LARGS GOLF CLUB

Advisory Report on the Golf Course incorporating the STRI Programme

Report date: 5th August 2014
Consultant: Richard Windows

CONFIDENTIAL

Date of Visit:	25th July 2014
Visit Objective:	To review the annual condition of the golf course, take objective measurements of green performance and confirm ongoing maintenance.
Present:	Mr David McDonald – Club Captain
	Mr Ian Mackay – Golf Course Committee
	Mr Keith Howie – Secretary
	Mr Iain Barr – Course Manager
	Mr George Morrison – Deputy Course Manager
	Mr Richard Windows – Turfgrass Agronomist, STRI Ltd
	Mr Ian Craig – Turfgrass Agronomist, STRI Ltd
Weather:	28°C and sunny.

Contents

Executive Summary

- The general condition and presentation of the golf course was excellent.
- The performance measurements on the greens were outstanding. They continue to show improvement year on year and are among the best inland greens we have seen in 2014.
- Excellent sward density and vigour was evident as well as consistency throughout all greens highlighting the superb maintenance programme delivered by the greens staff and continued support and investment by the Club.
- Although surface firmness was superb in the dry conditions it is important to continue organic matter reduction within the top 20mm of the soil profile. To ensure greens maintain this firmness throughout the inevitable wetter conditions that autumn and winter will bring, it is hoped that further organic matter reduction can be achieved with Graden sand injection in August.
- Due to the superb performance of the greens, the extension of maintenance procedures such as verticutting, hollow coring, top dressing and even Graden sand injection to the aprons was discussed. The aim being to firm up these surfaces making them more consistent to the playing qualities, particularly firmness, of the greens.
- Top dressing work has been carried out on high traffic routes of the course such as the right hand side of greens 2 and 4 and the back of the 3rd green. The aim of this work in conjunction with verti-draining is to incorporate 25-30mm of sand into the top layer of the soil to increase surface drainage and improve durability and stability during the wetter periods.
- The use of power caddies during the winter was discussed as a major contributing factor to the compaction of these high traffic areas. Hedgehog wheels or other alternatives are an option to help reduce the impact of power caddies on these areas.
- The new tee on the 1st hole has been established this season using Tillers dwarf rye and fescue turf. This tee is now in play and performing well with good levels.
- Re-levelling work is also planned for the 3rd men's and 5th medal tees.

Key Observations

Greens

The condition of the greens in terms of agronomic quality and playing performance is superb and easily amongst the best inland greens we have seen in 2014. The absence of winter greens in 2013 is an excellent indication of consistent year round performance and as a result of sound agronomic practice by the green staff at the Club.

The greens exhibit an even blend of browntop bent and annual meadow grass and ball roll qualities are maintained as a result of regular refinement by means of verticutting, grooming, top dressing and bi-weekly applications of Primo-Maxx growth regulator along with sensible fertiliser applications.

Evidence of Take-all patch was noted on several greens. This could be in response to recent applications of Microcal (calcium carbonate). This was applied in order to increase the pH of the soil making nutrients more readily available to the plant. The Take-all patch should be suitably controlled by an application of Heritage fungicide. In addition, spring applications of manganese will go some way to reducing the likelihood of a further outbreak next season.

Isolated dry patch was evident on some greens and a Theta Probe (or similar) was discussed as a potential purchase to allow greens staff to accurately monitor soil moisture and hand watering potential hot spots before the onset of drought stress.

Recent analysis in the laboratory (see below) indicates that organic matter levels remain slightly high in the upper 20mm of the soil profile. The work planned for the maintenance week in August involving hollow coring and use of the Graden sand injection scarification machine will be extremely effective in removing and diluting these accumulations in the upper soil profile. These works, in addition to the current verticutting and top dressing programme will produce better surface drainage and firmer drier surfaces during the wetter periods.

Presentation, performance and turf quality to the greens was superb.

Turf texture and species composition was excellent and delivering superb ball roll qualities.

Take all patch was present to the greens in response to action to increase soil pH.

Green Aprons

The green aprons are fertilised along with the greens and cut at 10mm along with the tees. This maintenance programme has meant that they are beautifully presented and well defined from the fairways.

Further work on the aprons was discussed including increased regularity of verticutting and top dressing and even treatment with the Graden sand injection scarifier. The aim of these works would be to improve surface firmness and ball release characteristics keeping them authentic to the continually improving playing qualities of the greens.

Tees

The general performance of the tees has been good, improvement works have been successful and future works to improve the more uneven surfaces has been planned.

The enlargement of the 1st medal tee has been successful. It was established using Tillers turf, Bar Medal blend (fescue and dwarf perennial ryegrass). The tee is now open for play and very well presented, currently being hand mown at 12mm with the intention of reducing the cutting height to 10mm in line with the rest of the tees on the course.

Re-levelling work is planned for the 3rd and 5th medal tees. Existing turf will be stripped and reused where possible and extra Bar Medal blend turf from Tillers will be brought in where necessary.

Rough

Verti-draining and sand top dressing works have been implemented on the high traffic areas between green to tee and tee to fairway. Buggy traffic and increased use of heavier power caddies, particularly in winter months, are adding considerable pressure to these areas resulting in compacted soil and loss of grass cover.

