Pitch Preparation –
The basic fundamentals

NZC

This resource is a means to connect with the personnel responsible for the preparation and delivery of cricket surfaces across NZ.

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Overview of cricket blocks

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1.1 — Introduction
A quality cricket surface allows players to express and develop their skills, ensures the cricketer has a rewarding experience and that the game of cricket can be enjoyed by players, and supporters alike across all levels of participation.

The intention of this manual is to guide the reader in the basic methodologies of pitch preparation. This manual will be a web-based tool that is regularly updated with video clips and pitch preparation trends and information. We will use this resource as a means to connect with the personnel responsible for the preparation and delivery of our surfaces at all levels of the game across NZ.

1.2 — What does the cricket administrator want from a cricket pitch?
There is a trend worldwide to move away from low, slow, variable pitches that provide 'nothing' for either batter or bowler. Such pitches do not help players develop their skills and they generally result in tedious cricket. New Zealand Cricket (NZC) encourages pitches that provide a fair balance between bat and ball – a pitch where batters feel as though they get value for shots and are confident they can score runs, and bowlers can take wickets. (1) Most cricketers agree that having good pace and bounce is the key to a good match. Seam movement and spin are part of the game for which players need to adjust their game, as is having some natural variation in pace and bounce. But having too much variance in pace or bounce, or having a pitch with very low bounce and slow pace is detrimental to pitch performance and can impact the quality of the game.

The NZC Grounds Warrant of Fitness is outlined below.
A "Good" pitch is one that: Encourages both bowlers and batsmen through consistent pace and bounce (not excessive seam movement). A delivery that passes through at stump height should carry through to the wicket keeper on a trajectory that is an upwards motion in ball flight off the pitch. (2)

One-Day and T20 pitches: Should be consistent in pace and bounce over the duration of a match allowing equality of conditions for both teams. There should be little or no turn and little or no seam movement. (3)

Four-Day pitches: Should provide good pace and bounce with limited seam movement and the pitch wears gradually as the match progresses encouraging spin bowlers and some (but acceptable) variable bounce later in the match.

Despite having a common overall goal, it is important to recognise that each venue is encouraged to have its own characteristics. This accounts for climatic variations, clay types, grass species composition and the individual preparation techniques of Turf Managers. Having venues with different characteristics helps our players develop and adapt to playing on different surfaces and conditions as they move around the country, overseas and through the playing ranks. As long as the pitch is safe and provides conditions where the ball comes on to the bat without excessive seam movement, spin or variability in bounce, then the pitch should help in the player development pathway and enjoyment of the game.

1.3 — What does a player want from a pitch?
A good surface for longer forms of cricket should offer:

- Consistent pace;
- Consistent bounce early in the match (but getting more variable from late day three and day four onwards);
- Some seam movement but not excessive;
- Some turn but once again not excessive. The best batters in the country don't mind pitches that seam or spin, as they are good enough to adapt to the conditions and realise that they are playing against the opposition, not the pitch. A similar view is shared by the top bowlers, provided the pitch offers encouragement through good pace and bounce. (4)

1.4 — What does the Turf Manager want from the pitch?
The Turf Manager wants a pitch that:

- Is easy to prepare (correct soil type, depth of clay and grass type);
- Is easy to keep the grass cover alive and provides a resilient surface so that it can take more matches per season;
- Produces consistent pace and bounce (the pitch should have minimal organic matter, good base compaction and even grass cover).

Most cricketers agree that having good pace and bounce is the key to a good match.

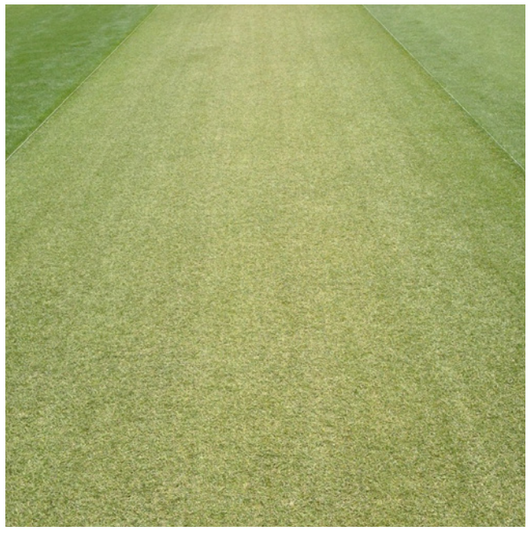
1. Martin Guptill 6 Westpac Stadium
2. Chris Martin McLean Park
3. Eden Park Bounce Test
4. Dale Steyn Basin Reserve

1.5 – Examples of match day performance standards
The quality of a cricket pitch can be hard to accurately and objectively define. There are however various properties that determine pitch performance and that can be measured, as illustrated below.

01 Levelness

The pitch shall appear level along its entire length with no noticeable holes or depressions.

When using a 3m straight edge, levels shall not exceed 5mm at any angle along the pitch.



02 Turf density and composition

At the start of preparation the turf cover shall look even along the entire pitch, with little or no bare ground visible. There shall be no noticeable weed content in the strip.

On match day, the percentage of bare soil should not exceed 15% overall and no bare spot shall exceed 20mm in diameter.

03 Grass height and mowing

Grass height will depend on the density of the turf cover. Grass shall be pressed onto the surface with a fine covering of grass over the clay. Some clay may be seen but if you need to search for the clay through the grass cover then the grass will need thinning out. (this can be achieved through verti- mowing and brushing of the pitch during preparation).

04 Surface hardness

There are some scientific tools that can be used to measure surface hardness (e.g. Clegg hammer), but equipment is generally not readily available and can be expensive. Some Turf Managers around the world use a penetrometer device to measure the force needed to push a metal pin into the surface. A knife or spike is often used as a substitute for the penetrometer. A simple alternative is to bounce a ball along the pitch to give an indication of ball bounce and the consistency of bounce height. When bouncing the ball into the pitch check for indentations. If the ball is leaving dents but the surface feels hard, this means that the sub-soil down to 50mm is probably still too wet and/or optimal base compaction has not been achieved through rolling. The surface should not dent when bouncing a ball vertically into the surface.

Bounce Test Bay Oval

05 Subsoil characteristics

Cores taken from the pitch on or close to match day must not show any layering within the surface 75mm and should have no noticeable organic layer.

Cores shall be solid with no noticeable feathering.

Core sampling can be carried out to determine the bulk density, moisture content and pore saturation values during the preparation process. Results will however be site specific.

Dale Steyn to Rob Nicol Eden Park

Cricket Pitch Monitoring Process

Pro tip — 01

Pitches that are too low and slow make it difficult to enjoy both playing and watching the game.

For more pro tips see section 7.0 — **Case studies**

Common problems experienced with cricket pitches

1.6

1.6.1 — Variable pace and/or bounce
For short form cricket and during the first two to three days of First-Class or Test match cricket variable bounce should not be prevalent - the aim should be to have consistent pace and bounce.

Variable pace and bounce may be due to the following causes:

- An uneven surface (can be due to a number of causes including poor renovation or rolling practice);
- Variation in grass density (bare or thin patches) or grass type (couch or Poa annua within a Perennial rye grass grass pitch);
- Excessive organic matter (particularly in conjunction with a patchy surface);
- Variation in soil density and or soil moisture content;
- Inconsistent watering along the pitch;
- A damp pitch; if the surface is too wet and soft the ball can hold up and create variable bounce;
- Insufficient base compaction.

1.6.2 — Low bounce
Pitches that are too low and slow make it difficult to enjoy both playing and watching the game. If the bounce is low players can adjust but will be restricted in the range of shots they are able to play. Batters will become 'front foot' players. The fielding side will often set negative fields (ring fields) to counter the low slow pace of the pitch. A batsman's mistake rather than the skill of the bowler can determine the result of a game.

Low bounce can be due to a number of reasons including:

- Insufficient base compaction;
- Low soil moisture content (dry surface);
- Layering or cleavage planes in the pitch profile;
- Excessive organic matter or thatch content in the pitch profile;
- Poor grass cover.

1.6.3 — Slow pace
As with low bounce, a pitch with slow pace limits the range of shots that can be played, particularly square of the wicket.

Lack of pace in the pitch can be due to the following reasons:

- Inadequate preparation (poor base density and/or lack of surface hardness);
- Too much grass (long grass which hasn't been thinned out enough);
- Not enough grass. A ball bouncing off the clay creating greater friction, slowing the pace of the ball. Clippings help increase speed but still result in greater friction than live grass that has been browned off;
- Excessive organic matter or thatch;
- A surface which is too dry and has lost its 'surface tension' (the surface has been allowed to dry too much between rolls);
- Surface is too damp allowing the ball to 'hold' and create a 'tennis ball' bounce.

1.6.4 — Excessive rate of surface deterioration
A pitch that becomes dusty or breaks up quickly can be difficult to prepare and play on. Generally pitches in NZ have a high clay content and excessive wear nearly always stems from poor preparation methods, including:

- Poor binding clay at the surface;
- Preparing the pitch in a dry state;
- Poor repair techniques;
- Buried layers (thatch overlain by a recent topdressing);
- Inadequate surface preparation (limited rolling).

1.6.5 – Excessive cracking
Cracking in a pitch is generally a good thing. For one day games it can mean that the pitch is drying out and the surface should be hard. For multi-day games it allows the pitch to deteriorate and create some variable bounce later on in the game. But if cracks open up too much and/or start to lift on the edges then they can become unstable, causing variation of ball bounce and even dangerous conditions. Excessive cracking may result from:

- An under-compacted base (new blocks with shrink/swelling clays are particularly prone to cracking if not compacted in layers during construction);
- Layering, with the cracks extending only to the layer, can result in the plate becoming unstable and even being able to lift out;
- Pitch being too dry (to the point where grass will be significantly under stress);
- Poor root structure;
- Past physical treatments such as drill seeding or vibra-moling (which should be avoided) or spiking/vertical draining, creating planes of weakness which open up upon drying.

1.6.6 – Excessive seam and/or spin
Australian off spinner and former assistant curator at Adelaide Oval Nathan Lyon recently made the comment that if a pitch is going to seam then it is also going to turn. In many instances this statement rings true as most factors that cause seam movement aid the ball turning, including:

- A high thatch content which allows the ball to sink into the surface and grip;
- A damp or under-prepared surface which allows the ball to indent the surface for the seam bowlers creating seam movement and a term known as 'turning damp' for the spinners;
- A coarse grass plant where the pitch has been shaved down late in the preparation exposing the crown of the plant known as a 'brown seamer';
- A clumpy or uneven grass cover where the ball will deviate off the grass;
- A thick or matted grass cover that allows the ball to grip on to the grass.

Sometimes spin bowlers can get assistance from the pitch where the seam bowlers will struggle. Such conditions include:

- An excessively dry surface that is starting to become dusty or break up (often more typical in overseas countries);
- A pitch with little or no grass cover;
- An abrasive or gritty surface.

Seam bowlers may get assistance off these surfaces but is more likely through reverse swing (from the pitch roughing up the ball) or inconsistent bounce or pace rather than actual seam movement.

1.6.7 – Thin or patchy turf cover
A uniform turf cover is deemed to be important for achieving consistent pace and bounce. Poor or patchy turf cover could be due to:

- A poor renovation process;
- Differing turf species present (Rye grass, Poa annua, Couch) with different growth habits and stress factors such as tolerance to heat, rolling or mowing heights;
- Insufficient grooming (verticutting, brushing etc.) resulting in clumpy growth;
- Too much grooming resulting in thin, weak turf which stresses out once rolling begins;
- Over-rolling especially on young turf or immediately following grooming;
- Loss of turf cover due to factors such as disease or chemical burn;
- Wear and tear from playing on neighbouring pitches;
- Uneven surface.

