would be for the FIFA Quality standard pitch suitable for recreation and community standard soccer-football, which will have a carrying capacity of up to 60 hours per week.

The total cost of use of an artificial surface and natural turf can be compared taking into account the likely level of use and likely revenue, carrying capacity per week, the cost of maintenance over the life of the surface, and different capital costs and life of each surface. See the following table.

Table 2. Cost of use comparison, natural and artificial turf over the life of the surface

Use Type	Hours over the life of the surface, per hour	
	Artificial Turf	Natural Turf
Total Cost of Use (considering hours of use, capital and recurrent cost and revenue for) over life of the surface. Includes netball but excluded lights for the oval	\$50 over 8 years	\$124 over 15 years
	\$34 over 10 years	

Choice of surfaces

The two key considerations for comparing surfaces in this instance are the ability to increase use, and the cost of use.

Carrying capacity and need to increase return on investment

If the carrying capacity of the oval is to be increased to approximately 60 hours per week, then an alternative to natural turf needs to be found.

Even with considerable improvements in water, intensive turf maintenance and replacing the existing surface now, it will not be possible to maintain the surface quality or sustain an increase in use, as resting and renovation periods will mean reduced hours of use.

Costs of use

The cost of use (total cost including replacement and maintenance and revenue per hour over the life of the surface and including one replacement) will be higher for natural turf than for artificial turf.

See the previous table 2.

Other considerations

Additional state and local government assistance may be available should the school community determine it wishes to increase the capacity of the oval to include additional community sport by installing an artificial surface.

If the school community wishes to reinstate a natural turf field, then it may not be cost-effective to install lights (although they will provide flexibility of use)— as lights could mean the field would likely exceed its carrying capacity. In this scenario, additional sports use would be restricted to the weekend and summer after school use.

The costs of use, however, would increase because use (and hence revenue) will reduce by almost 20%.

Water harvesting

It will be possible to harvest water from the school buildings and potentially from the oval, for use on the gardens bed and oval.

However, the success of any water harvesting system is dependent on rainfall and sufficient capacity to store water. For an artificial surface water is more easily collected from under the surface for storage, however this requires additional infrastructure which is typically very expensive and requires specialist engineering design.

This was outside the scope of this project.

A notional location for tanks has not been shown on the master plan as this will depend on the design of the system.

Comparison of use: Artificial and Natural Turf

Table 3. Proposed Programmed Hours of Use

Use Type	Probable Hours of Use Per Week		
	Artificial Turf	Natural Turf (with lights)	Natural Turf (without lights)
Club use (training & games)	24	10	10
Club use with lights	12	6	0
School use	23	13	13
Private/corporate hire	0	0	0
Total	59	29	23

Other considerations related to surfaces

Due to its resistance to weather and more intense use, artificial turf qualifies as the best alternative to natural grass. However, the product range of the third generation artificial turf shows huge quality differences between the various systems available on the market.²

If community sport is to be played, then an accredited surface such as that approved by AFL and cricket (or FIFA) should be used.

An important consideration related to the oval condition is that all sports surfaces need a high level of maintenance. Maintenance not only takes time away from sports use, but there is a cost.

Currently, the intensity of maintenance of the oval is not conducive to a high standard of turf cover or, sufficient to protect player safety and aesthetic values, nor enable greater use.

Artificial turf requires regular maintenance also. However, typically maintenance of artificial turf is less expensive overall than the maintenance of natural turf. Maintenance of both artificial and natural turf requires specialist skills and equipment.

Artificial surfaces need to be cleaned as organic matter increases compaction and reduces the life of the carpet. For this reason, eating, smoking, chewing gum and dog exercise need to be prohibited from an artificial surface.

Apart from the major differences of artificial surfaces enabling greater hours of use and being more cost effective over the surface's life, other issues with artificial surfaces are commonly raised. These include injury, player comfort in the hot weather and other environmental considerations.

FIFA studies show very little difference in injuries between natural and artificial turf. Some additional abrasion injury as a result of artificial turf is acknowledged. Abrasions can largely be overcome with adequate maintenance ensuring that the synthetic fibres stand upright.

Some additional bruising only was noted as the major difference in the latest FIFA study of the Women's World Cup matches on artificial turf compared to games on natural turf. Presumably, this may relate to the speed of the game.

In terms of player comfort, a key factor is the better predictability and playability of an artificial surface over a typical community standard natural turf playing field. This has been noted as an attraction for many players especially females.

However, in the hot weather, artificial surfaces are much hotter, and this needs to be managed in a heat policy.

Aesthetically many people prefer the look and smell of grass however for many months a warm season grass like couch will not be thick and look dark green.

An artificial surface is likely to have a significant carbon footprint, although substantially less water will be required to manage it, compared to natural turf. In any development of the oval the perimeter trees will remain – not only due to their environmental benefits but for the play experiences they provide. The Oval Committee have indicated their desire to plant a large number of trees.

An artificial surface will enable twice the amount of use than on natural turf and hence will provide considerable benefits to the school and broader community, in terms of physical and social activity.

² FIFA 2015

The potential program of use

A proposed program for both surfaces was produced based on the likely demand, local information and case studies from similar developments.

The artificial surface would allow for more school and club use than a natural turf surface. This proposed program allows for school use, club use and training up to some an average of 60 hours of use for an artificial surface and for natural turf with lights up to 29 hrs on average, and without lights up to 23 hrs.

Some private/corporate usage (e.g. local touch rugby or OzTag, league or a private soccer school) may also be possible. This has not been included in either surface scenarios, as the carrying capacity of both is likely to be fully subscribed by community club demand.

The artificial program is conservative and could potentially be extended if advertised and promoted further. However for hours above 60 hours per week the life of the surface is likely to be less than 8 years, and also the times at which the surface may be available may be outside playing hours that suit most users and neighbours.

Management of use

It should be noted that 29 hours of use on a natural surface is more than what would be advisable in best practice ground management. However, it is assumed that school use can be rotated around different parts of the ground to help avoid excessive damage. Use can be managed better if portable goals are used and training is rotated.

The natural turf surface would allow for one sports club each season (e.g. AusKick, junior and senior soccer-football). However, the synthetic surface would enable a second club to also use the facility for training and competition.

The increased carrying capacity of the artificial option is likely to result in more students and residents meeting physical activity targets.