A three to five year plan has been implemented with the aim being to accumulate 25-30mm of sand in the upper soil profile to increase surface drainage, stability and durability. Top dressing so far this year has been successful and around 5mm of sand is evident in the upper soil profile.

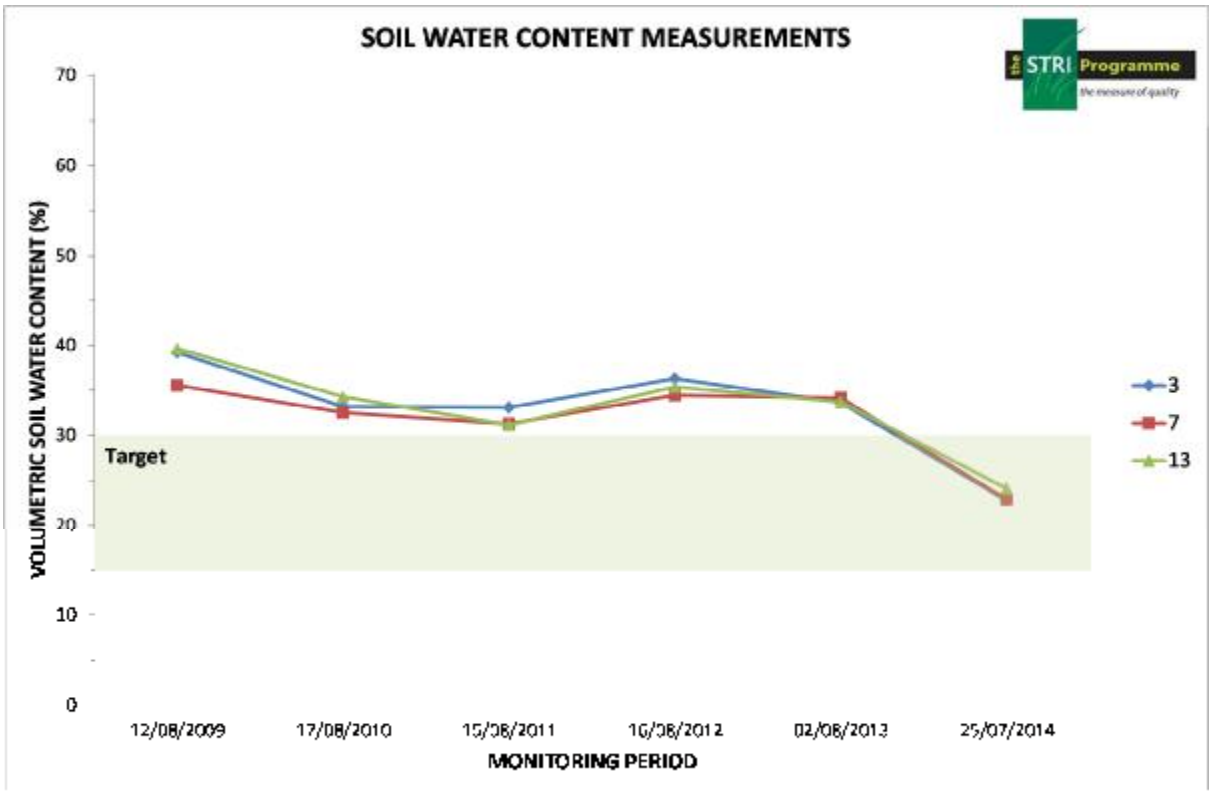
Ongoing work to improve the surface drainage and general durability of the pathways is important via sand top dressing. So far, approximately 5 mm of sand has accumulated beneath these areas.

Performance data

The full suite of STRI Programme measurements were taken during the visit to identify ongoing maintenance requirements and accurately assess the performance of the surfaces. The results are shown in the table and graphs below along with interpretation where necessary.

Performance Measurement Results							
Green No.	Speed (distance)	Smoothness (mm/m)	Trueness (mm/m)	Firmness Mean (gravities)	Firmness SEM (±)	Moisture Content (%)	Moisture Content SEM (±)
3	9 ft 3 in	14.7	4.9	107	2	22.8	1.0
7	9 ft 10 in	13.8	4.7	106	2	22.9	1.3
13	10 ft 5 in	12.8	4.4	105	3	24.1	2.1

