

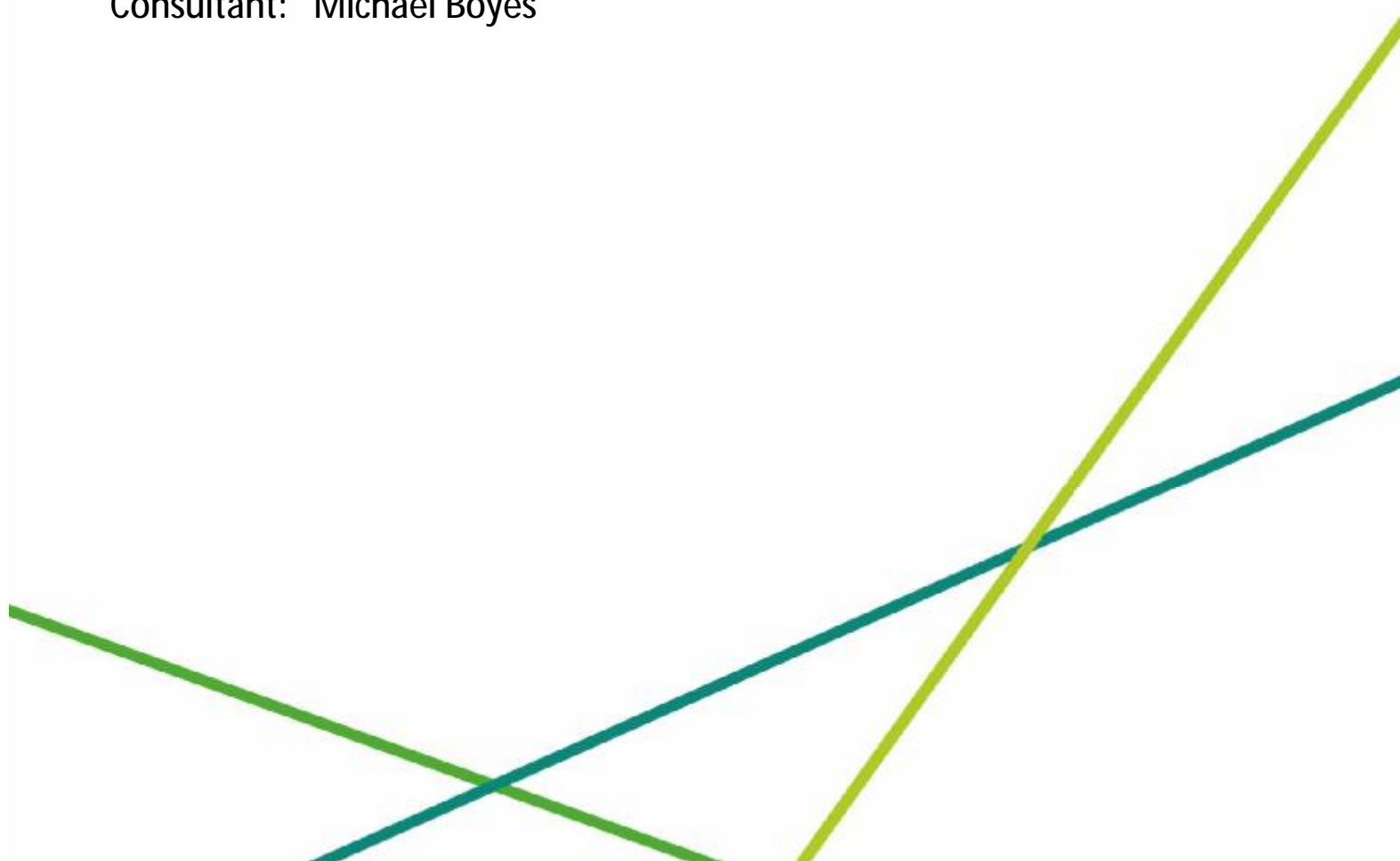


Making great sport happen

WOLLATON PARK GOLF CLUB

Advisory Report on the Golf Course incorporating the STRI Programme

Report Date: 3rd July 2019
Consultant: Michael Boyes



Wollaton Park Golf Club

Date of Visit:	Wednesday 29 th May 2019
Visit Objective:	To review agronomic conditioning, assess greens performance data and laboratory results and confirm ongoing maintenance requirements.
Present:	Martin Scothern – Course Manager Michael Boyes – Turfgrass Agronomist, STRI
Weather:	Warm and dry with some cloud cover (14°C).