Capital cost

The probable cost to construct an artificial playing surface will be approximately \$1.35M. This will be more expensive than upgrading the natural turf, which is estimated at \$825K. These costs include developing both surface options to allow multiple sports, having dedicated lighting to allow night use, netting/fencing to protect the school buildings, storage and a dedicated floodlit netball court. These costs do not include other element proposed on the masterplan.

A detailed breakdown is provided in Appendix 2.

Replacement cost

Artificial turf must be replaced at the end of its useful life. This varies from sport to sport, and the timeframe in which it is replaced is dependent on a number of factors including the surface type, the level and type of usage, the type of maintenance undertaken on the surface and the performance requirements expected from the surface.

With the proposed program and level of sport played, it is assumed that the carpet and shock pads will be replaced after 8 years. Some artificial surfaces may have a life of 10yrs. However, most are likely to be patched or replaced before this time.

Natural turf can have an indefinite lifespan if properly maintained; however, to maintain a good performance, turf fields should be resurfaced anywhere between 10 to 20 years. Based on previous studies of the soil and ground and the likely use, it has been assumed that resurfacing of natural grass occurs every 15 years.

The following table shows the estimated replacement cost, considering the capital cost in year 1 with allowances for when the actual investment will be required.

Table 4. Surface Probable Replacement Cost

Oval Surface	Replacement cost
Artificial Surface	\$234,332 (In year 8)
Natural	\$168,234 (In year 15)

Annual maintenance considerations

A natural turf-playing surface will be more expensive to maintain at approximately \$94K per year compared to a synthetic at an estimated \$50.5K per annum.

This is mainly due to the increased manual maintenance tasks associated with natural turf.

It should also be noted that natural turf will require significantly more water than a synthetic option and it is likely to require a period each year where it will be closed for minor maintenance (which has been allowed for in the carrying capacity calculations).

Appendix 2 shows more details about the probable annual costs for each option.

Comparison over the life of each surface

The additional carrying capacity of an artificial surface ensures that this option will receive the most use if properly programmed.

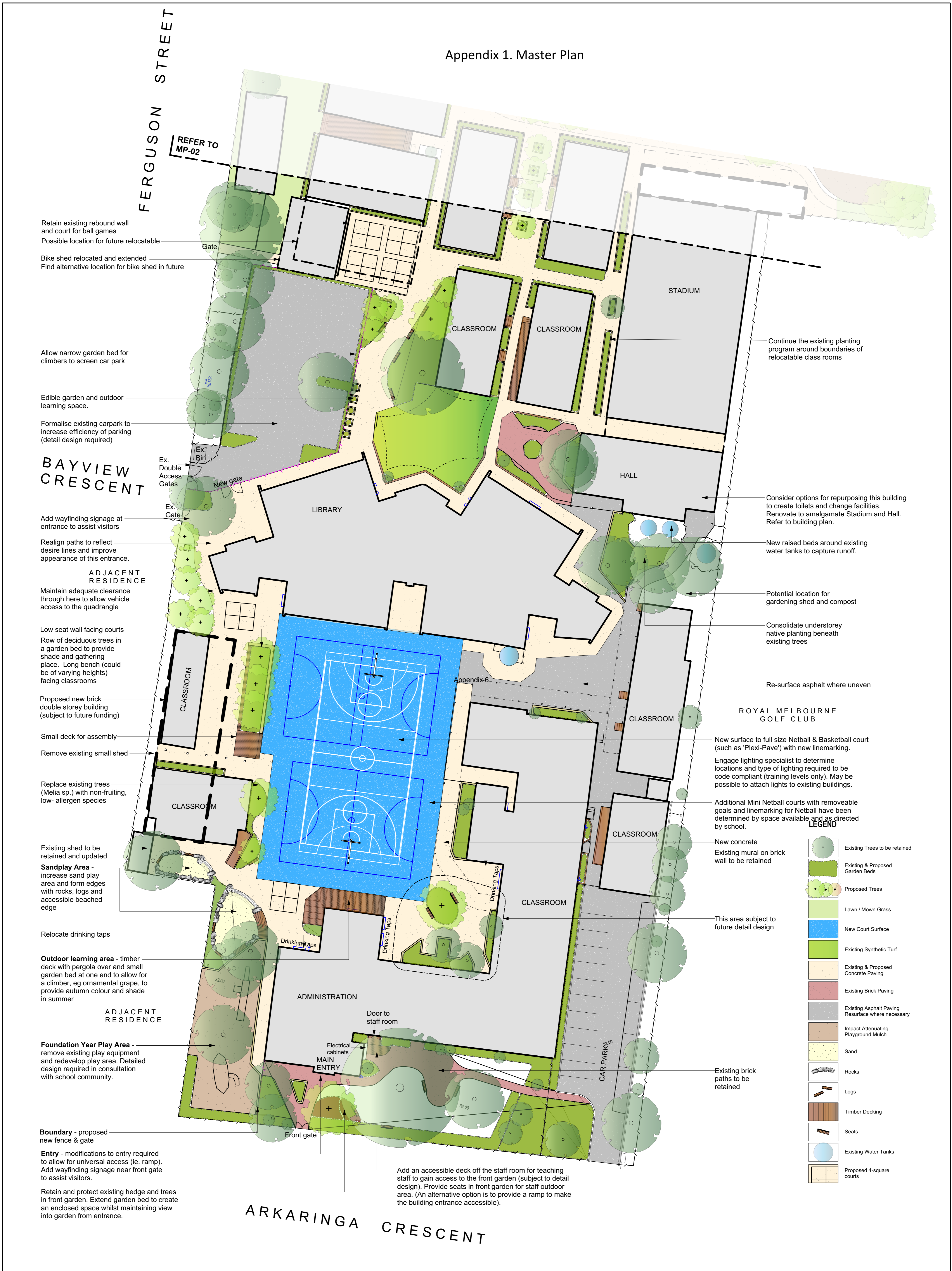
Hire costs of similar facilities were benchmarked to estimate the likely revenue generated by both options. The probable pricing was also reviewed by the Oval Committee and Council. The following table summarises and compares some key annual metrics and the overall performance of the two surface types over the life of each.