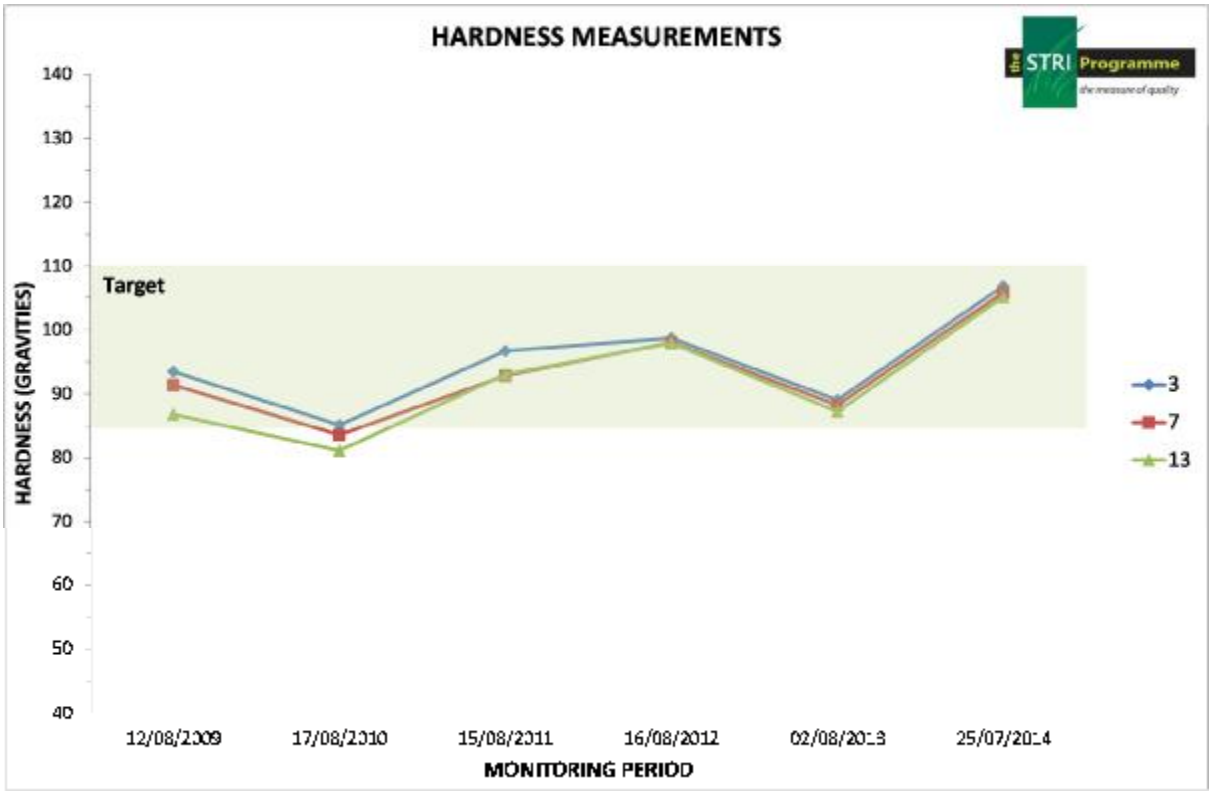
Soil Moisture Content



- Average soil moisture content was 23.3% with a range of 22.8% (3G) to 24.1% (13G).
- Soil moisture values were comfortably within target and superbly consistent between greens and within each green indicating that the Revolution surfactant programme is working well.
- As soil moisture values remained easily within target, it was felt irrigation was not necessary during the visit. To inform irrigation inputs with greater accuracy, the purchase and use of your own moisture meter would be very beneficial.

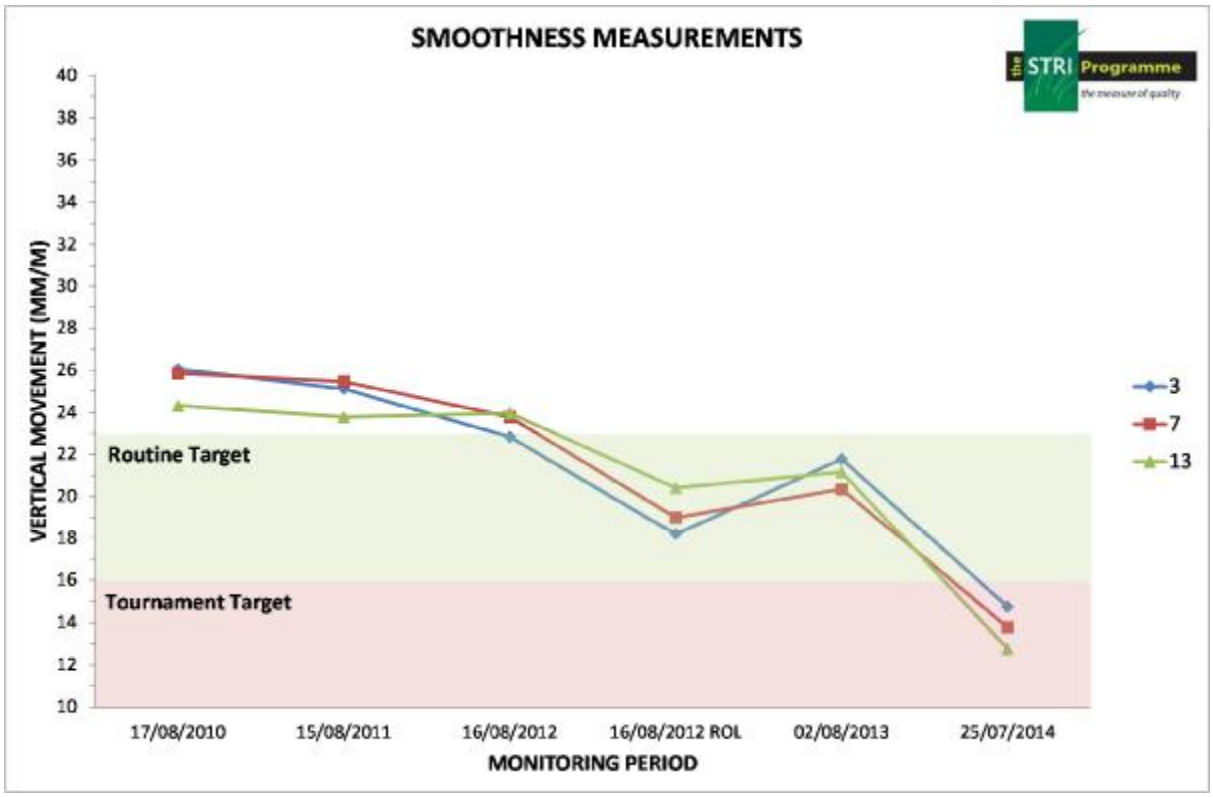
- Weather conditions have been very dry recently and it is expected that the greens would still retain excess moisture following heavy rainfall due to the slightly high organic matter levels.
- Efforts to reduce organic matter accumulations will reduce moisture retention and deliver improved surface firmness following rainfall events.