1.6.8 – Difficulty in drying
A pitch surface that is slow to dry out to match day hardness can be difficult to maintain and is likely to produce varying results. In some instances the surface may be dry but the underlying soil is still damp and prone to denting. Excessive moisture in a pitch could be due to:

- The local climate (or time of the year);
- Lack of covers to control rainfall;
- Poor levels on the block allowing water to pool in the low areas;
- Preparation methods such as inadequate compaction, watering too late in the week or insufficient preparation time;
- Construction issues such as poor drainage, the wrong type of clay used (some clays take longer to dry) for that level of cricket, or poor shaping of the block allowing water to run on from the outfield;
- Too dense a grass cover on the pitch;
- Excessive organic matter.

Characteristics of cricket pitches that affect how the pitch plays

1.7

1.7.1 – Excessive thatch or organic matter
Excessive thatch or organic matter can dramatically alter how a pitch plays. If left uncontrolled organic matter build-up can lead to pitches that: are low or slow with variable bounce, deteriorate rapidly, produce excessive seam movement or spin and can be difficult to dry out for play.

It is important at this stage to differentiate between thatch and organic matter as they will be treated very differently. Thatch is the plant material, both dead or alive, that sits on top of the playing surface. This can be controlled relatively easily with regular grooming or verticutting and can be remedied closer to preparation time if not carried out regularly. Organic matter on the other hand is the organic material below the surface of the clay. This is predominantly root material in rye grass pitches, but can also include any grass clippings or dead plant material that has been rolled into the surface at any stage of the year. Deep-lying organic matter is a lot more difficult to remedy during the season (unless there is time to carry out a renovation) and is best to prevent rather than rectify.

Prevention of excessive organic build up is based primarily around the renovation. A thorough renovation should be carried at out the end of every season to remove all organic material from the block, with the provision to turn over rye grass pitches every few years if needed. Aim to keep seeding rates between 40-50g/m^2 (3-3.75kg/pitch) when sowing out for the next summer and only fertilise when required to reduce the amount of plant growth, both above and below the surface (especially through winter).

1.7.2 – Layering
There are two forms of layering that can potentially lead to issues such as variable or low bounce, excessive cracking and surface deterioration. One form is a buried layer resulting from a poor renovation where the new top-dressed clay has buried the surface thatch. This situation should be avoided at all costs as the pitch can become dangerous due to the ball 'going through the top'.

The second form of layering is also known as a cleavage plane. This is where a horizontal crack or fissure is formed within the profile of the block. Cleavage planes can occur at various depths. They usually result from rolling when the top part of the block is significantly more moist than the lower part of the block (causing the pliable top to shear off the drier base), through using some forms of physical treatment to relieve compaction within the block (creating a 'cultivation pan'), or through a past buried organic layer. While the results associated with this type of layering are similar to a buried layer, the impact will depend on the depth of the break.

A thorough renovation is required every year in order to avoid layering. It may be possible to rectify a cleavage layer during the season, provided roots are not growing horizontally along the break. With good moisture management and rolling techniques, layering can be prevented from re-occurring, as discussed in more detail during the rolling techniques section.

1.7.3 – Surface levels
When discussing the importance of the levelness of the block it must be noted that it is vital for the block to have some slope, preferably cross fall, to allow rain water runoff, particularly when covering. Levelness on a micro-scale is however critical for consistency.

The pitch should have no sharp (noticeable) changes in elevation leading to humps or hollows. An uneven surface will lead to variable bounce, excessive cracking (in high spots), thin or patchy grass cover and difficult or uneven drying (low spots). It is vital to ensure levels are correct following renovation.

High spots or ridges are likely to dry out faster. They may not show up until preparation starts, or even until towards the end of preparation when the grass starts to stress out. If cross rolling of the block or pitch does not remove the high spot, then a light renovation may be the only option.

In contrast, low spots will dry out slower, creating patches which stay greener for longer during preparation. These spots will be softer on match day relative to the rest of the strip. Rolling will not remove low spots, so it may take patching or a light renovation to level off the strip. Alternatively, check for any areas following renovation that are ponding and top up with soil before seed germinates.

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Base density compaction target depth to: 75mm

Autumn sowing seed rates: 40–50gm/m²

Reduce wet spots from sweating covers: Hessian sheets

1.7.4 – Base density
It is generally accepted that pitches need to be well compacted to at least 75mm depth in order to achieve adequate bounce. If a pitch lacks base compaction it can lead to low and variable bounce, slow pace, excessive surface drying and can become difficult to dry out at depth. Once base compaction has been achieved it is normal to retain base compaction from season to season with the clay types we use in NZ.

Base compaction can be achieved at any time of year under the right conditions. Having the base at the right moisture content is vital to achieve optimum compaction when undertaking rolling; having a dry base will achieve little or no compaction.

1.7.5 – Grass cover
Achieving and maintaining a good grass cover throughout the season is one of the most important aspects of pitch preparation. It is a lot easier to remove grass during preparation than it is to put it back in. A poor grass cover can result in: a low or slow pitch, variable bounce, a patchy turf cover or a pitch that doesn't dry well below the surface and remains soft.

Aim to establish an even grass cover following the renovation using seed rates of between 40-50gm/m^2. Once the grass has established keep fertility levels consistent with healthy plant growth and ensure the turf remains free from disease. A rule of thumb is to fertilise your block every 14-21 days to ensure the grass cover is in the best possible condition leading in to preparation. The frequency of fertiliser application should be based on regular visual assessment of the condition of the grass cover.

1.7.6 – Moisture management
A pitch which is slow to dry or is uneven in drying can be difficult to manage and in many instances will provide a poor surface to play on with variable and/or low bounce, slow pace and the potential for excessive seam movement and spin early in the match.

There are three key aspects when discussing excessive moisture. A damp surface is the most common issue faced, particularly in week to week management where covers management is compromised. Care needs to be taken with irrigation, and weather during the preparation should be closely monitored. It is also important to have the right type of clay for the level of cricket being played; for example, a high shrink/swell clay with high clay content (>50%) will take longer to dry than a limited shrink/swell clay.

Covers offer a second potential excessive moisture issue, especially where sweating or leaks can create uneven moisture levels at the surface. Using two to three hessian strips or horse blankets underneath the cover will reduce the risk of wet spots on the pitch created from sweating. Check covers regularly for any leaks and if a leak is found repair or replace covers immediately.

The last aspect of excessive moisture is when the surface is dry and feels hard but the underlying clay remains very moist and the ball still indents. This usually occurs with a poor grass cover (having a good turf cover will help draw up moisture from depth) or if the block has been constructed with poor drainage and/or with a depth of clay that is too deep for the grass type. This aspect is very difficult to rectify mid-season and in severe cases a block reconstruction may be required.

1.8 — Clay properties for NZ soils
Two clays are predominantly currently used across NZ for First-Class and International cricket.

Patumahoe clay is a strong non-swelling clay, chocolate brown in colour. A feature of Patumahoe clay is that pitches can be prepared in a short time period (ability to dry faster after re-wetting and be prepared quickly) which is particularly useful for week to week matches. This clay type is used extensively throughout the North Island across all levels of play.

Kakanui clay is a high clay content soil and is a closer relative to the sticky black clays seen in Australia and the Bulli clays used in South Africa. It has a high shrink/swell capability and is used at many South Island First-Class venues.

There are other clays used at First-Class and International level around NZ, including:

- Gisborne - Matokitoki clay;
- Napier – Tongoio clay;
- Palmerston North – Marton clay;
- Nelson Marlborough - Ward clay.

The Ward and Marton clays have been used at First-Class level in the past but are currently used only on club and high school grounds. The main benefit of these soils is their ability to dry faster after re-wetting and be prepared over a short time frame (two to three days) for week to week matches.

How a clay type performs depends not only on the clay percentage, but also on the specific clay mineralogy. The term 'shrink/swell capability' refers to how much the clay swells on wetting and shrinks when drying. Some clay types, such as smectite clays, are more likely to swell and shrink than other clay types. Limited swelling clays shrink and swell in very small amounts when going through the wet/dry cycles. These clays are more prone to layering and may require turning over every few years to break up the compacted mass.

In contrast, a soil with a high shrink/swell capability (includes Waikari and Tongoio clays) will swell significantly when wetted up and "self-mulch" (crumble) if allowed to go through a wet/dry cycle. This self-mulching tendency enables the clay to regenerate structure and root zone aeration without the need for deep physical treatment. As a result, the high swelling clays tend to absorb more moisture and hold more nutrients. They require different preparation methods. This is an important consideration if changing soil types or moving to a different venue. A high swelling /shrinking clay will:

- Depending on the time of year take longer to dry the pitch out;
- Require a heavier roller to get the base compaction required (four to six tonne or heavier);
- Increase the amount of rolling time going into a pitch preparation (relative to profile depths);
- Require less water throughout preparation;
- Require less fertiliser.

Moisture management during preparation is one of the main differences between the two types of clay. The limited swelling clays can absorb substantial amounts of water during preparation and still be fine for rolling the following day, whereas the high swelling clays will expand with the water meaning a longer wait before rolling can commence, plus a loss in surface density.

The window available to get on and roll the pitch is significantly reduced with a high swelling clay, particularly with the first roll of the preparation. A lighter roller will be required as these clays can 'bow wave' (water and soil pushing in front of the roller) quite easily if the heavy roller is used straight away, whereas a limited clay can withstand a four tonne roller from the start in most situations. Furthermore, leaving a swelling-type clay too long between rolls can result in excessive shrinkage with cracks forming early on in the preparation.

Organic matter management is also likely to be different between the two clay types, as roots tend to sit more in the surface of the limited swelling clays.

1.9 — The turf cover and its role
To some it may seem strange that every effort is made to grow grass on a cricket pitch only for the turf cover to be decimated during the final preparation. The grass plant does however fulfill a number of important functions including:

- A healthy turf and root system results in even drying of the pitch to depth. Without turf cover water removal will be by surface evaporation, which can create steep moisture gradients (dry surface, wet subsoil) and inconsistent surface cracking;
- Roots, rhizomes and rolled-in surface turf cover assist in holding a pitch together;
- The turf cover affects the performance of the pitch. Grass cover creates pace and aids consistency. A good grass cover can also protect the ball from wear, which will in turn keeps pace for longer in the innings.

We are starting to see an increase in 'couch' (Cynodon Dactylon) pronounced cooch on NZ pitches at club and school level in the upper North Island. Our climate tends to favour rye grass, which is a cool season (C3) grass, and rye grass has been the dominant species used around the country for decades. But with increasing disease pressure, particularly in the north of the country couch, which is a warm season (C4) grass, is becoming an option on cricket blocks. Couch is not only more disease tolerant, but once fully mature can withstand significantly more wear and tear than rye grass. Its main limitation is its poor growth rate early in the season. To this end various options to improve early season growth of couch are being investigated.

NZ clay types:

Patumahoe
Kakanui
Matokitoki
Tongoio
Marton
Ward

Section — 2.0
The basic fundamentals

The basic fundamentals

01

Achieving good base compaction

02

Removing organic matter during the renovation process

03

Creating a level playing surface

04

Developing a full and even grass cover and maintaining it throughout the season

When it comes to preparing high quality, fair and safe cricket pitches there are four key tasks that must be carried out. It is important to start the season with the fundamentals in place, otherwise it is often a case of playing catch up.