Table 5. Oval: use, costs and revenue comparison

Key Metric	Natural Turf (no lights)	Natural Turf (with lights)	Artificial Turf
Annual hours of use	1,104	1,392	2,950
Annual revenue generated (including netball)	\$39,960	\$61,560	\$120,960
Year 1 net cash flow	-\$55,121	-\$52,979	\$71,869
Operating summary over the life of the surface	-\$2,057,461 15 years	-\$2,215,418 15 years	-\$1,168,481 8 Years

A breakdown of the probable cash flow can be found in Appendix 3.

Appendix 1. Master Plan



Retain existing rebound wall and court for ball games
Possible location for future relocatable
Gate
Bike shed relocated and extended
Find alternative location for bike shed in future

Allow narrow garden bed for climbers to screen car park
Edible garden and outdoor learning space.
Formalise existing carpark to increase efficiency of parking (detail design required)

ADD WAYFINDING SIGNAGE AT ENTRANCE TO ASSIST VISITORS
Realign paths to reflect desire lines and improve appearance of this entrance.
ADJACENT RESIDENCE
Maintain adequate clearance through here to allow vehicle access to the quadrangle

Low seat wall facing courts
Row of deciduous trees in a garden bed to provide shade and gathering place. Long bench (could be of varying heights) facing classrooms
Proposed new brick double storey building (subject to future funding)
Small deck for assembly
Remove existing small shed

Replace existing trees (Melia sp.) with non-fruiting, low-allergen species
Existing shed to be retained and updated
Sandplay Area - increase sand play area and form edges with rocks, logs and accessible beached edge
Relocate drinking taps

Outdoor learning area - timber deck with pergola over and small garden bed at one end to allow for a climber, eg ornamental grape, to provide autumn colour and shade in summer
ADJACENT RESIDENCE
Foundation Year Play Area - remove existing play equipment and redevelop play area. Detailed design required in consultation with school community.

Boundary - proposed new fence & gate
Entry - modifications to entry required to allow for universal access (ie. ramp). Add wayfinding signage near front gate to assist visitors.
Retain and protect existing hedge and trees in front garden. Extend garden bed to create an enclosed space whilst maintaining view into garden from entrance.

Continue the existing planting program around boundaries of relocatable class rooms

Consider options for repurposing this building to create toilets and change facilities. Renovate to amalgamate Stadium and Hall. Refer to building plan.

New raised beds around existing water tanks to capture runoff.

Potential location for gardening shed and compost

Consolidate understorey native planting beneath existing trees

Re-surface asphalt where uneven

ROYAL MELBOURNE GOLF CLUB

New surface to full size Netball & Basketball court (such as 'Plexi-Pave') with new linemarking.

Engage lighting specialist to determine locations and type of lighting required to be code compliant (training levels only). May be possible to attach lights to existing buildings.

Additional Mini Netball courts with removable goals and linemarking for Netball have been determined by space available and as directed by school.

LEGEND

- Existing Trees to be retained
- Existing & Proposed Garden Beds
- Proposed Trees
- Lawn / Mown Grass
- New Court Surface
- Existing Synthetic Turf
- Existing & Proposed Concrete Paving
- Existing Brick Paving
- Existing Asphalt Paving Resurface where necessary
- Impact Attenuating Playground Mulch
- Sand
- Rocks
- Logs
- Timber Decking
- Seats
- Existing Water Tanks
- Proposed 4-square courts

This area subject to future detail design

Existing brick paths to be retained

Add an accessible deck off the staff room for teaching staff to gain access to the front garden (subject to detail design). Provide seats in front garden for staff outdoor area. (An alternative option is to provide a ramp to make the building entrance accessible).

No.	Date	Issue Notes
3	16/02/17	Final Landscape Master Plan
2	20/12/16	Draft LMP with feedback from consultation incorporated
1	24/11/16	Draft LMP for discussion

Jeavons
LANDSCAPE ARCHITECTS
1st Floor 717 Nicholson Street
CARLTON NORTH VIC 3054
(03) 9387 7337
info@jeavons.net.au
www.jeavons.net.au

North
Scale 1:250 @ A1
Scale Bar
0 2.5 5.0 7.5 10.0 12.5m

DRAWING NUMBER	OF	TOTAL SHEETS	ISSUE DATE	(REV)
MP01		2	16/02/17	
DRAWN BY		CHECKED	PROJECT NUMBER	
RV		MJ	2491	

Note: This is a masterplan drawing and not a working drawing. It is not to be used for construction purposes. Levels and dimensions are approximate only. This drawing remains the property of the Landscape Architect. COPYRIGHT 2016 JEAVONS LANDSCAPE ARCHITECTS

CHELTENHAM ROAD



Retain & protect existing vegetation around perimeter of school grounds

Universal access Adventure/Fitness track around oval area. (Approximate alignment - subject to detail design to ensure no loss or damage to existing vegetation and compliance with access standards)

Running track line markings (will not be a competition surface). Surface is the same as playing fields

New sports surface for cricket, soccer and Auskick

Catchment along side of synthetic surface for harvest of drainage into sub-surface tanks. Subject to further engineering assessment, design and costing

Net behind goals. Goal post location to be confirmed.

Add several new logs to create space for outdoor classroom

Remove existing containers. Extend existing shed to house sports equipment, maintenance, event materials and archives.

REFER TO MP-01

New concrete paths to provide access to oval and play equipment

Four trees to be planted in tree bays and raised garden beds to be added alongside classrooms as part of an on-going garden club project. Ramp to classroom to be removed.

Form a larger mound than the one existing to create an amphitheatre from which to spectate events on the oval

Existing bike shed to be relocated

Proposed change facilities to include:
 - referee room/ office
 - storage for sports equipment
 - two unisex change rooms & toilet
 - first aid room

Note: Where possible, line mark to avoid conflict between goal areas and sporting code lines

Aussie rules football goal posts location to be confirmed. To be outside soccer pitch boundary.