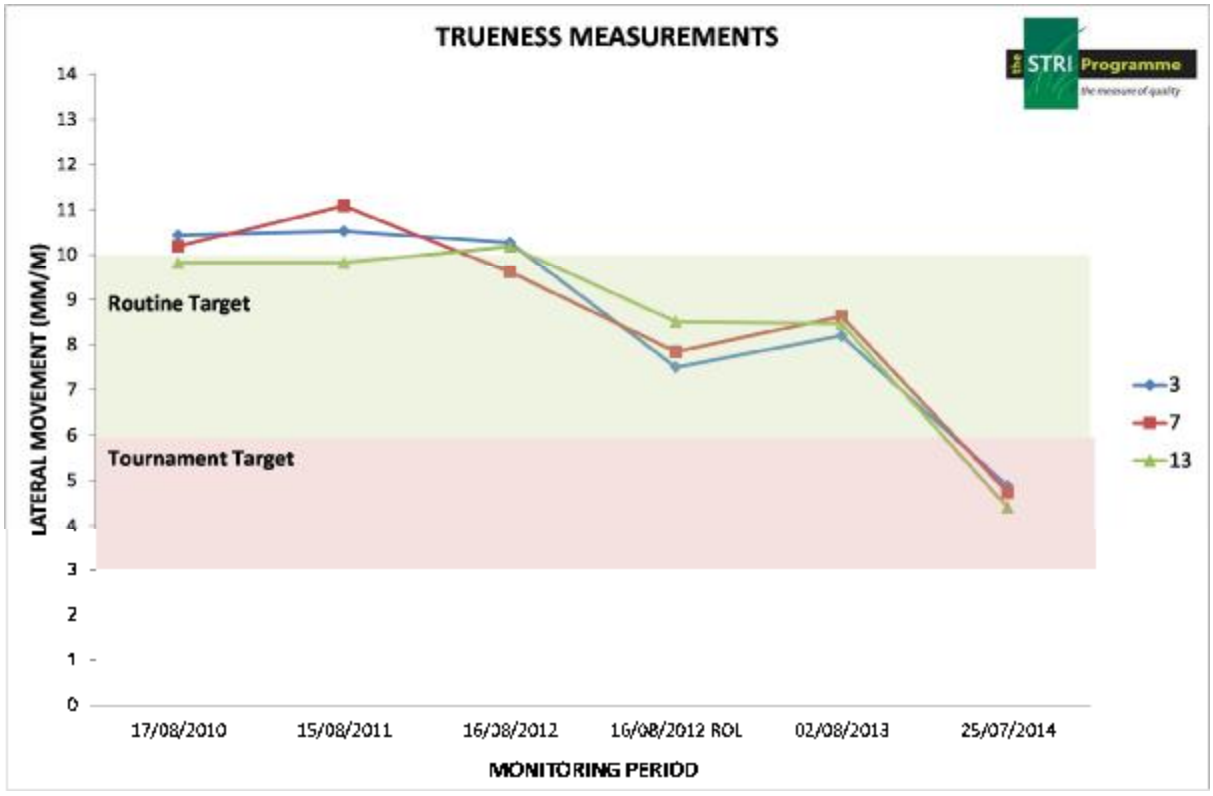
Surface Firmness/Hardness



- Average firmness values were 106 gravities with a range of 105 (13G) to 107 (3G).
- Surface firmness was excellent and values were all towards the high end of ideal target.
- It is expected that these firmness values would deteriorate in response to wet weather due to the aforementioned organic matter levels.
- The consistency of firmness between the indicator greens was very good.