Other than the base compaction rolling all the other fundamentals are based around the renovation. It cannot be stressed enough how important the renovation is to the actual performance of the pitch the following season. The season does not finish when the players do. Once the season is completed we need to ensure renovation is carried out properly and the block is well maintained through the winter months. (Important that you seek advice as to what renovation process is the right solution for your individual circumstances.)

2.1 — Base compaction/pre-season rolling
Rolling to achieve base compaction targets prior to the start of the season will:

- Reduce the amount of rolling during preparation;
- Maintain moisture at depth for a longer period of time;
- Provide for better and more consistent bounce.

If compaction is poor you could expect:

- Inconsistent ball bounce;
- Lower ball bounce;
- Cracks developing when the pitch dries out that become unstable;
- Preparation/rolling will take longer to achieve optimum base compaction.

Aim to have the lower part of the soil profile (below 50mm) compacted prior to the season commencing. Regardless of which type of clay is used having a well-compacted base will reduce the amount of rolling needed during the season. Reduced rolling during the preparation phase will decrease the stress on the grass plant, enabling the pitch to be used for more matches.

A well-consolidated block will retain most of its compaction between seasons unless the base is allowed to dry out. Good moisture management, particularly through the autumn months when the block has the potential to dry out, will ensure optimum base compaction is maintained for the following season.

Base compaction rolling is best carried out with a good grass cover, but can be achieved with little or no grass cover on the block. Covering through winter can keep the surface dry prior to the rolling process. Rolling could be carried out any time throughout winter or early spring period provided there is good moisture to depth and the surface is adequately firm. The key is to ensure the surface is dry enough for the block to be rolled – there should be minimal creasing of the clay. Also check the profile by taking out core samples to assess the compaction before and after rolling.

It is important to note that inadequate base compaction can often result in the surface becoming uneven once the block is rolled and compacted. If this is the case, then it is important to carry out the base compaction rolling prior to the renovation where levels can be rectified.

A cricket block can be slow to dry out at depth if:

- There is poor drainage underneath the block;
- The depth of clay is too deep;
- There is poor base compaction.

All of these issues result from poor construction and may only be fully resolved by re-building the block. Where reconstruction isn't practical then aim to get as much compaction as possible and ensure there is a good grass cover.

Pre-season rolling is different to base compaction rolling in that:

- It aims to firm up the top 50mm of the block;
- It removes any slight undulations and helps smooth off the surface.

Issues that can arise if no pre-season rolling is carried out include:

- Plant roots may sit only in the uncompacted topsoil layer creating excessive organic matter in the surface;
- Ridges or high spots may show up after mowing or verticutting;
- Grass may get rolled into the surface on high spots early in preparation.

Pre-season rolling aims to produce a smooth surface ready for the season. After renovating the block should have a level surface. Unfortunately there are many reasons, such as animals or people walking over the block, vandalism and even growth blankets/covers flapping in the wind, that can lead to the surface becoming uneven.

Cross or pre-season rolling is a good way to even out the surface of the block. At this stage the roller should be going as slowly as possible (approx. 10-20 metres per minute) depending on roller dimensions and it is always good to start either on a diagonal or across the block. It is beneficial to change the rolling direction each time, but avoid changing any more than 45 degrees each roll in order to remove any creases in the surface from the previous roll.

It is also important to let the block dry between each pass. One way to judge this is to look up your daily evapotranspiration rates. Ideally you will want 1-2mm of transpiration to occur between rolls. You may be able to roll twice per day or it may take three to four days for this to occur if the rolling is carried out mid-winter or early spring.

If your base compaction from the previous season is still intact, then the pre-season rolling process may only take three to four passes. Core sampling will determine the level of base compaction and the tactics needed to achieve compaction. Even in winter after a few days of rolling the block may need to be re-wetted. This may sound counter-productive, but if the surface dries out too much and cracks open it will be hard to achieve the surface levels required for cricket.

Aim to avoid excessive organic matter in the top 10-15mm.

2.2 — Organic matter
Organic matter or thatch is the dead root and plant material produced by established plants. Although all pitches will have some organic matter in them, the key is to have as little as possible going into the season by carrying out a good renovation. We should aim to avoid excessive organic matter in the top 10-15mm and definitely anywhere below 15mm.

Having too much organic matter will slow the pace of the pitch, cause uneven watering patterns and, in extreme cases, can produce a dangerous playing surface if the ball breaks through the top.

One way to check how much organic matter is building up in the block is to send soil samples in to your local consultant who can scientifically determine the organic matter percentage at different depths.

The best time to remove any organic matter that has built up on the block is during the renovation. Renovations can take many forms and the rigorousness of the renovation should be dictated by the amount of organic matter that is building up on the surface and the level of play that it will be used for. This will be discussed in more detail further on.

2.3 — Block levelness
Once all the organic matter has been removed the block needs to be leveled off so there are no undulations. Low areas on the block can lead to water ponding, which in turn can increase disease pressure and/or cause patches that are softer and greener than the rest of the pitch. In contrast high spots can result in areas that will burn off quicker and have weaker grass cover, plus have the potential for the ball to take off and bounce a lot more sharply.

The pitch surface should typically be level lengthways with a slight cross fall (between 0.3–0.75%) to allow water to run off.

In cases where there are known large low spots on the block, renovation should plan to roll the clay then top up low spots with more clay. Before applying additional clay aim to lightly scarify the rolled surface to help key in new clay. Next wet the block up, then roll once the clay is dry enough. Top up with more clay if required. Remember that clay compacts down to approximately 50% of its volume when fully compacted, so leveling off low spots without proper compaction can still leave low spots.

Location:

Pukekura Park, New Plymouth

6th

most beautiful ground in the world as ranked by Wisden Cricketer's Almanack (2007)

Block:

Patumahoe block

Home venue for:

Taranaki Cricket Central Districts Cricket

2.4 — Full and even grass cover

Once the block has been leveled off the aim should be to get a full and even grass cover.

If this is not achieved then it will be difficult to have an even and consistent pitch throughout the season. If the seeding rate is too light, then the grass will be clumpy which can create excessive ball movement (both vertically and sideways) off the pitch. In contrast a high seeding rate will produce weak grass plants that are disease prone and that will require regular thinning out by verti cutting over the season. A patchy turf cover can lead to inconsistent pace and bounce, no matter how many clippings are placed into the bare patches. During the season grass cover will be lost through wear and tear from other matches on the block, plus through natural attrition due to cricket played across the block.

Irrigation

Having a good water supply is essential in order to produce consistently good pitches. At a bare minimum, there should be a tap next to the block with good water pressure to allow hand watering and the use of a soaker hose. Pop-up irrigation is useful as this allows the block to be thoroughly soaked during the cooler early hours in the morning. Having the ability to water the block to depth will significantly improve the health and playability of the pitches. The grass will be able to withstand the heat and dry periods, the pitches will compact more at depth and bounce will be increased.

A sumi soaker hose, is a great tool to achieve an even watering along the length of a pitch.

Core sampler

Every person who prepares cricket pitches should have a core sampler.

The core sampler enables you to take samples from the pitch to monitor progress. It allows you to check the compaction levels in the base of the pitch. It can show how much moisture is below the surface and how deep the water has gone during the wetting up process. It also enables a check for organic matter build-up leading into the renovation period.

Fig. A Sumi soaker in use
Fig. B Core sampler and sample

Below: Full and even grass cover on the pitch at the start of preparation

A patchy turf cover can lead to inconsistent pace and bounce.

Section – 3
Rolling techniques

A groundsman heads out to roll the pitch

Rolling techniques

Rolling can be the most time consuming part of pitch preparation. While it is necessary to put in the hours to get a good hard pitch, it is important to know when and how to roll to get the best results to optimise the time available. (1)

Rolling theories differ across the world and need to account for:

- Roller weights and sizes;
- Clay types;
- Method of block construction (e.g. Depth of clay);
- Turf cover;
- Time of year pitch is being prepared;
- Climatic variations;
- Level of play.

A useful reference on the science of rolling was produced by the England and Wales Cricket Board (ECB) in 2009. (2)

While this reference focuses on English soils, there are many basic fundamentals that relate to how we roll in NZ, namely:

- Greatest vertical movement (compaction) is achieved when rolling at the right moisture content/pore saturation during the first two passes (down the pitch and back), with progressively less compaction occurring with additional passes;
- Compaction results from decreasing the air space within the soil profile. The pitch must be allowed to dry (decreasing the amount of water and increasing the air within the soil profile) to enable compaction to occur with the next roll;
- Horizontal movement (shearing) takes place in the top 35mm. The larger the circumference of the roller drum, the less horizontal pressure and potential movement;
- Horizontal pressure increases significantly in wet soil. However, grass roots help to reinforce the soil, limiting horizontal movement.

Putting the above research into context, to achieve optimal compaction roll down the pitch and back on the same roller width (two passes), then progressively move over the pitch giving each part of the pitch two passes.

Also, given that horizontal movement is what causes layering within the block, adopt strategies that limit horizontal forces primarily in the top 35mm of the pitch that occur when rolling too wet. Having a good root system will help prevent any horizontal movement as does having a larger drum size (provided the roller weight doesn't increase in proportion to the diameter increase).

3.1 — Points to be aware of when rolling

Ensure the roller drums have been wiped off and cleaned. Not only can you leave little hollows along the pitch if there is something on the drum, but sand or grass clippings from the outfield can be dropped on to the pitch.

Unless absolutely necessary (such as avoiding a cricket ball or safety reasons) do not stop the roller mid-pitch. Stopping can create slight impressions. If you need to talk to someone or stop for any length of time, take the roller to the end of the pitch behind the stumps.

Rolling in the heat of the day can quickly bruise off the grass cover. Avoid this unless you are at the end of the preparation cycle and want to brown the grass off for play.

Avoid over-rolling early in the process which can bruise off the grass. Rolling when too wet can bury the grass into the surface, or worse, cause layering.

1. Marchant De Lange to Nicol Eden Park
2. ECB Guidelines For Cricket Pitch Rolling
3. Cranfield Cricket Rolling Simulator

3.2 — Layering

Layering is a common issue, especially on clays with a limited shrink/swell capability (Patumahoe, local silt/loams etc). Layering can result from a number of causes, including:

- The surface of the pitch is wet but the base dry - not watering to depth;
- Rolling with a heavy roller while the pitch is too wet or there is little grass cover;
- Rolling too fast while the moisture content is too high or there is little grass cover.

All pitches move horizontally as well as vertically when a roller passes over them. (3)

If the top is wet and mouldable and the base is dry and compacted then the top effectively shears off from the lower part of the profile (called a shear plane; usually occurs at 30-50mm).

Layering has the ability to ruin a good block. One really bad preparation could damage a pitch to a point where the only way to fix the issue is to turn the block over. While it sounds dramatic layering is easily avoided or can be resolved if noticed early enough.

If a layer has been found it needs fixing as soon as possible. If left for too long roots can grow sideways in the layer. Once this occurs damage to the pitch can become irretrievable, as too much root material will prevent the layers from binding back together.

The key to repairing a layer is to get the base clay thoroughly moistened. It is often necessary to use a wetting agent penetrant to aid water movement across the cleavage plane. Once the profile below the layer is moist and the top has dried off sufficiently then commence rolling. Remember that the first roll is important as rolling too wet or using a roller that is too heavy will contribute, rather than repair, the layering.