Locate long jump in this area

Plant new screening vegetation

Sports practice space

Retain & protect existing significant tea tree in the nature play zone

Universal access Adventure/Fitness track around oval area. (Approximate alignment - subject to detail design to ensure no loss or damage to existing vegetation and compliance with access standards)

New playground - relocate existing equipment where possible (equipment shown is indicative only)

Plant single trunked trees to ensure clear visibility through area

LEGEND

- Existing Trees to be retained
- Garden Beds
- Proposed Trees
- Lawn / Mown Grass
- Sports Surfaces
- Run up for long jump (synthetic wetpour surface)
- Existing & Proposed Concrete Paving
- Impact Attenuating Playground Mulch
- Sand
- Rocks
- Mounding
- Timber Decking
- Seats - locate under or near trees
- Proposed lighting to soccer pitch

Note: Locations are indicative only - Lighting design subject to specialist design

Landscape Master Plan

Black Rock Primary School

Arkaringa Crescent, Black Rock

No.	Date	Issue Notes
3	16/02/17	Final Landscape Master Plan
2	20/12/16	Draft LMP with feedback from consultation incorporated
1	24/11/16	Draft LMP for discussion

1st Floor 717 Nicholson Street
 CARLTON NORTH VIC 3054
 (03) 9387 7337
 info@jeavons.net.au
 www.jeavons.net.au

North

Scale 1:250 @ A1

Scale Bar

DRAWING NUMBER	OF	TOTAL SHEETS	ISSUE DATE	(REV)
MP02		2	16/02/17	
DRAWN BY		CHECKED	PROJECT NUMBER	
RV		MJ	2491	

Note: This is a masterplan drawing and not a working drawing. It is not to be used for construction purposes. Levels and dimensions are approximate only. This drawing remains the property of the Landscape Architect. COPYRIGHT 2016 JEAVONS LANDSCAPE ARCHITECTS

Appendix 2: Oval: Probable capital and recurrent costs artificial and natural turf surface options

Costed Items / Requirements	Artificial Turf Comments / Assumptions	Probable Capital costs 2016	Probable Annual Recurrent Cost
1. Artificial turf provision (including carpet, pads, marking etc.)	Including all construction costs, carpet, pads, drainage, goals and marking, etc. Estimated based on previous projects.	\$820,000	
Artificial turf maintenance	Sweeping, repair, general maintenance.		\$5,000
2. Sports nets and long jump pit	Estimates for construction/supply.	\$30,000	\$1,000
3. Provision of water supply infrastructure	Est. to allow wetting the surface when required.	\$5,000	
Water usage	Allowance for occasional watering		\$500
4. Sport lighting- provision	Benchmarked allowance @ \$175,000 min. Dependent on elect. supply, distance etc.	\$175,000	
Sport lighting Bulb replacement	Sylvania Lighting Australasia / SES Lighting		\$20,000
Regular maintenance of sports light poles etc., other than bulbs	SES Lighting - 3 full service in 10 years		\$1,500
Technology to control lights, program water etc. Installation for this site	Sylvania Lighting Australasia / SES Lighting	\$3,000	
Maintenance - technology to control lights, program water etc.	Sylvania Lighting Australasia		\$500
5. Electrical supply upgrade to the site	Allowance for an upgrade to enable lighting.	\$20,000	
Electricity usage	Benchmarked.		\$4,500
6. Provision of sports netting	Allowance for major net between school buildings and the oval.	\$15,000	
Maintenance of netting	Allowance for annual maintenance and repairs.		\$2,500
7. Provision of goals/nets storage area for these.	Storage facilities.	\$23,000	
Total excluding pavilion and netball		\$1,091,000	\$35,500
8. Pavilion - public toilets, storage and referee room	Allowance for the addition of permanent facilities.	\$250,000	
Maintenance of pavilion - public toilet referee room	Assume 4%- cyclic maintenance. Excludes one-off damage in insurance. Cleaning recurrent based on 2 hr per week 50 weeks. Excluded major events.	\$10,000	\$5,000
9. Netball court and lighting	All costs associated with the additional court. Excludes any additional major earthworks required.	\$200,000	
Maintenance of netball court and lighting	Allowance for annual maintenance (including bulb replacement etc.)		\$10,000
Total including pavilion and netball		\$1,551,000	\$50,500

Exclusions: These costs do not include: water harvesting and tanks, relocation of the playgrounds bicycle parking, cricket nets, tree planting, path lighting and other costs associated with implementing the proposed works identified in the master plan.

Costed Items / Requirements	Natural Turf Comments / Assumptions	Probable Capital costs 2016	Probable Annual Recurrent Cost
1. Natural Turf provision -Capital	See attached information From Sports Turf	\$275,000	
Turf - line marking	Estimate		\$2,000
Turf Seasonal turf maintenance	Estimate based on previous projects and SRWA: Natural grass v synthetic turf study report.		\$25,000
Turf repair remediation	Top-dressed annually if required approx. Including sand.		\$5,000
2. Sports goals and long jump pit	Estimates for construction/ supply.	\$30,000	\$1,000
3. Irrigation – Capital	Upgrade of existing irrigation.	\$130,000	
Irrigation - Maintenance	Allowance		\$2,500
Water usage	450kL per week for 9 months of year at 2.50 per kL note dependant on efficiency etc.		\$40,500
4. Provision of sports lighting infrastructure	Costs benchmarked.	\$175,000	
Bulb replacement	Sylvania Lighting Australasia / SES Lighting. Less use than synthetic.		\$15,000
Regular maintenance of light poles etc., other than bulbs	SES Lighting - 3 full service in 10 years		\$1,500
System control -Capital (lights and water)	Sylvania Lighting Australasia / SES Lighting	\$3,000	
System control Maintenance - (lights and water)	Sylvania Lighting Australasia		\$500
Upgrade of electrical supply to the site	Notional allowance for upgrade to enable lighting.	\$20,000	
Electricity usage	Benchmarked		\$3,000
5. Sports Netting - Capital	Allowance for a major net between school buildings and the oval.	\$15,000	
Maintenance of netting	Allowance for annual maintenance and repairs.		\$2,500
5. Provision of goals/nets storage area for these.	Storage facilities.	\$23,000	
	Subtotal includes oval lights excluding pavilion and netball	\$ 671,000	\$ 98,500
	Subtotal excluding pavilion and netball excluding lights	\$476,000	\$79,000
Exclusions: These costs do not include: water harvesting and tanks, relocation of the playgrounds bicycle parking, cricket nets, tree planting, path lighting and other costs associated with implementing the proposed works identified in the master plan.			