Smoothness & Trueness

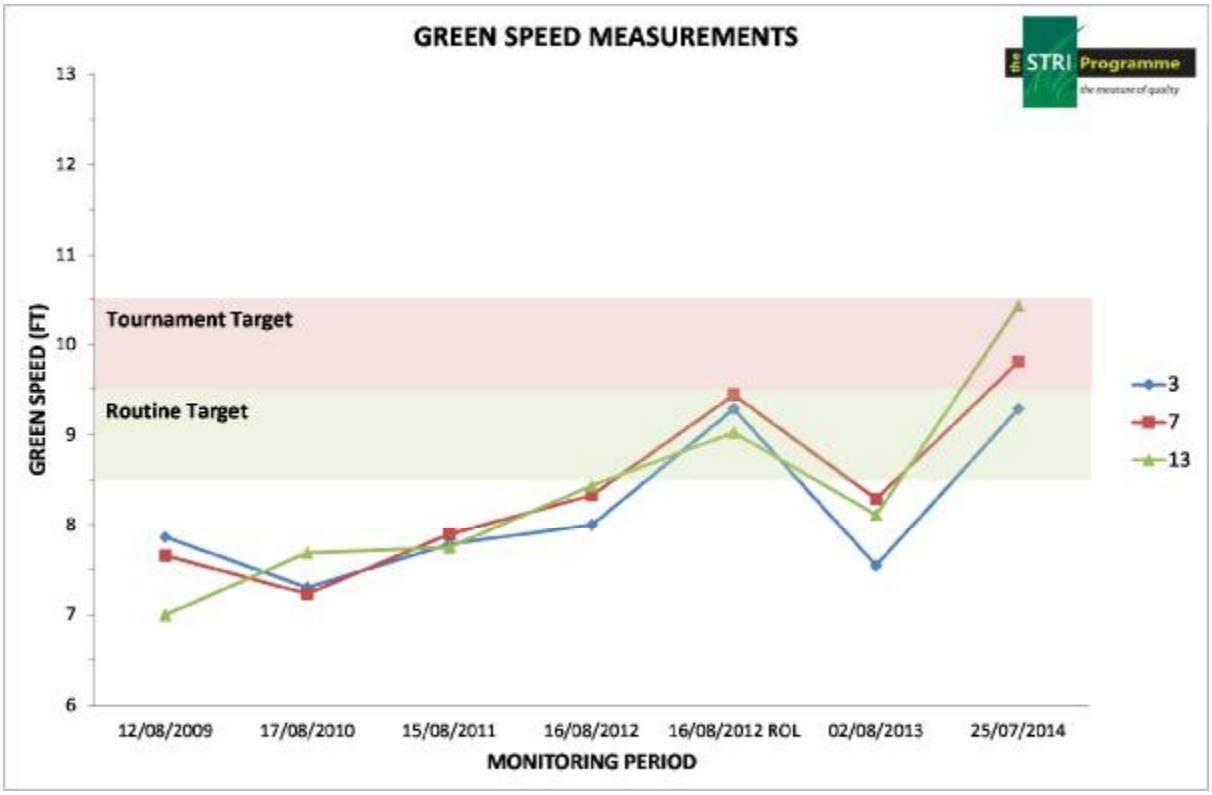




- Average smoothness was 14mm/m and average trueness was under 5mm/m and both fell within the very challenging tournament target ranges.

- The values obtained during the visit were the best they have been since formal STRI Programme testing began illustrating the existing excellent performance of the surfaces and the great response from the sward refinement programme currently implemented.
- Following a cut and roll the morning of testing these values obtained during the visit were considered to be reflective of those currently presented for routine play, which does show how good the greens are during the main season.

Green Speed



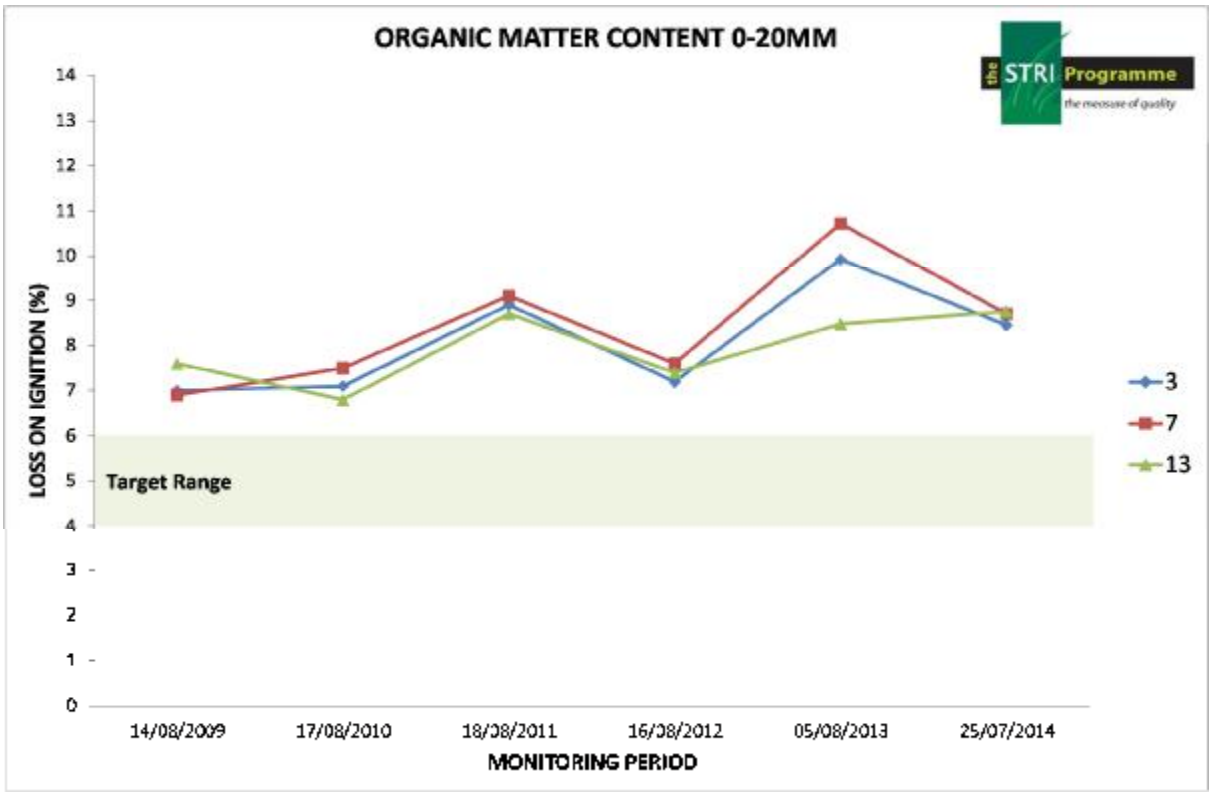
- The average green speed was 9ft 8in which is excellent for routine play.
- Consistency of speed has been good so far this season in response to refinement and Primo-Maxx growth regulator programme. The Primo-Maxx applications have also led to consistency of green speeds throughout the day.
- Greens 7 and 13 were within tournament target with green 3 being slightly slower however still at the higher end of routine target. This difference in green speed could be due to the shaded environment of green 3 and slightly damper conditions.