Headlines

- General golf course presentation was very good on the day of the visit and the greens display a healthy, dense sward. Recent *Poa annua* seed head activity is now on the decline and putting surfaces are performing well.
- Despite evidence of good sand integration there remains some tightness in the soil profile on greens and a higher than desirable level of organic matter accumulation in the top 50 mm.
- Greens turf quality texture and consistency continues to impress which was reflected in excellent smoothness, trueness and green speed recorded on the day. A fantastic 125 tonnes of sand top dressing have reportedly been delivered to the putting surfaces already this year.
- Soil moisture management on greens continues to improve and both volumetric water content and the corresponding firmness values were within target. However, a greater than desirable variance was evident between the individual moisture readings recorded (16-38%) and greater parity is essential.
- The newly constructed 6th tee is a superb addition to the course providing an ample teeing platform and excellent surface levels and further works of a similar nature are highly desirable.
- Grass recovery on drought affected fairways is encouraging and minor areas of thinning grass cover (i.e. 10th fairway) will require additional localised treatments to enhance progress. Raised areas of banking and surrounds on certain greens complexes have burnt off under the oppressive conditions of 2018 and a softening of the profile is suggested ahead of focussed aeration and over-seeding works.
- Further woodland management works are required to remove influential specimens which are impacting turf health (i.e. 15th green) and also thin or remove other examples which present a genuine Health & Safety risk or affect lines of sight and play.

Key Actions

- Make provision for hollow coring, sand top-dressing and integration of seed as part of the August renovations to greens. Consider the implementation of a deep scarification and sanding operation for spring 2020.
- Maintain routine solid tine aeration and the incorporation of light sand dustings at every available opportunity to improve drainage characteristics and degrade thatch accumulation further.
- Aim to exceed 200 tonnes of sand top dressing to the greens for the year 2019.
- Promote regular verti-cutting operations (i.e. -2 mm), every two to three weeks followed by a light sand top dressing to further refine surfaces and relieve tightness in the sward.
- Implement regular use of the soil moisture meter to promote a level between 20 - 25% Volumetric Water Content (VWC) consistently within, and across all putting surfaces. Undertaken irrigation upgrades on remaining seven greens.
- Plan for reconstruction and relocation of the 12th tee as part of this year's winter works programme.
- Remove the cherry tree at the left-hand side of the 15th green to alleviate disease pressure and optimise turf health and improve overall surface performance.

Objective Measurements

Measurement	Average	Target Range
Soil Moisture (%)	26% (range 16-38%)	15-30%
Hardness (Gravities)	106 Gravities	90-110 g
Smoothness (mm/m)	18 mm/m	<25 mm/m
Trueness (mm/m)	8 mm/m	<10 mm/m
Green Speed	10 ft 7 in	8.5-10.5 ft
Organic Matter 0-20 mm (%)	8.0%	4-6%
Organic Matter 20-40 mm (%)	5.4%	<4%
Soil pH	5.7	5.0-6.0
Phosphate (P ₂ O ₅)	7mg/l	>10 (mg/l)
Potassium (K ₂ O)	106mg/l	>30 mg/l

Key: In Target Marginal Variance Out of Target

Photo Observations and Comments



Figure 1: General golf course presentation was very good on the day of the visit which is encouraging given the relatively slow start to strong growing conditions this season.



Figure 2: Greens exhibited a healthy, dense grass sward and the *Poa annua* seed head activity of recent weeks appears to have eased somewhat.



Figure 3: Soil samples collected on the greens revealed the extent of sand integration but a higher than desirable thatch accumulation remains in the top 50mm of the profile.