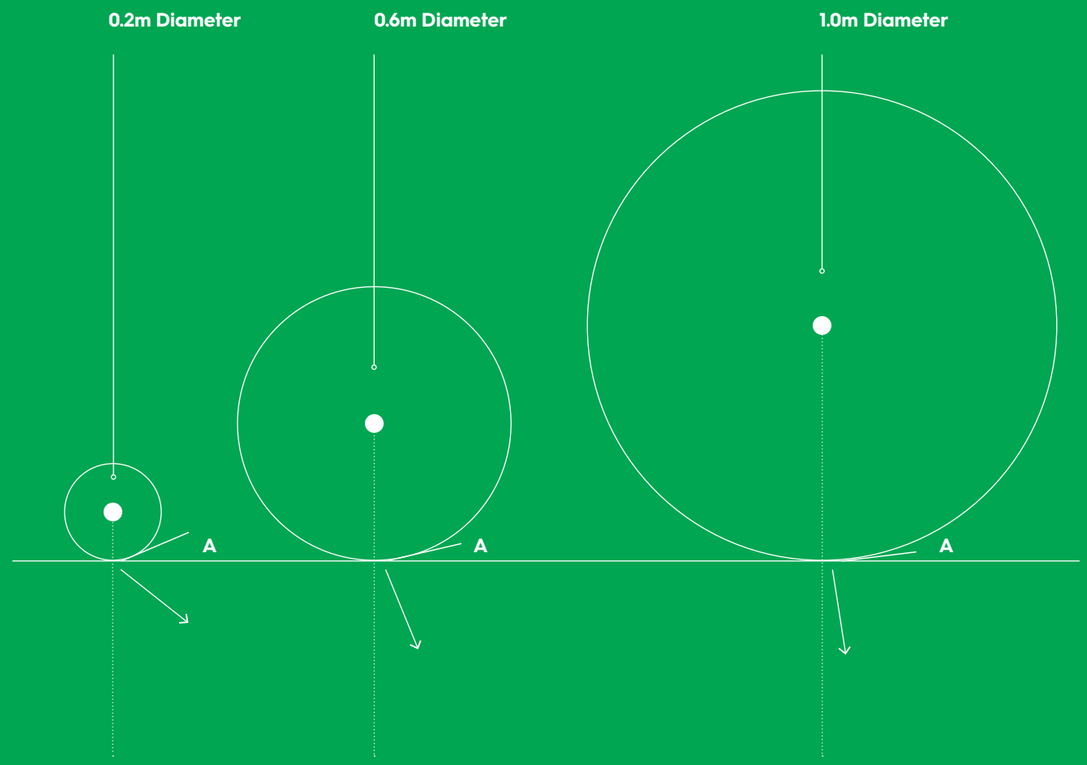
3.3 — Roller sizes
Many venues are limited by the size of the roller able to be used. If you only have a lighter roller, which is not allowing you to fully consolidate the block prior to the start of the season, then consider hiring in a heavy roller for the pre-season or base compaction rolling phase. Winter is the quiet time of year for road construction, so some hire centres offer cheap rates over this period. Alternatively, there may be another venue close by that is happy to let you borrow their roller for a while. A small investment before the season starts can save you many hours of rolling during the summer.

Below is a table to show the ideal roller weights for the type of clay that you are using.

Clay Type	Shrink/Swell Capability	Ideal Roller Weight	Region
Patumahoe	Limited	1-4 tonne	Auckland/North Island
Waikari	High	4-6+ tonne	Canterbury
Kakanui	High	4-6+ tonne	Otago
Ngatea	Limited	1-4 tonne	Waikato
Matokitoki	Limited	1-4 tonne	Poverty Bay/Eastern BOP
Marton	Limited	1-4 tonne	Manawatu
Ward	Limited	1-4 tonne	Marlborough

Use the right sized roller for your clay, or more to the point use the right "roller footprint". This term refers to the pressure applied to the soil surface. A single drum walk-behind roller full of water, sand or concrete can have a similar footprint to an empty eight tonne double roller with large drums. **(1)**

The size of the drum is an important factor, particularly when about to give the pitch its first roll. The larger the drum the less horizontal force is created.



The effect of diameter on direction of rolling forces
As roller diameter increases from 0.2 to 0.6 to 1.0m, the direction of force becomes increasingly more vertical. This is because the contact between the roller and the pitch **(A)** decreases with roller diameter.

Cranfield University - effect of the diameter of the roller on direction of forces

1. Pre-season rolling including roller footprint formula

3.4 — The impact of moisture on rolling
During the initial preparation, it is vital to get water to depth prior to beginning the rolling process. As the block compacts it becomes more difficult to get water into the soil as there are fewer drainable pore spaces between the soil particles.

Moisture is one of the key elements when compacting a clay. Soil pores, the spaces between the soil particles, are either filled with water or air. As a soil is compacted with the roller the quantity of water in the soil does not change. The mineral particles (soil) themselves cannot be compacted, nor the water because it is incompressible. The only way to compact a soil is by reducing the air content (Refer to Shipton and James, 2009).

If the soil is too dry then it will be hard and strong and will resist compaction. Furthermore, rolling too dry early on in the preparation is likely to stress out the grass cover causing damage.

If the soil is too wet when rolling it can't be compacted as there is no air to compact (all pore space is water-filled). If water is pushed in front of the drum of a roller stop rolling until the surface has dried out.

Using a core sampler regularly is important to monitor the moisture levels before rolling. A number of turf managers have historical data on optimal moisture levels to target during preparation. (1)

3.5 — Rolling speed
During the initial preparation phase the slower the rolling speed the better. At this stage of the preparation we are trying to increase the base compaction. Slow rolling will not only achieve better base compaction, but is less likely to stress the turf than rolling faster and for longer. Keeping the grass cover healthy is the key to getting longevity out of a pitch, especially in week to week venues. One pass at a slow speed, approx. Two to five minutes to travel the length of the pitch, is ideal; some machines may not be able to go that slow in which case go as slow as possible.

Once the desired base compaction has been achieved the new focus for rolling should be on grass conditioning and creating a hard, flat surface. Grass conditioning prior to rolling is discussed in more detail in following sections, but rolling can help bruise the grass off and getting the desired colour out of the plant. (2)

If you have access to a lighter roller then use this. Increase the speed of the roller significantly, as the more passes over the grass the more it will bruise the leaf.

Many of the newer varieties of rye grass are becoming more difficult to brown off. If you are concerned about the colour, then brushing the leaf up with a stiff broom between rolls can help take some of the colour out.

A light misting of water can be beneficial during the speed rolling. This is why many Turf Managers like to roll when there is a dew on the ground. Surface moisture can help firm up the top, stick the grass to the surface and leave a "shine" on the pitch once it is baked in the sun.

Be aware of having too much grass, as this can reduce the rolling effect on the surface and make it harder to compact and brown off. Too much grass (or underlying thatch) can reduce the rolling impact. Much of the energy created by the roller will be dispersed making it difficult to get a hard surface. Also, if the clay surface is not exposed to sun and air direct it may not be fully dry and baked. The aim is to have an even, thin covering of grass that sits on the surface. Ways to achieve this will be discussed in the preparation techniques section.

3.6 — Amount of rolling required
There are many factors to take into account when determining how long it will take to get a pitch ready, including:

- Depth of clay – a block with a clay depth over 125mm will be difficult to compact beyond this point;
- Speed of drying - the individual micro-climate of the ground and the time of year the pitch is being prepared directly determine the speed of drying and in turn the interval between each roll. This will vary depending on the time of year and can be calculated by referring to measured evaporation transpiration rates;
- The grass cover on the pitch. A good grass cover will help draw moisture out from depth, speeding up the compaction phase of rolling. Too much grass will reduce the surface from "baking" hard;
- Keep taking core samples each day to check how quickly the pitch is compacting;
- If the pitch is to be re-used the following week(s) for club or school matches, then preparation during subsequent weeks may only take a couple of hours to re-firm the surface following a good soak up at the start of the week.

The NZC turf management team, in discussions with roading engineers, concluded that optimum compaction will be achieved by rolling at the correct moisture content – for cricket a rule of thumb is to roll for 8-12 passes at 15-20 minutes per pass over two to three days – a total of two to four hours rolling to achieve base compaction on the blocks at their High Performance Centre at Lincoln University.

1. Cricket Pitch Monitoring Process
2. Bert Sutcliffe Oval Roller

Pro tip — 02

Soil pores are either filled with water or air, and as neither soil particles or water can be compacted, the only way to compact a soil is by reducing the air content.

For more pro tips see section 7.0 — **Case studies**

Location:

Queenstown Events Centre, Queenstown

Block:

Kakanui block built over browns clay base

Outfield:

Ryegrass outfield on a sand slit/carpet drainage system

Home venue for:

Central Otago Cricket Otago Cricket

Section — 4.0
Preparation techniques

Preparation techniques

Getting water to depth in the profile and ensuring there is an even coverage along the pitch is one of the most critical elements of pitch preparation. It often takes longer to get water down through the clay as the block dries out over the summer and as the block becomes more compacted.

Although there are many different preparation techniques, it is important to realise that changing one part of your preparation could mean modifying something else. For example, if you have always cut your pitches at 4mm but now want to leave more grass on them, then verticutting or grooming will need to be carried out otherwise the pitch is likely to be slow in pace and/or the surface of the pitch could dry out a lot slower.

Most cricketers agree that having good pace and bounce is most important for a good match. Seam movement and spin are part of the game for which players need to adjust their style, as is having some natural variation in pace and bounce. But having too much variance in pace or bounce, or having a pitch with very low bounce and slow pace, is detrimental to pitch performance and can impact the quality of the game.

4.1 — Irrigating

Having a good quality water supply and watering system is essential towards achieving pitch performance. Pop-up irrigation is rarely consistent enough to use on its own. Having a quick coupler valve or tap with good pressure next to the block gives you the ability to hand water or use soaker hoses to get even coverage to depth in the pitch profile.

Getting water to depth in the profile and ensuring there is an even coverage along the pitch is one of the most critical elements of pitch preparation. It often takes longer to get water down through the clay as the block dries out over the summer and as the block becomes more compacted. If the block has dried out significantly it may take two to three days of pulse irrigation to get the water back down to a depth of 75mm or more. Pulse irrigation refers to where some water is applied, then allowed to soak in before more water is applied and allowed to soak in. Pulse application is preferable to letting water pond on the block for an extended period of time. Water ponding on the block can lead to problems such as turf grass disease outbreak. The use of penetrants could be beneficial, especially in clays that have a low shrink/swell capability. Penetrants speed up the process of getting water into the clay plus helps water penetrate more evenly through the profile. Penetrants should be applied early in the morning or on cloudy days. Apply at the top end of label rates. Note that when using penetrants, it will take longer for a pitch to dry out during the preparation phase.