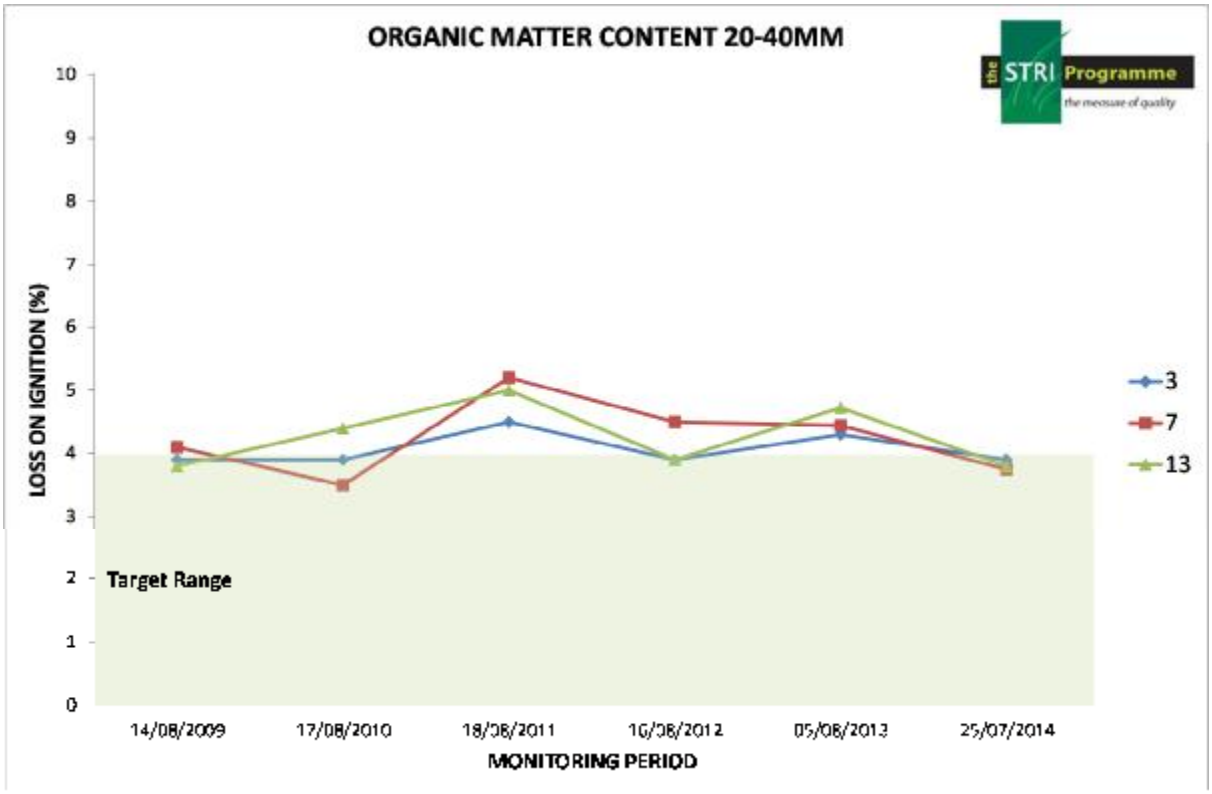
Organic Matter Content

Organic matter samples were taken from the indicator greens at 10mm increments through the top 40mm of the soil profile. The results are shown in the table and graphs below along with interpretation where necessary.