Figure 4: Tightness of the greens soil profile was also evident in places with horizontal breaks and a restriction on root development and extension.



Figure 5: Disease impact was very well managed on the putting surfaces with very minimal signs of pathogen activity, confined to the more shaded and secluded greens.



Figure 6: One such example is the 15th green where the adjacent cherry tree is casting significant shade and disease activity was seen in the resultant shadow. Tree removal is highly advisable to preserve the integrity of the surface.

Photo Observations and Comments (continued)



Figure 7: The newly constructed 6th Tee is an excellent addition providing ample teeing area and superb surface levels. All works were carried out in-house.



Figure 8: A candidate for future reconstruction works is on the 12th hole where the proposition is to increase the size of the tee and move to the right to improve orientation of the hole.



Figure 9: In general, fairways are recovering well from the oppressive hot and dry weather conditions of 2018. Patience is required as this will undoubtedly be a long process.



Figure 10: The 10th fairway probably displays the worst legacy of 2018 drought conditions and additional overseeding operations have been undertaken to repair thinning areas, particularly on raised sections of the profile.



Figure 11: Extreme banking around green complexes have also been significantly impacted by the extended hot and dry weather and lack of irrigation provision. Softening of such profiles are advised to avoid similar damage re-occurring.



Figure 12: Marking from triplex tyres from continually cutting a perimeter pass on the greens was evident in places. Reduce the impact by occasionally omitting the clean-up pass or off-setting the cutting line by coming in half a box.

Photo Observations and Comments (continued)



Figure 13: Bunker noses on recently constructed hazards have burnt-off under the extreme drought conditions. Restorative works will be required and employing a higher height if cut may assist in grass recovery/retention.



Figure 14: Ongoing focussed tree management is welcome across the site to remove/thin specimens which directly affect turf health, present a genuine Health & Safety risk and impact lines of play, as above in relation to the teeing area.

Recommendations

Greens

Organic Matter Management

- Impacting organic matter accumulation in the greens profile remains a key priority to improve agronomic condition, drainage characteristics and overall surface performance. August greens renovations are already scheduled to comprise a micro hollow core operation followed by top dressing and seed integration.
- Consider the implementation of a deep scarification sand injection operation at the next available opportunity, (i.e. spring 2020) to target the top of the profile where the greatest accumulation of thatch persists.
- The following table identifies different possible combinations of aeration techniques which are available and the respective impact which can be made. In order to hit 20% of the surface the suggested autumn renovations utilising a micro hollow core tine (i.e. 6mm diameter) highlighted in yellow would require more than 4 operations, whereas the more conservative of the deep scarification operations (highlighted in green) can achieve the same in just over 2 operations, and is ideally targeted at the top 25mm where the most significant accumulation of thatch build-up has been identified in the greens profile at Wollaton Park Golf Club. This could be carried out via a pedestrian Graden (or tractor mounted GKB Sandfiller as illustrated below) but remains a decision for the Club as to which combination of methods suits best, fits in with the golfing calendar and is most palatable to the membership.

Impact of Tine Size & Spacing & Surface Area Impacted by Core Aeration and De-thatching					
Tine Size Ø (mm)	Spacing (mm)	No. Holes per m ²	Area Impacted by 1 Tine (cm ²)	% Surface Area Impacted	No. of Aerations Needed to Impact 20% of Surface
6	25 x 25	1,550	0.316	4.91	4.1
6	25 x 50	775	0.316	2.45	8.1
6	50 x 50	388	0.316	1.23	16.3
9	25 x 25	1,550	0.710	11.04	1.8
9	25 x 50	775	0.710	5.52	3.6
9	50 x 50	388	0.710	2.76	7.2
12	25 x 25	1,550	1.265	19.63	1.0
12	25 x 50	775	1.265	9.82	2.0
12	50 x 50	388	1.265	4.91	4.1
16	25 x 25	1,550	1.981	30.68	0.7
16	25 x 50	775	1.981	15.34	1.3
16	50 x 50	338	1.981	7.67	2.6
Deep scarify 3 mm blades	25 x 25	N/A	N/A	14.10	1.4
As above 2 mm blades	25 x 25	N/A	N/A	7.80	2.6