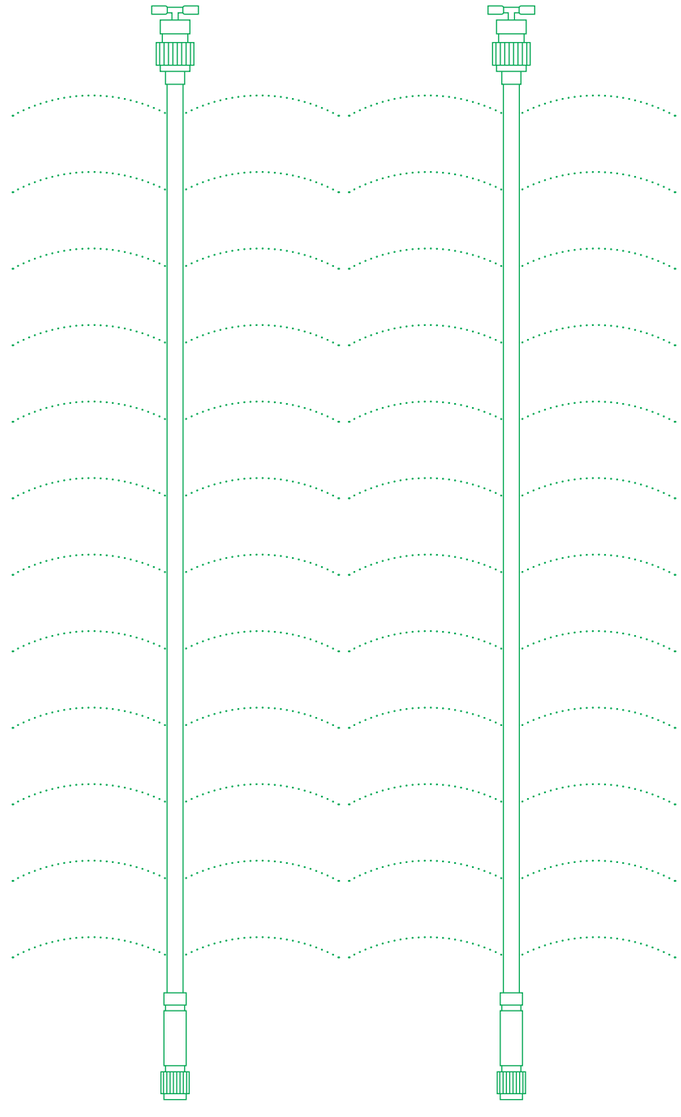
Take clay samples regularly to check how far the water is getting into the profile. Do not rely on how the pitch looks and feels on the top.

If watering to depth is not carried out then the likely issues include:

- Layering;
- Poor or inconsistent bounce (a ‘dead’ pitch);
- Poor plant health and limited recovery.

The ideal time to irrigate is during the cool of the night, generally between 3am to 5am. Early morning is generally the least windy time of the day and watering then will help reduce disease pressure, especially in the northern parts of the country when overnight temperatures start to reach 15°C. This is the tipping point for cool season grasses (rye grass) to be susceptible to disease pressures. The aim should be to have no noticeable water ponding on the block by the time you start work and for the surface to be in a state where you will have the option to roll the pitch.

Sumi soakers apply even distribution of irrigation to pitch.



4.2 – Fertilising

When it comes to cricket blocks there are four main elements to focus on: nitrogen (N) for growth and colour; phosphorous (P) for root production; potassium (K) for plant strength and heat/drought tolerance, and Iron (Fe) for colour and plant strength or disease resistance.

At renovation time turf managers generally use a base fertiliser with a higher P content to help root development and speed up establishment (a number of quality seed starter fertiliser options are available from suppliers).

Once seed has germinated and regular mowing commences apply a 1:1 N:K ratio to help improve turf grass sward density. This is a crucial time to apply regular, but light applications of fertiliser. Be careful as applying too much nitrogen at this stage can increase disease pressure if your grass is sown late in spring or early in autumn when temperatures are still high. A number of First-Class venues will apply light applications of fertiliser at 10-21 day intervals. The application should be determined by the leaf texture of the turf grass, with the aim being to produce a robust grass cover which will set up your block and give you options when it comes to preparation of the surfaces during the season.

During the season keep to a 1:1 N:K ratio. Most products will have some P in them which is fine, but the roots should have developed sufficiently by now and will need minimal P during the season.

Iron can be used to help strengthen the plant to help reduce wear and tear on unused pitches, plus offers the added bonus of reducing disease pressure.

It is important to use quick release fertilisers rather than slow release fertilisers, particularly in the upper North Island where algae slime on the blocks can become an issue. Slow release fertilisers can mean that nitrogen sits on the surface while it is breaking down, feeding the slime. Avoid the use of some organic fertilisers for similar reasons.

Choose the type of fertiliser according to where you are in the preparation phase. For example, using a fertiliser with a higher potassium level will help strengthen the plant, protecting it from drought/heat stress and from wear and tear. However, it could also make it harder to brown off the grass cover during the preparation phase. Using a nitrogen-based fertiliser in the last four weeks of preparation can assist the pitch to brown off during preparation.

4.3 – Spraying

Disease outbreak is now no longer confined to the northern regions of the country. We are noticing that disease pressure is moving further south. It is important to keep a look out for disease on a daily basis and have access to spraying equipment and chemical as and when needed.

NZC have put out a document specific to cricket pitches with a full list of chemical options to help prevent or target certain diseases. **(1)**

Natural techniques to reduce disease pressure include:

- Watering in the cooler hours (usually between three and five am) or first thing in the morning if you need to hand water/soaker hose. Having the plant sitting in saturated soil during the heat of the day creates the humidity that will encourage spores;
- Use up-front fertilisers and use them sparingly. Most diseases feed off nitrogen;
- Seeding rates are important. In most instances use no greater than 50gm seed per sqm. A higher seeding rate may assist in achieving a very dense turf cover, but it can encourage damping off disease post-germination.

1. Turfgrass Disease Management

The four main elements

N **Nitrogen**	P **Phosphorous**
K **Potassium**	Fe **Iron**

Location:

Molyneux Park, Alexandra

Block:

Kakanui block

Grass species:

Kentucky bluegrass (Poa pratensis) Festuca rubra Lolium perenne on a natural soil base

Home venue for:

Central Otago Cricket Otago Cricket

4.4 — Mowing heights

When mowing stick to the ⅓ rule (cut no more than ⅓ of the length of leaf off the plant at any one time). There are many arguments as to whether you should use a rotary or a reel mower for the first cut. Either way will work fine as long as the blades are sharp to prevent tearing of the leaf, and that the soil is dry and grass is well enough established that soil does not stick to the wheels or the roller of the mower - there should be no moisture or dew on the leaf.

Remember that the top dressed soil will still be light and crumbly, so any moisture will have it sticking to the wheels or rollers leaving channels and/or damaging the young plant.

Typically, the mowing height of a rye grass block is between 12-15mm during the playing season. This allows the grass to be long enough to survive the heat stresses and dry periods during the matches without being too long to affect plant density.

Grass height of a pitch for play can vary significantly. Some Turf Managers leave the grass length long on game day, whereas others mow down to 3-5mm. The reason for this is the turf density and how much the plant has been thinned out. Reducing the turf grass density of the plant allows the longer leaf to be rolled onto the clay.

There are two methods that are used to reduce the grass density:

- Verticutting units which slice vertically through the plant to thin the actual plant out;
- Grooming units on the front of mowing units which help stand the grass plant up immediately before mowing of the grass.

Verticutting the pitch

A verticutter will slice through the plant itself and thin the plant from the base. A good verticutting unit will have blades no further than 10mm apart and be able to get low enough to just touch the surface of the pitch.

There is no need to go into the surface, as we are only trying to thin out the base of the grass plant. This can be carried out throughout the season, but particularly anywhere from four weeks out up until immediately prior to the wetting up process leading into the first preparation. Timing of verticutting depends on the fertility levels of the block. If running a low fertility program then verticut three to four weeks before the first preparation on the pitch and fertilise straight after to allow the grass to recover from the verticutting and fresh green fine leaf to come back.

Depending on fertility levels and how aggressive the verticutting process – it will take about five to seven days for the pitch to recover. At this stage the leaf of the plant will be fine and turfgrass density should be ideal for pitch preparation.

Grooming the pitch

Grooming unit kits are generally available on the higher end type of pitch mowers. They help stand up all the lateral growth for removal by the mower. The blades should be set as closely to the surface of the pitch as possible and will generally take many passes (up to 10-12) to fully thin out the grass cover. Groomers are not designed to cut through the base of the plant like verticutters, but will get into the base of the plant eventually and reduce some of the density. This works very well if you have a dense and uniform grass cover but can also expose the bare patches on the pitch. Grooming would generally be carried out three to four weeks before the first use on the pitch. The pitch should be fertilised immediately after to get fresh leaf growth back before rolling commences. Grooming can also be carried out in the days leading up to the match or in between matches, if you feel the grass is still too dense.

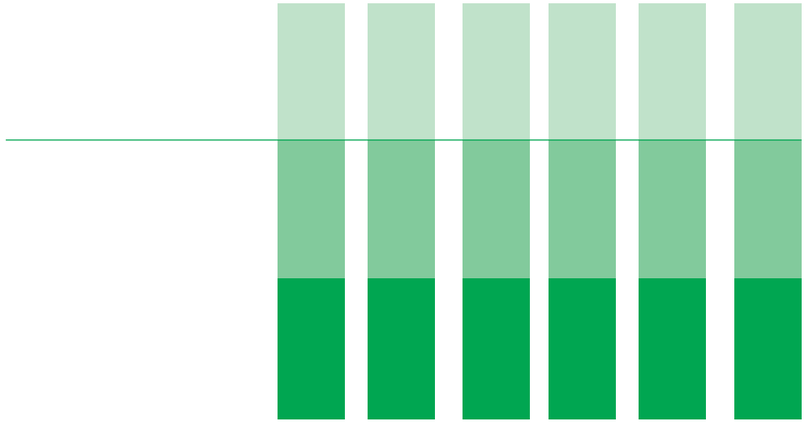
Either of the two above-mentioned methods are preferred to leaving the grass cover dense and then scalping the grass to make it look 'brown'. Scalping will result in the crown of the plant becoming exposed and once the ball starts hitting the plant, the plant will get damaged or die. If there is no access to a verticutting unit or groomers then try reducing the plant height early on in the preparation process (three to four weeks prior to the game). This allows the plant time to adjust and reduce the crown and allows fresh green leaf to re-grow and protect the crown. In this situation brushing the grass up before mowing is along a similar principle to grooming, so will be beneficial in helping reduce plant density.

The method used to thin the turf cover will have a bearing on the final height of cut for a match. If the pitch has been heavily verticut then grass height can be left a lot longer (block height or longer); if groomed work towards a height of cut of 4-6mm, depending on density.

It is important to remember that rye grass can be very resilient. Colour is not important; we have seen in recent seasons Test match pitches in NZ that look a similar colour to the outfield, yet they don't seam about. This is because the plant has been thinned out and the pitch surface is hard. If there is only young green leaf on the surface of the pitch then the ball will not excessively seam off the plant (or indent the surface). The ball will only seam if the grass is too dense or coarse or if the soil is still damp and soft.

Mowing height:

Cut no more than ⅓ of the length of leaf off the plant at any one time



Rye grass block height — playing season

12-15mm

Verticutting:

5-7d

The number of days it will take for the pitch to recover

Grooming:

3-4w

The recommended number of weeks between grooming and first pitch use

Section — 5.0
Pitch preparation

5.1 – Pitch preparation model 1
The following preparation models are based on the assumption that there is a good quality grass cover on the block, that the profile is well compacted and there is minimal organic matter in the surface.

The first of these models is designed for weekend to weekend style of matches, where the club/school does not have access to a verticutter but has access to a reel mower (without groomers) and a roller. Each ground will be site specific so the following is only a guide to pitch preparation.

4 weeks to 2 weeks out

If you have a spare 30 minutes anywhere during this period and there is reasonable moisture in the pitch, then it won't hurt to give the pitch a roll. Any rolling you can do at this stage will reduce the pressure in the last two weeks leading into the first preparation and reduce the impact of poor weather.