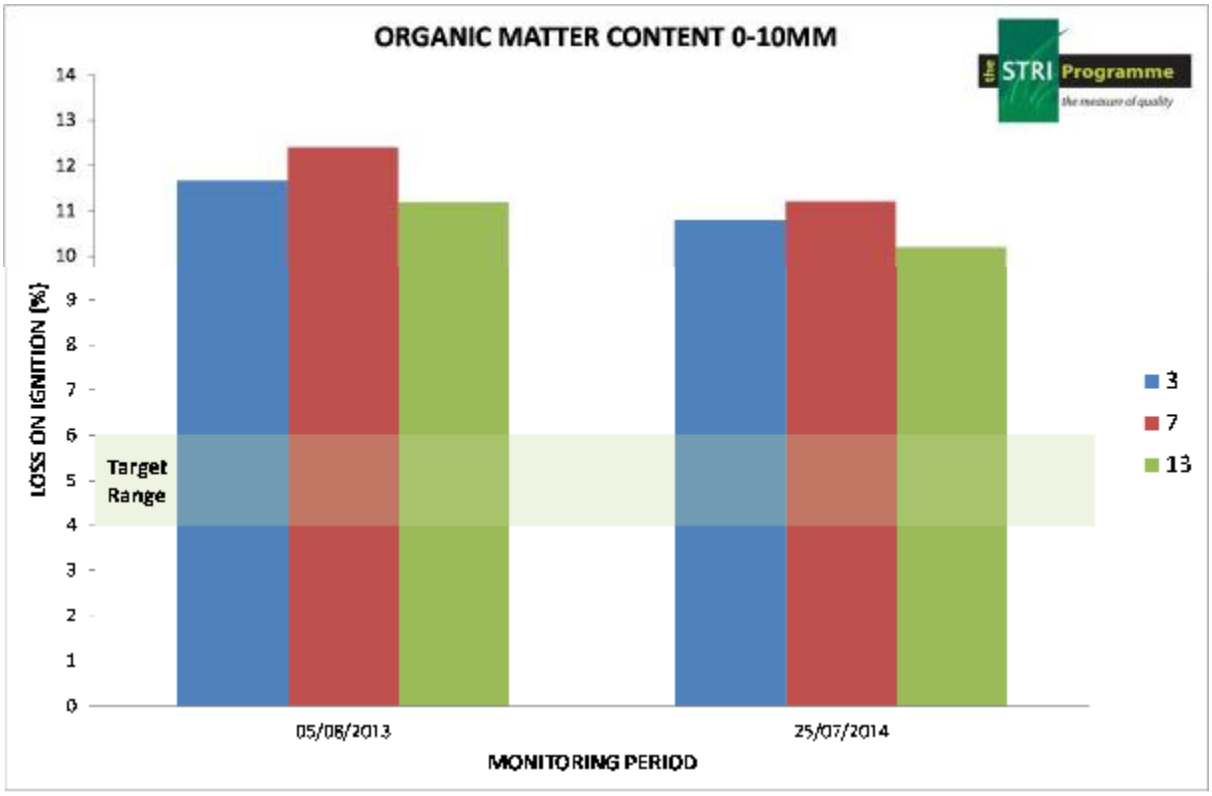
Organic Matter Content			
Loss on Ignition (%)			
	Green 3	Green 7	Green 13
0-10 mm	10.8	11.2	10.2
10-20 mm	6.1	6.2	7.3
20-30 mm	4.1	4.0	4.4
30-40 mm	3.7	3.5	3.2

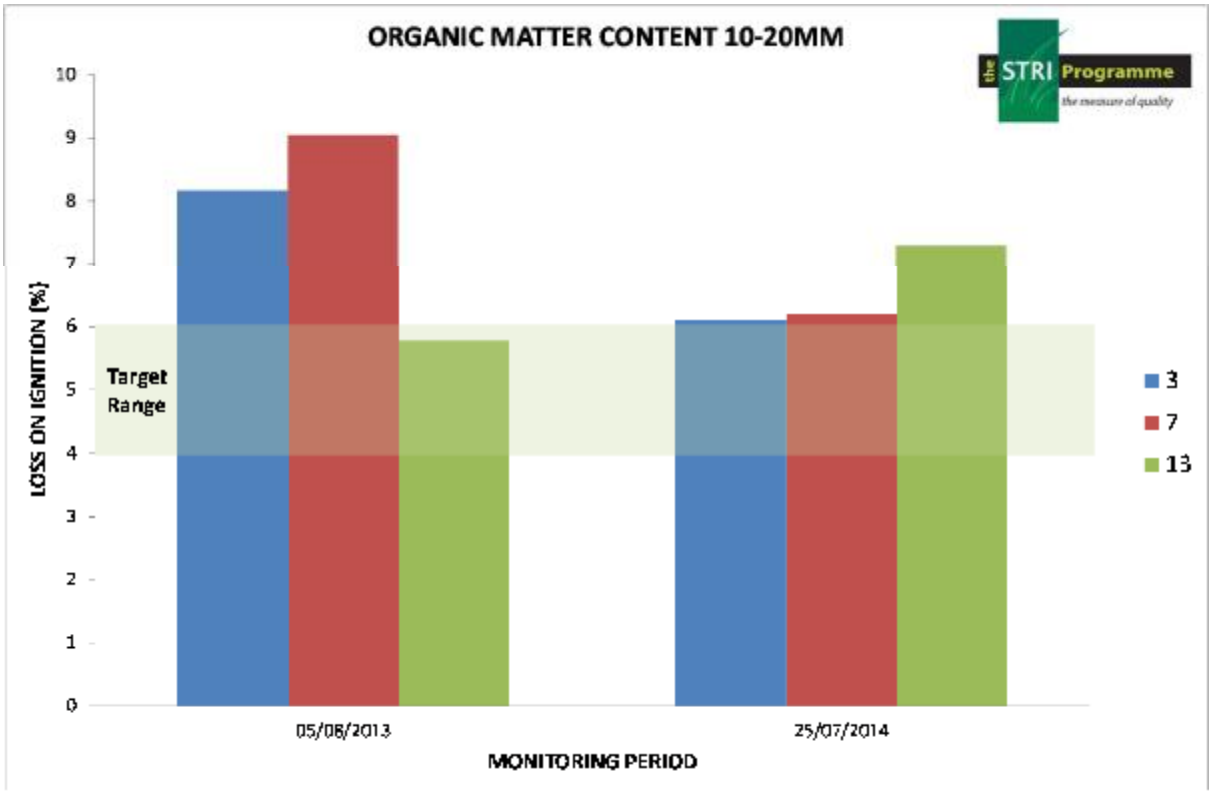
Graphs to show the values at 0-20 mm and 20-40 mm are shown below.