Taken from the July/Aug 2001 Ed. of USGA Greens Section Record, Vol. 39 No. 4



For more information on the GKB Sandfiller visit: <https://www.gkbmachines.com/machine/sandfiller/>

- Sand top dressing delivery to greens has been exceptional this year with a reported 125 tonnes delivered to date, so if the weather conditions remain conducive to applications, we should be able to exceed the annual target of 150 tonnes for the year quite comfortably. Continue with light sand dustings at every available opportunity, incorporated with aeration and surface refinement practices.

General Maintenance

- Mowing length is currently being maintained at 3.25 mm which is the absolute minimum height of cut we should be aiming to sustain for the majority of the main playing season. It was discussed that a 3mm height of cut could be employed for special Club Championships and key events, but the preference would be to improve surface performance and speed through surface refinement operations and the judicious use of the roller, rather than reducing the sward length further. This would help to preserve the excellent agronomic developments made to date by avoiding unnecessary stresses on the grass plant.
- As previously advised, restrict the use of the roller to a maximum of twice a week during the main playing season with a view to incorporating an additional operation simply as a polishing exercise for key tournament preparations. Double cutting exercises may also be adopted to achieve this fine tuning of the putting surfaces but as recommended should be reserved for isolated occasions to avoid stress or a thinning of the sward.
- Occasionally omit the clean-up lap pass on the mowing operations or offset the cutting angle by half a box from the edge of the green to avoid further development of tyre track marking commonly known as "triplex ring".

Surface Refinement

- Now that *Poa annua* seed head activity has eased, implement the programme of verti-cutting, every two to three weeks, to a maximum depth of -2mm below the surface. Complement these operations

wherever possible with light dustings of sand top dressing integrated into the sward to promote an upright growth pattern and continue to improve surface performance.

Nutrition

- Nutritional inputs appear well-balanced with the greens sward displaying a strong and healthy, dense grass coverage with minimal signs of disease impact.
- The well-established programme of nitrogenous inputs through Microflow liquid in conjunction with Primo MAXX tank mixes continues to deliver a balanced spoon feed of the required elements which meets the requirements of the grass plant whilst avoiding peaks and troughs in growth patterns. Aim to keep the total nitrogen inputs at a maximum of 90 kg/ha for the year.
- Soil chemistry analysis revealed soil pH and potassium levels to be within ideal target range, but as previously identified phosphate levels continue to sit marginally below optimum levels. This can be easily addressed with the planned granular application previously recommended (i.e. C-Complex 4:3:4, or similar) to follow the August greens renovations.

Routine Aeration

- Despite a varied aeration programme, encompassing regular solid tine aeration through the Toro Pro-Core 648 supplemented with an occasional Air2G2 injection operation, there appeared some tightness in the soil profiles in certain greens. The importance of varying the depth and diameter of tine used in the aeration operations is key to break through any structural pans and horizontal breaks to integrate the sand and improve drainage characteristics and optimise overall surface performance.
- Deep solid tine aeration (i.e. Verti-drain) remains a key part of this process and should again be adopted in early/mid-October using a 30mm diameter tine with an absolute maximum of 5° heave. If sufficient fissuring is being achieved at depth through the Air2G2 operation, then the use of any heave should be eliminated from the deep solid tine aeration operation as a vertical insertion of the tine will deliver the desired effect.
- Having an Air2G2 as part of the fleet affords superb flexibility for winter aeration which should continue to focus on monthly air injection operations, supplemented as appropriate with the occasional pencil solid tine aeration (i.e. 6mm Ø) via the Tore Pro-Core 648.