12 days out

If irrigation application is uneven, then hand water the dry parts of the pitch or use a sumi soaker hose to get water to penetrate down to a depth of 100mm. This may take a couple of days of pulse irrigation if the block has dried significantly from play over the weekend. If moisture to depth is achieved in the morning and the pitch dries off enough before the end of the day, then carry out one slow pass with the roller for about 25-30 minutes.

11 days out

Mow the pitch at block height. Do not brush up the pitch at this point. Carry out one slow pass of the roller in the morning and then repeat again in the afternoon. Hand water at the end of the day if the weather is fine to replace any moisture loss. If watering in the evening ensure the surface will be dry enough to get on with the roller first thing in the morning.

10 days out

Mow the pitch down to 10mm. One slow pass with the roller in the morning, then again in the afternoon.

9 days out

Mow the pitch down to 8mm. One slow pass in the morning, repeat in the afternoon. Hand water again at the end of the day, enough to allow the roller on first thing the next morning.

8 days out

Mow the pitch down to 6mm. One slow pass in the morning, again in the afternoon. By this point hopefully you will have at least four to five hours rolling into the pitch. The crown of the grass plant should be lowered each day by lowering the mowing height, not by brushing. This will provide a little more protection for the grass cover from foot traffic. The pitch should be firm and dry enough that players can run over it without creating any damage.

5 days out

Water the pitch then allow it to dry out enough to roll; mow before rolling at 6mm. This will take off any debris from the weekend. Spread the clippings out of the catcher onto any bare patches on the pitch. Follow this with one slow pass of the roller.

4 days out

If the pitch was too wet to roll the previous afternoon, mow and add clippings prior to rolling this morning. If the pitch did get a roll the previous day, then mow it down to match height (4-5mm). Do not brush up, as the clippings may not be fully pushed into the surface. Slow pass in the morning and again in the afternoon. Lightly hand water before leaving for the day.

3 days out

Using a stiff bristled broom, sweep the pitch to stand up and grass then mow at match-day height. Use clippings if there are any bare patches remaining. Slow roll in the morning; repeat in the afternoon.

2 days out

Mow at match height. Roll in morning and again in afternoon. Monitor moisture. If it is hot and dry and the pitch is starting to crack, then hand water. If forecast is potentially wet then hold off on the watering. You can always add a little in the morning if the forecast changes to dry.

Pitch Watering Hagley Oval

Day prior to match

Mow pitch to match height. This is the time to make some judgement calls. If the pitch is starting to show signs of cracking then it may just be a quick pass of the roller to press the grass down, as a slow pass may pull up too much moisture. If there are no signs of cracking and it was watered the night before then a slow pass is required in the morning. Mark up (as per NZC pitch marking diagram) straight after rolling to allow the paint to dry before the afternoon roll. During the afternoon roll at a quicker pace (30 secs-1 min pass over the length of the pitch) to help bruise or brown the grass off. This may be repeated during the afternoon.

Match day

Remove covers (if used). Mow pitch and give a final roll.

5.2 — Pitch preparation model 2
Week to week preparation for a venue that has a reel mower with a groomer kit.

4 weeks out

Set groomers on the mower to zero so that they are just touching the clay surface. Do not go into the clay. Carry out as many passes as possible until there is no more grass being thrown into the catcher. This may take 10-15 passes. Move over half a catcher width at a time, especially on the first few passes, so that the mower doesn't choke up and to even the thinning out process. Fertilise with a nitrogen-based up front fertiliser and water in.

4 weeks out to 2 weeks out

Begin pre-rolling of the pitch. Any rolling that can be done through this period will significantly reduce the amount of rolling required in the final two weeks of preparation when the pressure is on.

12 days out

If the watering system is uneven look to hand-water the dry parts of the pitch or use a sumi soaker hose to get water down to 100mm. Once this is complete the hose can be moved to the pitch that is currently being played on if it has not received enough water. If the pitch dries out enough before the end of the day, carry out one slow pass with the roller for about 25-30 minutes.

11 days out

Mow the pitch at block height. Make one slow pass with the roller in the morning and then repeat again in the afternoon. If required hand water at end of day in to replace any moisture loss. Ensure the amount of water applied will allow the pitch to be rolled first thing in the morning.

10 days out

One slow pass with the roller in the morning, then again in the afternoon.

9 days out

One slow pass with the roller in the morning, repeat in the afternoon. Hand water again at the end of the day, enough to allow the roller on first thing next morning.

8 days out

Mow pitch at block height. One slow pass of the roller in the morning and again in the afternoon. At this point, hopefully you will already have at least four to five hours rolling into the pitch. The grass should be looking slightly under stress but still retain a reasonable green colour. The pitch should be firm and dry enough that players can run over it without creating any damage.

5 days out

Water up the pitch to depth. Once the pitch dries out enough to roll, mow at block height with groomers on. Spread clippings out of the catcher onto any bare patches on the pitch. Follow up straight away with one slow pass of the roller to press clippings into the bare patches.

4 days out

If the pitch was too wet to roll the previous afternoon, mow and add clippings prior to rolling in the morning. If the pitch did get a roll the previous day, then make a slow pass in the morning and again in the afternoon. Lightly hand water before leaving for the day.

3 days out

Slow roll in the morning and repeat in the afternoon.

2 days out

Roll in morning and again in afternoon. Monitor moisture. If it is hot and dry and the pitch is starting to crack, then hand water. If the forecast is on the wet side, then hold off on the watering. You can always add a little water in the morning if the forecast changes to dry. Grass should be pressed flat onto the surface at this stage so mowing should not be needed.

Day prior to match

Mow at block height only if required. This is the time to make some judgement calls. If the pitch is starting to show signs of cracking, then limit rolling to a quick pass to press the grass down; a slow pass may pull up too much moisture. If there are no signs of cracking and the pitch was watered the night before then a slow pass is required in the morning. Mark up straight after rolling to allow the paint to dry before the afternoon roll. During the afternoon roll at a quicker pace (30-60 secs pass over the length of the pitch) to help bruise or brown the grass off. If you have access to a lighter roller then this will be beneficial. Repeat this speed rolling during the afternoon. Between rolls brushing the grass will also speed up the colour of the grass changing to a brown appearance.

Match day

(if required to work). Remove covers (if used).
Mow the pitch and give a final roll.

Subsequent weeks
Set the watering system to come on Sunday night. Once dry on Monday mow or sweep the pitch to remove debris created from the match. Sweep out the footmarks and repair if needed. Moisten the footmark prior to placing any clay to help with binding of the topsoil. Place moist, finely-screened topsoil into the footmarks, cover with hessian cloth and firm up with a roll or use a rammer. Repeat if necessary to bring up to level. Irrigate the whole pitch/block.

A good method when using clay to patch a footmark is to drop screened soil onto a clean concrete floor and add some water. Mix the clay to achieve even moisture throughout, adding more water if needed. Once moist (but not sloppy) place mix into the footmarks and compact firmly. Once the footmark has been compacted and leveled off then general irrigation can continue. A water-based PVA glue mixed into the water at a 1:8 PVA: water solution can help strengthen the binding if needed.

Assuming good base compaction has been achieved from the first preparation, the pitch may only require a couple of hours rolling to firm back up for use. Moisture management is the key factor over the subsequent weeks. Irrigate according to the micro-climate at your ground and the weather forecast. Where hot, dry weather is forecast aim to irrigate on Wednesday night and commence rolling on Thursday afternoon. However if poorer weather is forecast aim for four days of drying.

Once irrigating has finished and the pitch is dry enough to mow and roll, apply grass clippings (if required) to bare patches including footmarks. Clippings will reduce the likelihood of clay sticking to the roller.

1. Water

2. Mow/sweep

3. Roll

Location:

Basin Reserve, Wellington

Block:

Patumahoe block

Outfield:

Ryegrass outfield on a sand slit/carpet drainage system

Home venue for:

Cricket Wellington

Section — 6.0
Renovating a cricket pitch

Renovating a cricket pitch

6.1 — What type of renovation is required?
There are two factors that can influence the type of renovation required at the end of the season. The best way to know is by looking at core samples. Sampling will allow you to see how deep the organic material is, whether there are any layers or breaks in the sample that need addressing, or if there are many large cracks in which the roots are forming and preventing the clay from fully binding.

The second factor that may influence renovation type is feedback from players and officials on pitch performance. Such feedback can be very subjective and political, so should never be the sole factor in renovation decision-making.

If you are unsure what the best step to take is contact a suitably qualified agronomist or experienced turf manager in your region to come and take a look and offer advice.

Sampling — Feedback

6.2 — Re-laying the block
Otherwise known as turning the block over. Some venues with limited swelling clays, such as Patumahoe, will turn the block over every year or few years to prevent layering (core sampling will help guide when the block will need turning over).

If sampling shows there is some layering but roots are growing through the layer(s) and not horizontally, then in most cases turning the block over can be avoided. The subsoil below any potential layer should be getting the same or more moisture than the soil above in order to enable potential layers to bind back together. How to avoid layering and what to do when you have layers is discussed in more detail in the section on rolling.

On the other hand, if there are numerous roots growing horizontally and not penetrating into the subsoil it will be difficult for the layers to bind back up and the block will need turning over.

There are many ways in which to turn the block over. The starting point is to remove the organic matter off the top as per a normal renovation. This avoids burying any organic matter. Once the top has been removed then breaking up of the next layer can start.

Once the clay to below the layer has been broken up leave it to sit open for a couple of weeks to allow any old root material to break down and water to soak in (if timetabling and weather allow).

When it comes time to re-compact the profile be aware that the loose clay must be at the right moisture content. Do not rush this phase and allow for the moisture to be on the drier side once compaction begins. When the clay is loose it is best to 'dry' roll to close up major pore spaces between the soil particles. If the clay is too wet when rolling starts then it will be like rolling soup. Roll dry, get it as hard as possible, then wet up, ensuring that the harder base has just as much moisture in it as the top layer that you are trying to compact.

Further compaction will be required after re-wetting. Depending on weather conditions and clay type, this may only take two to three rolls over as many days before the soil needs re-wetting. Take samples daily and keep wetting up and rolling until target densities are achieved.

Once the target zone is compacted, scarify the surface in at least three directions to aid binding of newly-applied clay. Apply the final dressing of clay to bring up to finished levels and roll. Repeat the topdressing and rolling if necessary to get a smooth and level surface. Sow seed and finish off as outlined below with the major renovation.

Roots growing sideways and excessive thatch in the surface.

Location:

Cobham Oval, Whangarei

Block:

Patumahoe block

Outfield:

C4 warm season grass – drought and heat tolerant

Home venue for:

City Cricket Club
Northland Cricket
Northern Districts Cricket

6.3 — Autumn or major renovation
A major renovation should be carried out annually. The main purpose of this type of renovation is to remove as much organic material off the surface as possible (in this case the old dead roots sitting in the surface 10-15mm of the profile). This should be carried out in autumn on blocks that do not have winter sport on them, or in spring as soon as the winter sport ceases.

There has been much discussion in recent years about whether to spray all the grass off the block with glyphosate and start afresh with a complete new grass cover the following season, or to retain some of the established grass. Complete herbicide removal of the grass would be beneficial where:

- Topdressing with more than a 10mm layer of clay;
- Leveling off any undulations within the block;
- Removing weeds present on the block that cannot be controlled with selective herbicides once established;
- Reducing the amount of organic material build up before renovating;
- The goal is to have grass cover that is the same age and roots that theoretically are at the same depth, therefore the drying of the pitch will be consistent during preparation.