- Average organic matter values at 0-20mm were 8.6% and 3.8% at 20-40mm compared to 9.7% at 0.20mm and 4.5% last year.
- Organic matter values are falling in response to work last August and increased routine sand top dressing.
- Values at 20-40 mm are now within the top end of the desired target.
- The soil profile has been further broken down to highlight the main areas of concern in terms of organic matter.





- The top 10mm of the soil profile exhibits the highest levels of organic matter, with an average of 10.7%. Average values have dropped 1% from last year, i.e. from 11.7% to 10.7%. However, they remain too high at this depth.
- The Graden sand injection in conjunction with continued routine verticutting and sand top dressing should see a significant reduction in these numbers in the future.

- Values at 10-20 mm were much lower and generally in target, indicating the top 10-15 mm of the soil profile is where organic matter reduction should be targeted.

Soil Chemical Analysis

Samples were submitted to the laboratory for routine analysis of soil pH, phosphate and potassium levels. The results are shown in the table below along with interpretation where necessary.

Soil Chemical Analysis			
	pH	P_2O_5 (mg/l)	K_2O (mg/l)
3	5.2	14	60
7	4.8	10	63
13	5.1	10	41

- Soil pH levels are up slightly on last year in response to applications of Microcal. Average values in 2012 were 4.5, 4.9 in 2013 and 5.0 this season.
- Despite the increased, a further application at 40g m^2 would be recommended in an effort to keep the pH consistently above 5.0 but more ideally around 5.5.
- Phosphate levels are up on last year and above the minimum threshold level of 5 mg/l meaning applications can now be relaxed.
- Potassium levels remain adequate and existing inputs should be sustained at their current level.

Key Recommendations

Greens

- A combination of hollow coring and Graden sand injection scarification should be performed on the greens in order to remove and dilute the organic matter accumulations within the top 10-15mm of the soil profile.
- This operation should ideally be carried out during the aeration week beginning 18th August. This date would allow for optimum recovery rates as air and soil temperatures will still be high.
- Overseeding of the greens during the aeration week with browntop bent would continue to improve sward species composition. Browntop bent also exhibits better health during the winter months than annual meadow grass and would help to improve year round playability.
- Continued verticutting, grooming and sand top dressing throughout the remainder of the growing season and light top dressing where possible during the winter months. This should help to continue the dilution of the organic matter.
- Application of Heritage fungicide at 2.5L/ha would be recommended to control the current Take all patch activity on the greens.
- Applications of manganese in the spring will help to reduce the likelihood of further outbreaks of this disease next year.

- A further application of calcium carbonate (Microcal) would be recommended in the spring.

Green Aprons

- Intensification of maintenance operations such as verticutting, hollow coring, top dressing and, if possible, Graden sand injection scarifying.
- These operations would lead to firmer drier aprons producing ball release characteristics authentic to the greens.

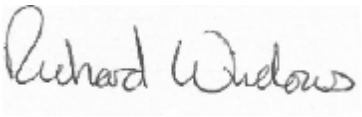
Tees

- A continuation of the tee levelling and enlargement programme would be very beneficial to improve the quality of tee surfaces. Existing turf should be re-used where possible and where necessary Tillers fescue and dwarf perennial ryegrass turf should be used as this has been used to very good effect on the 1st medal tee.

Rough

- A continuation of the verti-draining and sand top dressing of the high traffic areas between green to tee and tee to fairways should be continued. Good progress has been made this year with these areas however further work is required in order to accumulate the desired 25-30mm of sand at the sward base. This will improve surface drainage, stability and durability during periods of high rainfall.

Signed:



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