Moisture Management

- Despite the average soil moisture content falling within ideal target range there is greater than desirable variance between individual moisture readings, both within the respective greens and between the various putting surfaces tested (i.e. 16-38%). Great consistency is key to ball and surface interaction and consistent soil moisture levels and green firmness, and a reliable soil moisture probe is a key piece of equipment in achieving this aim. Used regularly the probe can identify irregularities in the irrigation delivery and also identify areas of particular putting surfaces which may be more water retentive than others for focussed micro-management with regards to aeration and sanding practices.

Green Collars, Surrounds and Approaches

- These key areas should be viewed as an extension of the green and receive similar maintenance practices, nutritional inputs and irrigation delivery. Aim to promote a similar programme of aeration and sanding to remove any excess organic matter accumulation and improve drainage characteristics to provide a smoother transition from the fairway into the putting surface.
- As growing conditions strengthen schedule verti-cutting operations to improve the texture of the sward to present a different challenge with respect to the variety of possible approach shots into the green.

- The possible introduction of tighter mowing around the green surrounds was again discussed to utilise the existing contours to improve the visual and strategic challenge presented to the golfer. However, it should be noted that some raised areas on the profile have burnt off during the drought conditions of summer 2018 and some softening of the contouring may be necessary in the first instance to facilitate both reparative maintenance and safeguard against future damage under possible returning drought conditions.

Tees

- The recently constructed 6th tee is an exceptional example of the quality of work and skill set of the greenstaff as all of the works were undertaken in-house and the results are excellent. Further similar works are prescribed for the 12th tee to extend the teeing area and reposition towards the right-hand side of its current location in order to provide adequate teeing area and improve overall surface levels. Aim to include tee renovations as part of the regular winter programmes to continue to improve the facilities at Wollaton Park Golf Club.

Fairways

- The extended hot and dry conditions of summer 2018 inevitably impacted the fairways but recovery is very encouraging. The vast majority of fairways present virtually complete grass cover with thinning areas largely confined to raise sections of the profile. The most severely impacted appears to be the 10th fairway and supplementary over-seeding operations have already been undertaken to further promote recovery and a successful seed strike is evident. Some localised supplementation of recovery works may be necessary with regards to further aeration and sand/seed integration.
- Plans to instigate a regime of brushing and verti-cutting are still relevant but should be reserved until fuller grass cover is established and strong growing conditions return. At present this operation would come via an external contractor as the required equipment does not form part of the Club's current fleet.
- Schedule ongoing autumn deep solid tine aeration for the fairways to promote better soil structure and drainage capabilities to support strong grass growth.

Bunkers

- Bunker redevelopment work has yielded some excellent results around the 9th green and further monitoring is required to ascertain the success of the new sand hazards and the requirements with regards the maintenance of the turf noses and surrounds. Of particular interest across the site at Wollaton Park Golf Club, is the influence of the deer as they traverse the playing areas and in particular with regards to steep bunker faces with respect to potential damage. This will have an impact on regular maintenance practices to preserve turf noses and the integral shape of the bunker itself. Exposed faces and bunker noses have understandably been impacted by the drought conditions of 2018 and some localised repairs will be necessary. It is important to ensure that there is adequate rootzone to support turf health in these exposed areas and an increased height of cut may be helpful to safeguard against future damage of this nature.

Rough

- The hot and dry conditions of 2018 have restricted growth in the long roughs and plans should be made to utilise the Wiedenmann Super 500, year-on-year with focused cut and collect operations. As previously advised, utilise the Uni-Rake to thin out the turf base and stand the grass up. Annual operations should help to promote a thin wispy rough which is aesthetically pleasant but not overly penal for the odd errant shot.

Woodland Management

- Remove the cherry tree, at the front left-hand side of the 15th green, as it is negatively impacting the turf surface resulting in increased pathogen activity and disease outbreak.
- Conduct a general audit of the woodland across the site to identify other specimens which are negatively impacting turf surfaces, presenting a genuine Health & Safety risk, affecting lines of sight or unduly influencing the strategy with which the course is played.