Costed Items / Requirements	Natural Turf Comments / Assumptions	Probable Capital costs 2016	Probable Annual Recurrent Cost
6. Pavilion- Capital (- public toilet, storage and referee room)	Allowance for the addition of permanent facilities.	\$250,000	
Pavilion - Maintenance (- public toilet referee room)	Assume 4%- cyclic maintenance. Excludes one-off damage in insurance. Cleaning recurrent based on 2 hr. per week 50 weeks. Excluded major events	\$10,000	\$5,000
7. Netball court and lighting.	All costs associated with the addition of court. Excludes major earthworks of required.	\$200,000	
Maintenance of netball court and lighting.	Allowance for annual maintenance (including bulb replacement etc.)		\$10,000
	Total including pavilion and netball	\$1,131,000	\$113,500
	Total including pavilion and netball (excluding oval lights)	\$936,000	\$94,000



Appendix 3. Probable costs and revenue (including costs of and revenue from netball and without oval lights)

Natural Turf (Base case) – Costs and Revenue years 0-15 (useful life of asset)																
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
COSTS																
Construction	-\$936,000															
Maintenance		-\$95,880	-\$97,798	-\$99,754	-\$101,749	-\$103,784	-\$105,859	-\$107,976	-\$110,136	-\$112,339	-\$114,585	-\$116,877	-\$119,215	-\$121,599	-\$124,031	-\$126,512
Replacement costs		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-\$168,234
Total costs	-\$936,000	-\$95,880	-\$97,798	-\$99,754	-\$101,749	-\$103,784	-\$105,859	-\$107,976	-\$110,136	-\$112,339	-\$114,585	-\$116,877	-\$119,215	-\$121,599	-\$124,031	-\$294,745
REVENUE																
Revenue		\$40,759	\$41,574	\$42,406	\$43,254	\$44,119	\$45,001	\$45,901	\$46,820	\$47,756	\$48,711	\$49,685	\$50,679	\$51,693	\$52,726	\$53,781
Total revenue	-	\$40,759	\$41,574	\$42,406	\$43,254	\$44,119	\$45,001	\$45,901	\$46,820	\$47,756	\$48,711	\$49,685	\$50,679	\$51,693	\$52,726	\$53,781
Net Cash flow	-\$936,000	-\$55,121	-\$56,223	-\$57,348	-\$58,495	-\$59,665	-\$60,858	-\$62,075	-\$63,316	-\$64,583	-\$65,874	-\$67,192	-\$68,536	-\$69,907	-\$71,305	-\$240,964
Cumulative cash flow	-\$936,000	-\$991,121	-\$1,047,344	-\$1,104,692	-\$1,163,186	-\$1,222,851	-\$1,283,709	-\$1,345,784	-\$1,409,100	-\$1,473,683	-\$1,539,557	-\$1,606,749	-\$1,675,285	-\$1,745,192	-\$1,816,496	-\$2,057,461



Appendix 3. Probable costs and revenue (including costs of and revenue from netball and without oval lights) cont'd

Artificial Turf (Base case) – Costs and Revenue years 0-8 (useful life of asset)									
Year	0	1	2	3	4	5	6	7	8
COSTS									
Construction	-\$1,551,000								
Maintenance		-\$51,510	-\$52,540	-\$53,591	-\$54,663	-\$55,756	-\$56,871	-\$58,009	-\$59,169
Replacement costs		-	-	-	-	-	-	-	-\$234,332
Total costs	-\$1,551,000	-\$51,510	-\$52,540	-\$53,591	-\$54,663	-\$55,756	-\$56,871	-\$58,009	-\$293,501
REVENUE									
Revenue		\$123,379	\$125,847	\$128,364	\$130,931	\$133,550	\$136,221	\$138,945	\$141,724
Total revenue	-	\$123,379	\$125,847	\$128,364	\$130,931	\$133,550	\$136,221	\$138,945	\$141,724
Net Cash flow	-\$1,551,000	\$71,869	\$73,307	\$74,773	\$76,268	\$77,794	\$79,349	\$80,936	-\$151,777
Cumulative cash flow	-\$1,551,000	-\$1,479,131	-\$1,405,824	-\$1,331,052	-\$1,254,783	-\$1,176,990	-\$1,097,640	-\$1,016,704	-\$1,168,481

Appendix 3. Probable costs and revenue (including costs of and revenue from netball and without oval lights) cont'd

Natural Turf (Scenario 1 – 20% increase in revenue) – Costs and Revenue years 0-15 (useful life of asset)																	
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
COSTS																	
Construction	-\$936,000																
Maintenance	-\$95,880	-\$97,798	-\$99,754	-\$101,749	-\$103,784	-\$105,859	-\$107,976	-\$110,136	-\$112,339	-\$114,585	-\$116,877	-\$119,215	-\$121,599	-\$124,031	-\$126,512		
Replacement costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-\$168,234	
Total costs	-\$936,000	-\$95,880	-\$97,798	-\$99,754	-\$101,749	-\$103,784	-\$105,859	-\$107,976	-\$110,136	-\$112,339	-\$114,585	-\$116,877	-\$119,215	-\$121,599	-\$124,031	-\$294,745	
REVENUE																	
Revenue		\$48,911	\$49,889	\$50,887	\$51,905	\$52,943	\$54,002	\$55,082	\$56,183	\$57,307	\$58,453	\$59,622	\$60,815	\$62,031	\$63,272	\$64,537	
Total revenue	-	\$48,911	\$49,889	\$50,887	\$51,905	\$52,943	\$54,002	\$55,082	\$56,183	\$57,307	\$58,453	\$59,622	\$60,815	\$62,031	\$63,272	\$64,537	
Net Cash flow	-\$936,000	-\$46,969	-\$47,908	-\$48,867	-\$49,844	-\$50,841	-\$51,858	-\$52,895	-\$53,953	-\$55,032	-\$56,132	-\$57,255	-\$58,400	-\$59,568	-\$60,759	-\$230,208	
Cumulative cash flow	-\$936,000	-\$982,969	-\$1,030,877	-\$1,079,744	-\$1,129,588	-\$1,180,428	-\$1,232,286	-\$1,285,181	-\$1,339,133	-\$1,394,165	-\$1,450,297	-	\$1,507,552	\$1,565,952	\$1,625,520	\$1,686,279	\$1,916,487