While spraying off the turf cover can be a good practice, there are a couple of factors to be taken into consideration. First, a full grass cover needs to be achieved quickly – often within a month or so – before the onset of winter. If a turf cover has not been achieved and a light renovation needs to be carried out in spring, then you can end up with grass of a different age. Second, moisture in the block needs to be maintained. If the block dries out roots may go down the cracks and end up a lot deeper than in the rest of the block, creating lines during preparation that are more difficult to brown off.

For lower grade club or school cricket blocks the focus should be on having an even and strong grass cover that will easily withstand the stresses placed on it during the season. By not spraying the block out and keeping some of the old, established grass, this allows the block to recover quicker following the renovation.

If you choose not to spray out the block with glyphosate, then spraying for broadleaf and competing grass weeds prior to renovation may still need to be carried out.

Allow at least three days for any chemical to translocate through the plant before starting any removal of the turf cover. There are various methods used to remove the organic matter from the surface of the block, namely:

- Scarifying in many directions (up to 15-20 passes);
- Turf cutting the top off the block;
- Using a top maker, road mill or similar device to remove the top off the block.

The key for turf cover removal is the depth that the machine goes. As a minimum the blades should go through the organic layer to the clean clay below, as we don't want to bury any organic material. For a higher level of cricket (e.g. Premier club, First XI or higher), it is best to remove the surface completely each season. Lower level cricket may only require an annual six to eight passes with a heavy duty scarifier, with the top taken off every few years.

Most scarifiers take out around 10% of the surface per pass, so if the blades are 10mm apart then the blades should be 1mm thick; where the blades are 25mm apart they should be 2-3mm thick.

Be aware that a pedestrian scarifier may not have the power to get deep enough to remove all of the organic matter. A tractor-mounted machine is not only quicker, but with the extra power can allow you to go deeper into to the profile.

It is important to note that if the likes of a turf cutter or top maker is used the surface will still need to be scarified two to three times to allow the fresh top dressed soil to bind into the existing surface.

Once the block has been scarified and the debris (or tailings) removed it can then be seeded. Certified rye grass seed is the only cool season grass option to use on most cricket blocks in NZ.

Choose the right variety of seed for your situation. If you are sowing late in autumn or early in spring some varieties will struggle to germinate in the cooler soil temperatures. Some varieties are more disease tolerant; some are more open; others are very dense and will require more thinning out during the season. Take the time to research the varieties and match the right seed for your situation. Contact NZC to discuss the options for your climate zone.

Consider what seed rates you wish to use. Many grounds are using very high seed rates to achieve a carpet-like appearance to the block. While this looks good, it may not give the best result, particularly with an autumn sowing. Rye grass has a fibrous root system, so the majority of the roots are near the surface. Autumn seeding rates higher than 50gm/sqm (approx. 3.5kg per pitch) can create a very dense grass cover with a lot of roots competing for moisture and nutrient. By the start of the season there is likely to be a very dense mat of roots creating high organic matter in the surface of the pitch, which is what we are trying to avoid. Using higher seed rates in spring is common to help speed of establishment, but this too can enhance organic matter build up towards the end of the season.

It is essential that the right clay is sourced to top dress the block with. The topdressing clay must be compatible with the clay that the block is constructed in. Using the wrong clay may result in poor binding with the base clay, with the top dressed layer peeling off to create a dangerous pitch. If the original clay source is no longer available then NZC or your local consultant should be able to provide contacts for alternative sources.

Applying the clay is the next phase. In the past we spread the clay by hand, but this can create issues where the finer clay particles build up in the throwing arcs and the larger particles spread further. This in turn can result in problems such as uneven seed germination and poor surface levels. As a result most venues have now moved to using drop spreaders, either pedestrian or tractor-mounted, in order to provide a more even distribution of particles and uniform cover across the whole block.

When estimating the amount of clay to put back onto the block consider the amount of organic material removed. If 10mm of material is to be removed it will require 0.75m^3 of compacted clay to maintain the original levels of the block. Remember that the volume of screened clay will be halved once compacted, so the amount of topdressing to use in this instance will be approx. 1.5m^3 of screened clay.

Note:
if you are filling in any low spots or are adding more than 10mm of clay then avoid seeding until you have achieved the final levels. Burying the seed too deep will prevent germination in these areas.

Once the clay has been applied screed the block with a leveling bar to ensure final levels have been achieved and any slight undulations have been removed.

Ideally use a contractor with a laser level to ensure the final levels are exactly where they need to be.

After the final leveling it is the time to apply a general seed starter fertiliser.

Once the fertiliser is applied spray Ethofumisate (Nortron) at 2L/ha as a pre-emergent spray to stop any Poa annua and broadleaf weeds from germinating and competing against the rye grass seed.

One last task is to cover the block with shade cloth or a growth blanket. Seed needs to be kept constantly moist during this period up until germination. Putting a cover over the block stops the seed from drying out too quickly and also has the added benefit of protecting the seed and soil eroding and washing out during heavy rainfall.

Remember to water little and often to keep seed moist until it has germinated, being careful to avoid water ponding on the surface. Never let the soil completely dry out during the establishment phase.

6.4 — Minor renovation
A minor renovation is generally carried out in spring to help increase or even out plant cover as a result of damage received through winter, or in case of a poor seed strike in the autumn renovation. There is generally little or no need to remove organic material from the block.

The minor renovation generally involves the block being mown down as low as possible (2-3mm), then given two to three passes with a scarifier at a depth of 5-10mm. Remove the debris from the block, sow rye grass at approx. 25g/m^2 and place a very light dressing of clay over the top, just enough to cover the seed and the scarifying lines.

Apply a light dressing of an NPK fertiliser, spray with Nortron at 2L/ha to prevent any weeds from germinating, place a growth blanket or shade cloth over and irrigate as for the major renovation. Be careful not to leave growth blankets down for too long at this time of year as they may create some slime. Remove as soon as germination is seen.

Section — 7.0
Case studies

Phil Stoyanoff

Turf Manager
McLean Park and Nelson Park, Napier

7.1 — The difference in preparing pitches for First-Class or international standard of cricket as opposed to club level cricket.

Phil has been one of NZ's leading Turf Managers for nearly 20 years. While in Napier Phil has prepared many international pitches including nine Test matches and 45 ODIs with over 100 First-Class matches. Not only does he prepare high quality international and First-Class pitches on McLean Park, but Phil and his team are constantly preparing club pitches every weekend for the local Hawkes Bay club cricket as well as many national and regional age group tournaments on the neighbouring Nelson Park.

Phil has also prepared Test match and ODI pitches in Bangalore, plus has trained many aspiring turf trainees in Malaysia, Thailand, UAE, Bhutan, Qatar, Singapore and Hong Kong.

The following is how Phil likes to prepare his pitches and the differences between club or tournament standard pitches and First-Class or international standard.

Renovating
When renovating a cricket block I like to have the block slightly soft but not to the extent that the groove lines close up when sweeping with a Holbar sweeper.

When scarifying I like to change the depth of the cuts; some passes are deep at about 15-20mm deep, other passes will be closer to the surface. After each pass I will use the Holbar sweeper to pick up the thatch. The reason why I change the heights of the scarifer is so that I will get any thatch that has established at different levels over time. I will scarify at least 8-10 different angles. The scarifer blades are spaced about 5mm apart, so it is very aggressive.

Phil has been one of NZ's leading Turf Managers for nearly 20 years.

I apply a 25kg bag of seed to a nine strip block on the club decks and about ¾ of a bag on McLean Park (5¾ pitches wide), although I will be cutting back on that this year on McLean Park as I felt the grass cover was getting just too thick.

When it comes to placing the soil on the blocks I will use a Vicon spreader at very low revs and spread 1.5m^3 onto the club blocks and 1m^3 onto McLean Park - just enough clay to cover the seed in the groove lines. The aim is to put on the exact amount that has been taken off, as I don't want to change the levels of the block in the process.

All blocks are sprayed out prior to the renovation. The blocks on Nelson Park are renovated in autumn as there is no winter sport, and on McLean Park renovated twice per year, once at the end of the season and again immediately following rugby.

Pre-season rolling
I don't pre-season roll now. I've got such good compaction all the way through the pitch profile. I feel that by not pre-season rolling I'm getting a greater amount of water down through the profile.

The clay that I use is a shrinking swelling clay so it is easier to wet up. If I was using a non-swelling clay I probably wouldn't go too heavy with pre-season rolling, it is a lot harder to get moisture through the profile with non-swelling clays. If anything I would use a lighter roller (one to two Tonne) when cross rolling.

Preparation
When preparing a club pitch compared to international pitch I do bulk density tests twice daily for international cricket. I will soak hose an international wicket for about two to three days before starting to roll the wicket. For a club pitch I will use overhead sprinklers to get moisture through the profile and then start lightly rolling the wicket.

When rolling I ensure that the clay isn't too wet for the first roll after any moisture has been put into the pitch. If there is any moisture on the roller then I get off and wait until there is no moisture on the drum before I get back on.

Preparation of club pitches is pretty much like preparing an international pitch. I try to make the club wickets consistent as possible. I don't worry about taking the colour out of a club pitch. My club pitches will tend to last for about four weekends, that is with junior and men's cricket being played every Saturday and Sunday.

On McLean Park I will use the light roller a lot more because of the existing compaction on this block. This helps prevent drawing out too much moisture from heavy rolling. The light roller also shuts down the grass early on in preparation, usually in the first three days. Then I only use the heavy roller if samples look to have any 'feathering' in them or if the samples aren't quite where I want them. I use hessian a lot to reduce the drying of the pitch and syringe water when needed.

Over a 12 day period I would do on average 10-12 hours of rolling. For a First-Class or Test match I would do on average 10 hours as I want to protect the plant more to allow the new ball to grip for the first 10-15 overs.

On Nelson Park I would look to do about two hours rolling per week in the first week of preparation, more if it's a Hawke Cup match. The first week will be carried out with a heavy roller, and then each subsequent week the rollers will get lighter as grass cover becomes more worn and compaction is better.

The grass condition is generally the same, just greener for club cricket. On Nelson Park I will verticut and leave the grass at 15mm. For an ODI I will verticut and mow the grass at 15-20mm, as I don't want the ball to grip, either slowing the pace of the ball or creating seam movement.

For a First-Class or Test match I may give a light verticut or not depending on the density of the grass cover. This will be on a case by case basis, as I am quite happy to leave some older grass on the pitch. I will mow the pitch to 10mm as I want to expose the crown more to allow the ball to grip off the grass for the first 10-15 overs for each time the new ball is taken.

“My club pitches will tend to last for about four weekends, that is with junior and men’s cricket being played every Saturday and Sunday.”

– Phil Stoyanoff

Phil’s pitch preparation programme

Preparation method	Nelson Park	McLean Park
Verticutting	Light – 1 pass	ODI - multiple passes First-Class/Test - case by case basis, maybe a light pass
Irrigating	Pop up sprinklers	2-3 days soaker hose
Duration of preparation	Mon-Fri	12 days
Rolling	2 hours first week with heavy roller 2 hours max following week with light roller if compaction good	Mainly light roller as compaction already very good. Heavy roller when samples suggest to. 10-12 hours for short form games, 10 hours max for multi day matches
Moisture management	Minimal	Sampling twice daily. Use of hessian covers to reduce drying, light hand watering if/when required
Grass height	15mm	ODIs 15-20mm (heavily verticut) Tests 10mm (minimal verticutting if at all)
Browning grass off	Minimal	Usually shut down early in preparation from light roller

Peter Domigan

Former Turf Manager
Queenstown Events Centre, Queenstown

7.2 —
Peter started his First-Class cricket career at Molyneux Park in Alexandra where he spent 15 years constantly providing very highly regarded pitches at both club and First-Class level, even hosting some age group internationals and international tour matches.