Plant & Equipment

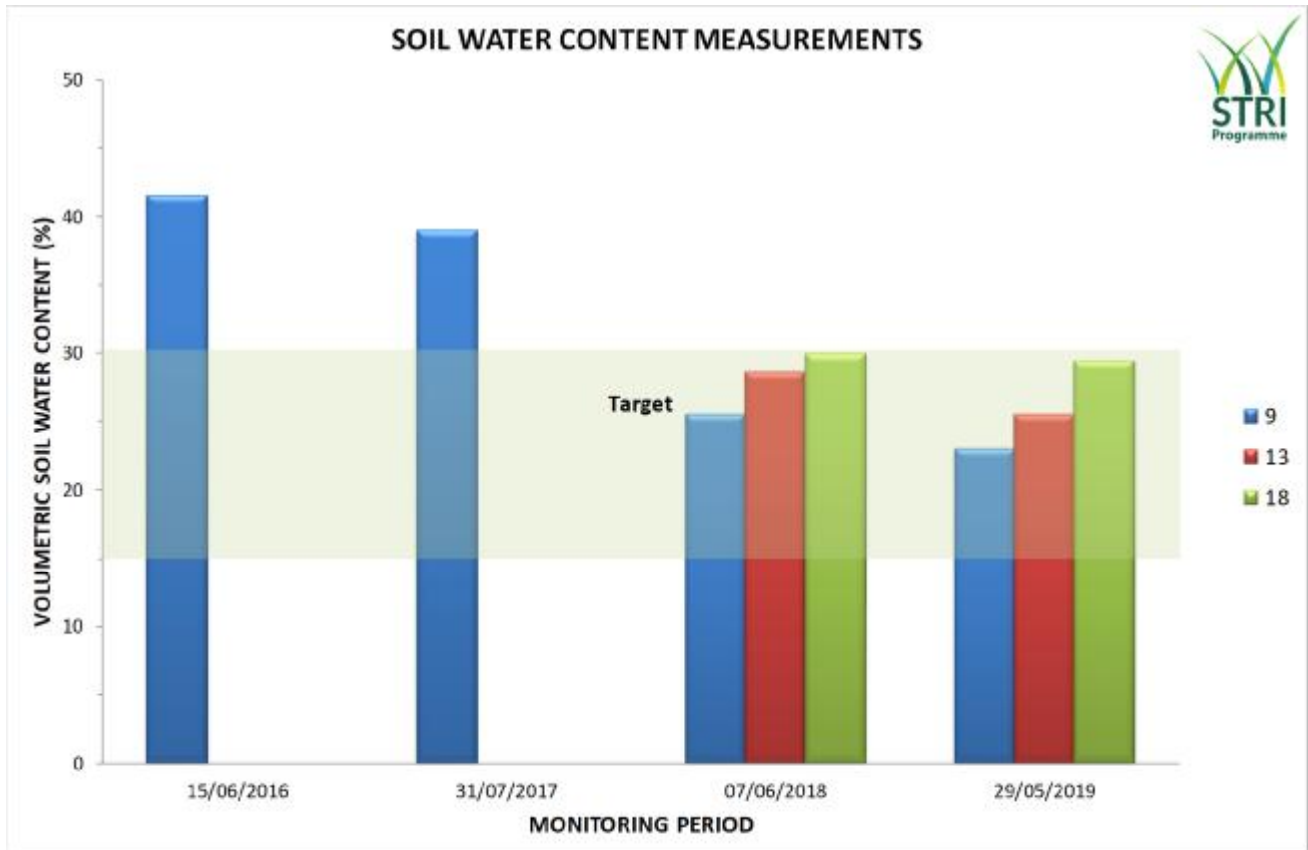
- Structured plant and equipment replacement programmes are absolutely essential to optimise maintenance practices at Wollaton Park Golf Club. The current tees mowers are reported to be some 12 to 14 years old and the fairway mowers are said to be of a similar age. Staged replacement is key to maintain the high standards expected and safeguard against possible breakdowns from ageing equipment.
- Particular pieces of key plant which would prove extremely beneficial would be a dedicated Verti-drain unit (i.e. Wiedenmann Terra-spike, or similar) and a brush attachment for fairways. This would lend greater versatility to the operation, particularly in light of the conditions experienced during last summer, to carry out essential operations when the limited windows of opportunity are available as opposed to relying on outside contractors or the loan of similar equipment from other neighbouring Clubs.