**Appendix 3. Probable costs and revenue (including costs of and revenue from netball and without oval lights)
cont'd**

Artificial Turf (Scenario 1 – 20% increase in revenue) – Costs and Revenue years 0-8 (useful life of asset)									
Year	0	1	2	3	4	5	6	7	8
COSTS									
Construction	-\$1,551,000								
Maintenance		-\$51,510	-\$52,540	-\$53,591	-\$54,663	-\$55,756	-\$56,871	-\$58,009	-\$59,169
Replacement costs		-	-	-	-	-	-	-	-\$234,332
Total costs	-\$1,551,000	-\$51,510	-\$52,540	-\$53,591	-\$54,663	-\$55,756	-\$56,871	-\$58,009	-\$293,501
REVENUE									
Revenue		\$148,055	\$151,016	\$154,036	\$157,117	\$160,260	\$163,465	\$166,734	\$170,069
Total revenue	-	\$148,055	\$151,016	\$154,036	\$157,117	\$160,260	\$163,465	\$166,734	\$170,069
Net Cash flow	-\$1,551,000	\$96,545	\$98,476	\$100,445	\$102,454	\$104,503	\$106,594	\$108,725	-\$123,432
Cumulative cash flow	-\$1,551,000	-\$1,454,455	-\$1,355,979	-\$1,255,534	-\$1,153,079	-\$1,048,576	-\$941,982	-\$833,257	-\$956,689

Appendix 3. Probable costs and revenue (including costs of and revenue from netball and without oval lights) cont'd

Natural Turf (Scenario 2 – 20% decrease in revenue) – Costs and Revenue years 0-15 (useful life of asset)																
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
COSTS																
Construction	-\$936,000															
Maintenance		-\$95,880	-\$97,798	-\$99,754	-\$101,749	-\$103,784	-\$105,859	-\$107,976	-\$110,136	-\$112,339	-\$114,585	-\$116,877	-\$119,215	-\$121,599	-\$124,031	-\$126,512
Replacement costs		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-\$168,234
Total costs	-\$936,000	-\$95,880	-\$97,798	-\$99,754	-\$101,749	-\$103,784	-\$105,859	-\$107,976	-\$110,136	-\$112,339	-\$114,585	-\$116,877	-\$119,215	-\$121,599	-\$124,031	-\$294,745
REVENUE																
Revenue		\$32,607	\$33,260	\$33,925	\$34,603	\$35,295	\$36,001	\$36,721	\$37,456	\$38,205	\$38,969	\$39,748	\$40,543	\$41,354	\$42,181	\$43,025
Total revenue	-	\$32,607	\$33,260	\$33,925	\$34,603	\$35,295	\$36,001	\$36,721	\$37,456	\$38,205	\$38,969	\$39,748	\$40,543	\$41,354	\$42,181	\$43,025
Net Cash flow	-\$936,000	-\$63,273	-\$64,538	-\$65,829	-\$67,145	-\$68,488	-\$69,858	-\$71,255	-\$72,680	-\$74,134	-\$75,617	-\$77,129	-\$78,672	-\$80,245	-\$81,850	-\$251,720
Cumulative cash flow	-\$936,000	-\$999,273	-\$1,063,811	-\$1,129,640	-\$1,196,785	-\$1,265,273	-\$1,335,131	-\$1,406,387	-\$1,479,067	-\$1,553,201	-\$1,628,818	\$1,705,947	\$1,784,618	\$1,864,863	\$1,946,713	\$2,198,434

**Appendix 3. Probable costs and revenue (including costs of and revenue from netball and without oval lights)
cont'd**

Artificial Turf (Scenario 2 – 20% decrease in revenue) – Costs and Revenue years 0-8 (useful life of asset)									
Year	0	1	2	3	4	5	6	7	8
COSTS									
Construction	-\$1,551,000								
Maintenance		-\$51,510	-\$52,540	-\$53,591	-\$54,663	-\$55,756	-\$56,871	-\$58,009	-\$59,169
Replacement costs		-	-	-	-	-	-	-	-\$234,332
Total costs	-\$1,551,000	-\$51,510	-\$52,540	-\$53,591	-\$54,663	-\$55,756	-\$56,871	-\$58,009	-\$293,501
REVENUE									
Revenue		\$98,703	\$100,677	\$102,691	\$104,745	\$106,840	\$108,976	\$111,156	\$113,379
Total revenue	-	\$98,703	\$100,677	\$102,691	\$104,745	\$106,840	\$108,976	\$111,156	\$113,379
Net Cash flow	-\$1,551,000	\$47,193	\$48,137	\$49,100	\$50,082	\$51,084	\$52,105	\$53,147	-\$180,122
Cumulative cash flow	-\$1,551,000	-\$1,503,807	-\$1,455,669	-\$1,406,569	-\$1,356,487	-\$1,305,404	-\$1,253,299	-\$1,200,151	-\$1,380,273

Appendix 3. Probable costs and revenue (including costs of and revenue from netball and without oval lights) cont'd

Financial Assumptions for cash flow purposes- including netball – year 0			
	Natural Turf (with lights)	Natural Turf (without lights)	Artificial Turf
Inflation rate. Applied to revenue and expenses	2.0%	2.0%	2.0%
Construction costs	\$1,131,000	\$936,000	\$1,551,000
Maintenance costs	\$113,500	\$94,000	\$50,500
Replacement cost (Carpet & shock pad replacement)		\$125,000	\$200,000
Replacement frequency years	15	15	8
Weeks in use annually (club, school and private)	48	48	50
Weeks in use annually (netball)	42	42	42
Hours of use training weekly (club, school and private)	29	23	59
Annual use hours	1,392	1104	2,950
Annual revenue generated (including netball)	\$ 61,560	\$39,960	\$ 120,960

Appendix 4. Images

1. Netball court



2. The Oval



3. Other active spaces on the campus





Appendix 5. Community and Stakeholder Engagement

Engagement and communication with community groups has been important throughout the project. Listed below are the key stakeholders that have been consulted throughout this time:

Consultation completed by Oval and Surround Sub Committee:

1. Parents
2. Teachers
3. Children/students
4. Local sporting associations from AFL, soccer- football, cricket, netball and basketball.
5. Local community associations catering to people with a disability and providing performing arts
6. Dog walkers
7. Neighbours (additional to commence February 2017)
8. Bayside City Council and Councillors
9. Schools/Principals that have undergone similar projects
10. Local, State & Federal politicians
11. Subject matter experts regarding turf and synthetic solutions.
12. Architects and designers

Further Consultation completed by @leisure and Jeavons Landscape Architects:

1. Working groups with teachers.
2. Bayside City Council staff
3. Sports Turf consultants
4. Peak sporting bodies
5. Artificial sports turf suppliers.
6. Working groups with representative students from each year level.