In 2004 he was offered a position in Queenstown to set up the grounds at the Queenstown Events Centre and develop blocks for club play plus the main oval that has hosted international cricket.

Peter helped pioneer the method of building cricket blocks using a local Alexandra base clay (which had very limited shrink/swell capability and compacted very tightly) underneath 50mm of Kakanui clay. This enabled the blocks to be prepared a lot quicker and arguably with more bounce than a full Kakanui profile.

Here are some thoughts on what Pete faced when preparing pitches between the two levels of cricket.

Peter helped pioneer the method of building cricket blocks using a local Alexandra base clay.

Renovation
In Queenstown we've only got two to four weeks to renovate 10 blocks and get back in play before the first game of the season, and as such we only have time to do a very light renovation. Because of the quick turn around the blocks are not sprayed out prior to renovation to enable the blocks to recover quicker for play.

We scarify up to five directions at a depth of 10-12mm to remove trampled organic matter, thus leaving the top of the profile with as much live grass as possible. We then seed at a high rate of 10 to 12kg per block; average size of block 350sqm (five strips). Next we spread by hand about 0.5m^3 of clay over the top and screed off with a level bar.

Out on the main oval we will scarify 15-20 passes at a depth of between 10-20mm, ensuring that we are removing any organic matter that has been pushed down into the block from rugby. Each pass is in a different direction and I always finished on a diagonal so any seed lines that are evident aren't straight up and down the pitch.

With seed not really germinating until late September in Queenstown, we put 1-1.5 bags of seed on the block (four strips) to get a full grass cover as soon as possible and then place 0.5-0.75m^3 of topsoil per strip over the top and level off. Once leveled we would then finish of with some fertiliser.

Pre-season rolling
As soon as winter sport is finished and soil conditions are suitable we will cross roll all blocks to smooth/flatten the surface prior to the renovation. Then once the grass is fully established we undertake compaction rolling carried out prior to the individual pitch preparations.

Preparation
Out on the main oval I like to verticut monthly to keep the leaf nice and fine and avoid letting the plant get too dense before coming into the main preparation phase. Just prior to the final wet up of the preparation we will give the grass cover a final groom using the grooming kit on the mower if needed, depending on the condition of the grass at the time. On the club blocks we will generally give the pitch a verticut just prior to wetting up for the prep (10 days out from the first use).

When it comes to watering up we will use the pop-ups on the oval plus hand watering over one to two days to ensure the pitch is fully saturated to depth, whereas on the club blocks we really only have one day to get as much water down into the profile as possible. Using pop-ups only it may take 10-12 hits with 10 minutes on the sprinklers to get the water down deep.

We usually have a 10 day build up for any major matches out on the oval, with probably no more than 10 hours rolling through that preparation. I start with the top reasonably dry and spend the first few days just concentrating on slow base compaction rolling, maybe three to four hours over three days (3x 30 min rolls per day). Then six to seven days out, if the base densities are good, I will re-wet the pitch and start working the top and get that in the condition I'm after. If the pitch is drying quickly I will give a light hand water after the second roll of the day before rolling in the late afternoon.

The last four days consist of surface finishing rolling. I like to bruise the grass off by rolling in the heat of the day. I will still use my heavy roller through this period as it crushes the grass quicker than my light roller. The grass will go off (start to turn brown straw colour) fairly quickly if rolling at the right density. If it's not starting to bruise then I will brush the grass up and take some length off to allow more air around the plant to dry it off.

I will take regular samples to check for moisture and compaction. I don't cut the samples up and analyse them; I go from experience. How much moisture I put back in is dependent on the weather forecast and how much the grass is drawing out of the pitch. I try to maintain an even moisture through the profile. A light hand water before rolling can help crush the grass onto the surface.

I have my block mower set between 15-17mm. I cut the club pitches at this height, maybe a couple of extra cuts and a light brush to help thin it out a little more if needed following the earlier verticut. For an ODI the grass will be crushed onto the surface by rolling. If struggling to brown off then I will take the mowing height down to 10mm. For a Plunket Shield match I will cut at 15mm, but will reduce the verticutting leading into the match.

“I like to verticut monthly to keep the leaf nice and fine and avoid letting the plant get too dense.”

– Peter Domigan

Peter’s pitch preparation programme

Preparation method	Club cricket	First-Class – international
Renovation period	2-4 weeks	6-8 weeks
Grass conditioning	1 verticut just prior to wetting up of the first use	Monthly verticutting plus grooming prior to wetting up if required
Irrigating	Pop ups only. Pulse irrigating as only 1 day to get as much water into profile as possible	Pop ups and hand watering for 2 days ensuring profile is fully saturated
Duration of preparation	2 weeks (Mon-Fri) including verticut and wetting up	10 day build up excluding grooming and wetting up
Rolling	2 hours per week	Up to 10 hours rolling
Moisture management	Minimal. Only hand water if needed	Regular monitoring through visual analysis of samples and monitoring forecasts
Grass height	15-17mm	15-17 mm for all forms of cricket with the ability to reduce to 10mm if required. Density dependent on the length of the match
Browning grass off	No intentional browning off but will naturally bruise up as it dries out towards end of week	ODIs will have all colour stripped out of them through crushing the grass with heavy roller, with the ability to brush up and reduce mowing height if need be

Jared Carter

Turf Manager
Bay Oval and Blake Park, Mt Maunganui

7.3 —
Jared has built up a vast experience of cricket pitch preparation experience over the last 20 plus years, including the Basin Reserve. He was the inaugural NZC Turf Manager and also completed a sabbatical at Lord's.

Renovating
At Blake Park we have four club blocks that we look after. When it comes to renovating them we will scarify the blocks in 9-12 directions. We will complete three passes then sweep off the debris, another three passes with the scarifer then sweep until there is minimal grass left. We don't spray the club blocks out and we carry out the renovation on three of the blocks in autumn and one in spring due to them being a thoroughfare between two rugby fields.

Once cleaned off we will seed at 25gm/m^2 (¼ bag over a four strip block) then place about 0.5-0.75m^2 clay over each strip and level off using a level bar on the back of the tractor. We will then place another 25gm/m^2 of seed over the top and drag a 3m wide screed over the top to ensure final levels are accurate.

Following that we will apply fertiliser and then Ethofumisate (Nortron) at 2L/ha for pre-emergent weed control.

Out on the main oval and in the practice facility the principles are much the same, we just go a little harder. We will spray the blocks off given that we may need to apply more clay, as these blocks can have far more cricket on them than the club blocks. We will scarify to basically remove the top off the block so there is no more grass left. This may take 15-20 passes with the scarifier using the same method as above, three passes and sweep. On these blocks we will replace the clay, generally the same amount that has been removed, and level off using the leveling bar on the back of the tractor. We then allow this to wet up and settle a few times then roll once dry enough. This allows us to firm up any low spots from the season before and ensures that we can add more clay if needed to get the levels exactly how we want them.

Jared was the inaugural NZC Turf Manager and also completed a sabbatical at Lord's.

Seed rates are as above if sowing out in autumn, or if it is a spring renovation the sowing rate increases to 75gm/m^2. We will scarify then top up one final time, apply the seed and then screed with the leveling bar to bury the seed. Next step is to apply fertiliser and then spray pre-emergent, cover with a growth blanket and water in.

Pre-season rolling
Pre-season rolling is fully dependent on how the cores are looking in each block. We generally only roll to smooth the surface leading into the season once the grass is fully established following the renovation. The only time we really carry out any compaction rolling is if we turn a block over, but even then most of the compaction has been carried out before we re-sow it.

Pitch preparation
On the club blocks we look to make one pitch last four to five weeks regardless of how many matches are played on it during this period. We will verticut a month out from the first match and fertilise to condition the grass leaf. We will aim to get four to six hours rolling in before the first match and this rolling can be anywhere within the last three weeks leading into the first match. This is because of time constraints. Expecting to double or triple the amount of rolling during the week leading into the first matches is unrealistic, so we try and sneak in a roll or two in the weeks leading up to get that base compacted as much as possible.

In the weeks between matches we will only give each of the blocks 1.5-2 hours rolling on a Thursday and Friday. The goal in the early part of the week is to ensure water is getting into the base of the block without leaving too much water sitting on the surface. We use pop-up sprinklers on the club blocks, occasionally using soaker hoses if we need concentrated watering of the pitch.

With rolling the grass will generally start to bruise off by the Friday afternoon but we don't want it to brown off completely as we will need as much grass as possible to survive four weeks of play.

Out on the oval we will stick to similar methods of verticutting a month out from the first match and fertilising to get some fine green leaf back. For any white ball games we would verticut quite heavily to thin the plant right out. For red ball matches we only carry out a light verticut to leave some crown for the new ball to hold on to. We then focus on getting moisture into the base as soon as possible and maintaining it by using soaker hoses or hand watering. If we are struggling for time or to find gaps between matches we will use a penetrant to get water in quicker.

We will look to give the pitches six to eight hours compaction rolling to get the base where we want it for white ball matches. The focus then shifts to getting the surface where we want it through moisture management and grass conditioning. We bruise the grass off by brushing and using the light roller at high speed. For red ball matches we will give six hours maximum compaction rolling with minimal light rolling to bruise off the grass.

We will bruise off the grass for white ball games and therefore probably won't mow it at any particular height, as the grass will be pressed onto the surface. But for multi day matches we will mow anywhere between 6-10mm depending on grass density and how much we have verticut.

“We will aim to get four to six hours rolling in before the first match and this rolling can be anywhere within the last three weeks leading into the first match.”

– Jared Carter

Jared’s pitch preparation programme

Preparation method	Blake Park	Bay Oval
Verticutting	A month out from the matches	A month out from the matches. Heavily verticut for white all games; a light verticut for red ball matches
Irrigating	Pop up sprinklers	Soaker hoses and hand watering from 4 weeks out
Duration of preparation	Mon-Fri	Up to 2 weeks for white ball matches; 6-7 days for red ball
Rolling	Up to 6 hours from three weeks out for the first prep. Up to 2 hours per week for subsequent weeks	6-8 hours compaction rolling for white ball games then light rolling for grass conditioning following. 6 hours max for red ball games with minimal light rolling
Moisture management	Minimal	Daily sampling for the 2 weeks leading into a match. Can heavily water 2 days out if needed
Grass height	Set at block height	Left at block height for white ball matches although unlikely to cut as rolling onto surface. 6-10mm for red ball matches
Browning grass off	Minimal	Usually start 4 days out for white ball matches; minimal for red ball

Web based references

- Pitch Perfect
- Cranfield Cricket Rolling Simulator
- Basic Guide to turf cricket preparation - John Shannon
- ECB Guidelines For Cricket Pitch Rolling
- Queensland Cricket

Appendix

Appendix 1
Cricket Pitch Monitoring Process

Appendix 2
Pre-season rolling including roller footprint formula

Appendix 3
Turfgrass Disease Management

Acknowledgements
NZC would like to acknowledge Jared Carter and Keith McAuliffe for writing the document. Special thanks to all turf managers that have supplied information photos and case studies.

Disclaimer
NZC provide all information contained within this document in good faith. NZC cannot be held liable for misinterpretation of technical information applied in principle based on the information contained with this document.

Location:

Bay Oval, Mount Maunganui

Block:

4 pitches of Patumahoe with ryegrass

4 pitches of Kakanui with couch

Outfield:

Couch outfield over natural dune sand

Home venue for:

Bay Of Plenty Cricket Northern Districts Cricket

Notes

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