SportsTurf Consultants (Aust.) Pty Ltd.
A.B.N. 41 950 863 362

45 Westerfield Drive, Notting Hill, Victoria 3168 Ph: (03) 9574 9066 Fax: (03) 9574 9072 Email: info@sportsturf.com.au

2nd November 2016

Ms Sally Jeavons
At Leisure
534 Mt Alexander Road
Ascot Vale VIC 3032

SPORTSFIELD REPORT – BLACK ROCK PRIMARY SCHOOL

1. BACKGROUND

Black Rock Primary School is looking at the potential of upgrading the oval surface. This will involve short term and future capital works.

2. EXISTING CONDITIONS

2.1 General Description

At present the small to medium sized oval is in a moderate condition. The current turf cover is a mix of grasses with a moderate amount of grass and broadleaf weeds. The major turf species comprise of ryegrass, with some underlying Kikuyu and Couch. The total turf cover for the oval surface is approximately 75%.

The overall oval surface is pitted and rutted with tufty grass cover. There were areas where grass cover had thinned that were hollowing out and becoming very uneven.

The soil profile of the oval is a sandy loam to a depth of 300mm at the time of assessment the soil was moist.

The surface is uneven and will lead to poor ball bounce and playability. The unevenness is significant and will require civil earthworks to overcome. Overall the playing surface has a one way fall.

The oval surface is highly worn and this was particularly evident in the goal mouths (AFL & Soccer). The goals mouths had significantly hollowed out due to student use.

Due to usage factor the soil conditions of the oval were highly compacted and this will be detrimental to turf growth.

The oval has a moderate percentage of broadleaf weeds and this need to be controlled by herbicide application.

No automated irrigation is present on the oval surface.

A synthetic wicket is present in a central location on the oval surface. The quality and condition of the synthetic matting is old and damaged and requires replacement. The corners of the central synthetic wicket had exposed concrete.

Practice cricket wicket nets were observed on site and these were old and worn out. There was significant damage to netting and no synthetic matting on the concrete surface.

3 SOIL CONDITIONS

3.1 Black Rock Oval

The oval has no subsurface drainage system and relies solely on surface cross-fall to shed water. The sandy loam soil profile was highly compacted.

Given the level of surface undulations and imperfections these will retain surface water and not allow rainfall to be readily shed from the playing surface.

3.2 Soil Physical Tests

3.2.1 Oval

A drainage test was conducted on the topsoil under **ASTM F 1815 –11** Standard Test Methods for Saturated Hydraulic Conductivity to determine the drainage characteristics of the topsoil and testing revealed the topsoil drained at a slow rate. (10mm/hr)

4. SUMMARY OF PROBLEMS AND ISSUES

The following problems exist and need rectifying:

4.1 Black Rock Primary School Oval Deficiencies

- Deficiency with surface shape and levelness of the playing surface.
- Lack of Automated Irrigation to the entire playing surface.
- Slow drainage characteristics of the local sandy loam topsoil.
- Lack of subsurface drainage.
- High percentage of broadleaf weed species
- Overall turf cover percentage.
- Lack of warm season turf species

Any upgrade must attempt to address as many of these issues as possible.

The critical aspects are to create an even one way fall so that water can be shed from the surface and not impeded by undulations. Installation of a automated irrigation system to provide a uniform watering system for the oval surface. Some strategic drainage will be required to assist with the removal of water from the playing surface. This may include a perimeter drain with some lateral drains collecting into the perimeter drain. Improvement in the percentage of turf cover also needs to be addressed.

5. SOIL NUTRITION

5.1 Black Rock P/S Nutrients

The pH level is moderately acid and needs alteration. Salts are low and harmless for the establishment and growth of a turf surface. Phosphorus is present in the soil is low and needs to be increased. Potassium, Calcium and Magnesium are at deficient levels in the soil profile. The CEC% is low and indicates poor nutrient retention this is typical of sand type soil profiles. Trace element levels are generally good with the exception of Copper and Boron that are low.

The following fertiliser applications are required at renovation/refurbishment time;

- Dolomite lime 2 tonne/ha.
- Gypsum at 2 tonne/ha.
- Superphosphate at 150 kg/ha.
- Potassium sulphate at 200 kg/ha.
- Granular trace element mix at 100 kg/ha.
- NPK fertiliser 24:4:13 or similar at 250 kg/ha.

Maintenance fertiliser is required for optimal nutrition;

- Apply an NPK fertiliser 24:4:13 or similar at 150 kg/ha every 4 weeks.

6. OVAL RECTIFICATION WORKS – SHORT TERM

The following works are required in order to get the Oval into a good condition however only significant capital works will solve the major issues with this playing surface to get it in a condition suitable for match play. These short term works will also not improve the current usage levels of the oval surface.

6.1 Black Rock P/S

The key aspects of the works required to get this Oval into a better condition are;

- Lower mowing heights and maintain at a low cutting height to promote turf growth.
- Spray the broadleaf weeds with herbicide
- Aerate the surface with a vertidrain or similar implement.
- Heavily topdress the surface.
- Fill holes with suitable sandy loam material.
- Promote grass growth through regular fertiliser practices.
- Reinstate areas around the goal mouths and make level.
- Seed and sod kikuyu into bare areas.

The extent of these short term works is somewhat limited given the current surface levels not being of a standard to satisfy match play and in addition to this the lack of a functional irrigation system in order to maintain the surface over the summer months.

Cost Estimate for the maintenance/works program is \$10,000 - \$20,000

7. OVAL RECTIFICATION WORKS – LONG TERM

The long term oval works proposed for the Black Rock Primary School will rectify the major issues and deficiencies associated with the oval surface. These capital works will also place the oval in a better condition with it able to better tolerate usage.

7.1 Black Rock P/S Ideal Proposal

The initial proposal for the upgrade works for the oval involves the following:

7.1.1 Surface Reshaping & installing Sand Drains

- Undertake a survey of the oval surface. The oval needs to be surveyed on a 15m grid to pick up the entire surface and so accurate design can be created.
- Strip the grass from the surface to expose the topsoil (removing no more than 50mm from the surface)
- Shape the oval to create a single slope diagonally across the surface in accordance with current contours. This will minimise the amount of reshaping, involving cutting and filling required over the site. The surface will need to be a single slope smooth free on any undulations. Given the extent of the undulations some additional soil may need to be imported to site.
- Utilise for the most part existing topsoil as the playing surface and modify with necessary fertiliser additives.
- Install strategic subsurface drainage this will entail some lateral slotted piped drains as well as a perimeter drain.
- Install a fully automated irrigation system to cater for grass growth.
- Sprig, seed or sod with kikuyu or couch.
- Grow in for a period of 12 weeks then oversow with turf type ryegrass.
- Timing of works ideally earthworks/drainage commence in late September early October with the aim of grassing the playing surface prior to Christmas to maximise the kikuyu or couch sprigs/sod growth period. Oversowing with ryegrass can occur in early March.

Cost of Proposal \$200,000 - 300,000 (ex GST)



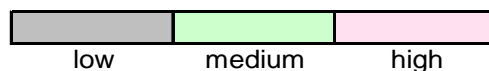
SportsTurf Consultants (Aust.) Pty Ltd
 45 Westerfield Drive Notting Hill Victoria 3168
 Ph 03 9574 9066 Fax 9574 9072 email: info@sportsturf.com.au

Soil Nutrient Analysis - Results

BLACK ROCK P/S

28 October 2016

	Ideal Range	Oval			
pH (water)	6.0 - 7.0	5.8			
Electrical Conductivity (mS/cm)	< 0.27	0.02			
Total salts (ppm)	< 800	59			
Phosphorus (Colwell) (ppm)	50 - 80	18			
Exchangeable cations					
Potassium (meq /100g)	0.5 - 0.6	0.1			
Calcium (meq /100g)	> 3.5	1.1			
Magnesium (meq /100g)	0.8 - 1.0	0.2			
Calcium Magnesium Ratio	2 - 5	6.1			
Sum of Cations (CEC) (meq%)	> 5	1.5			
% of CEC (Base Saturation)					
Potassium (%)	> 10	4			
Calcium (%)	60 - 70	75			
Magnesium (%)	18 - 23	12			
Sodium (%)	< 5	2			
Trace Elements					
Sulphur (ppm)	10 - 50	2			
Zinc (ppm)	1 - 10	7.6			
Copper (ppm)	1 - 10	0.4			
Manganese (ppm)	1 - 4	2.6			
Iron (ppm)	10 - 75	82			
Boron (ppm)	0.3 - 1.0	0.1			
Chloride (ppm)	< 100	10			
Organic carbon (%)	1.2 - 2.5				



DISCLAIMER: Results are based on the analysis of the samples as received.

Because of the variability of the sampling procedures, environmental and managerial conditions, the Company does not accept liability for lack of performance based on these recommendations.

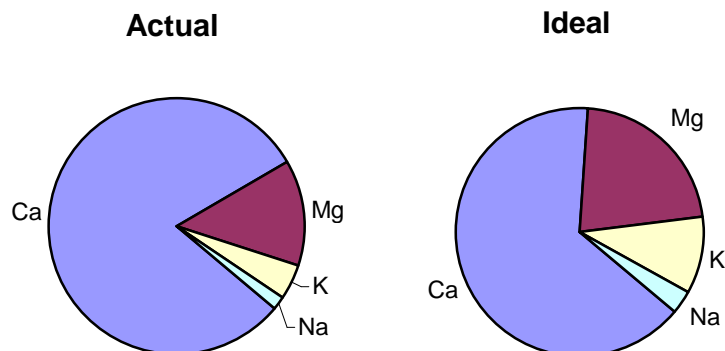
Recommendations are made in good faith based on the sample and information supplied.

SOIL ANALYSIS REPORT

CLIENT:		BLACK ROCK PS Oval					DATE:		28/10/2016			
SAMPLE No:	21875308	SAMPLE RESULT	LOW			MEDIUM			HIGH		IDEAL	COMMENTS
pH (water)	5.8	X X X									6.0 - 7.0	moderately acid
Elect Cond. (mS/cm)	0.020	X X									< 0.27	low, likely low nutrient levels
Total Salts (ppm)	59	X X									< 800	low, likely low nutrient levels
Phosphorus (ppm) Col. P.	18	X									50 - 80	low
Cations (meq%)												
Potassium	0.1	X									0.5 - 0.6	low
Calcium	1.1	X									> 3.5	low
Magnesium	0.2	X									0.8 - 1.0	low
Ca/Mg Ratio	6.1	X X X	X	X	X	X	X	X	X		2 - 5	high
Sum of Cations (CEC) (meq%)	1.5	X									> 5	low
% of CEC (Base Saturation)												
Potassium	4	X X									> 10%	irrelevant until CEC improves
Calcium	75	X X X	X	X	X	X	X	X	X		60 - 70%	irrelevant until CEC improves
Magnesium	12	X X									18 - 23%	irrelevant until CEC improves
Sodium	2	X X									< 5%	irrelevant until CEC improves
Trace elements (ppm)												
Sulphur	1.8	X									10 - 50	low
Zinc	7.6	X X X	X	X	X	X	X	X			1 - 10	acceptable
Copper	0.4	X									1 - 10	low
Manganese	2.6	X X X	X	X	X	X	X				1 - 4	acceptable
Iron	82.0	X X X	X	X	X	X	X	X	X		10 - 75	high
Boron	0.1	X									0.3 - 1.0	low
Chloride	10	X									< 100	low, good
Organic Carbon (%)											1.2 - 2.5	

Base Saturation Levels - Cations

Note the base saturation levels are irrelevant until CEC improves



Ca: Calcium Mg: Magnesium K: Potassium Na: Sodium

DISCLAIMER	Results are based on the analysis of the sample as received. Because of the variability of the sampling procedures, environmental and managerial conditions, the company does not accept liability for lack of performance based on these recommendations. Recommendations are made in good faith based on the sample and information supplied.
-------------------	---