Signed

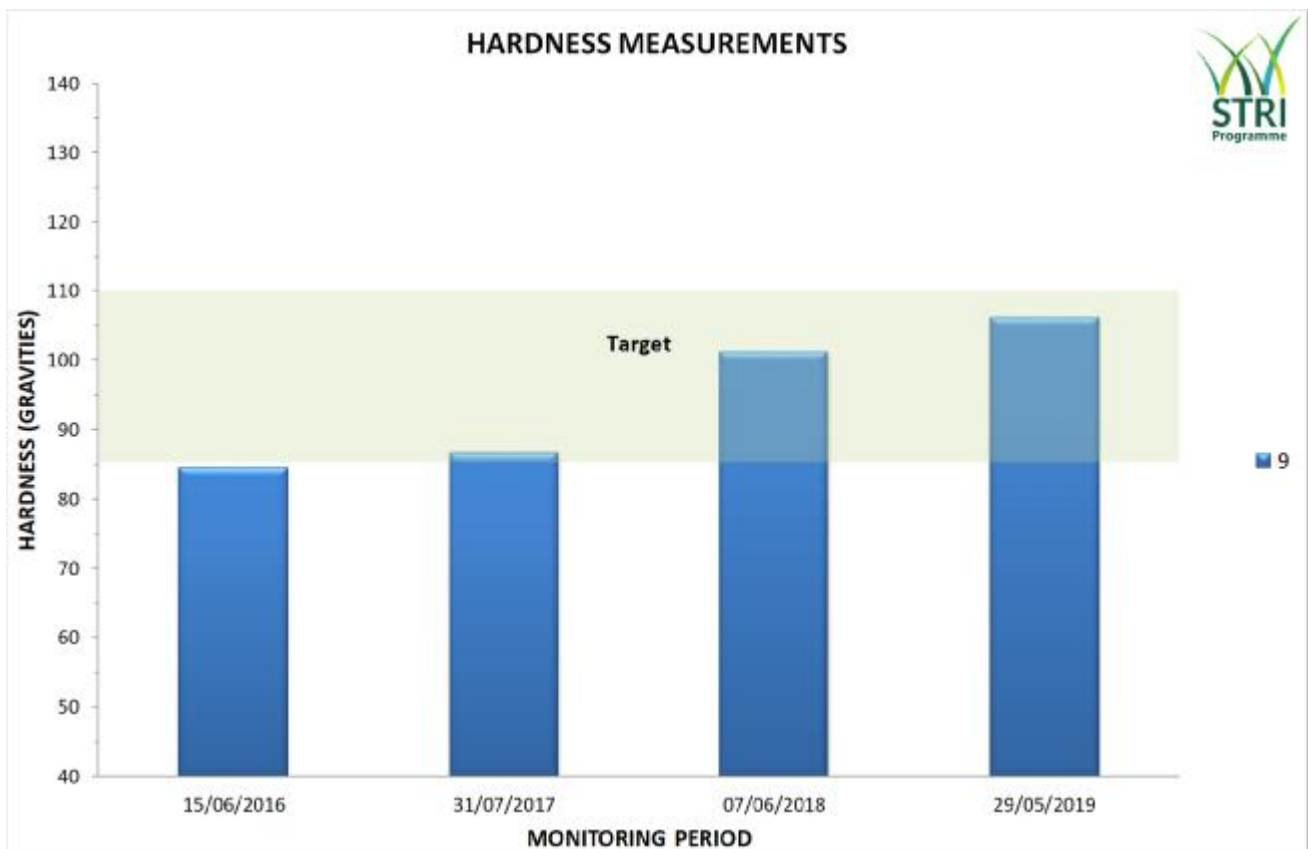
A handwritten signature in black ink, appearing to read "M. Boyes", written in a cursive style.

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Objective Data



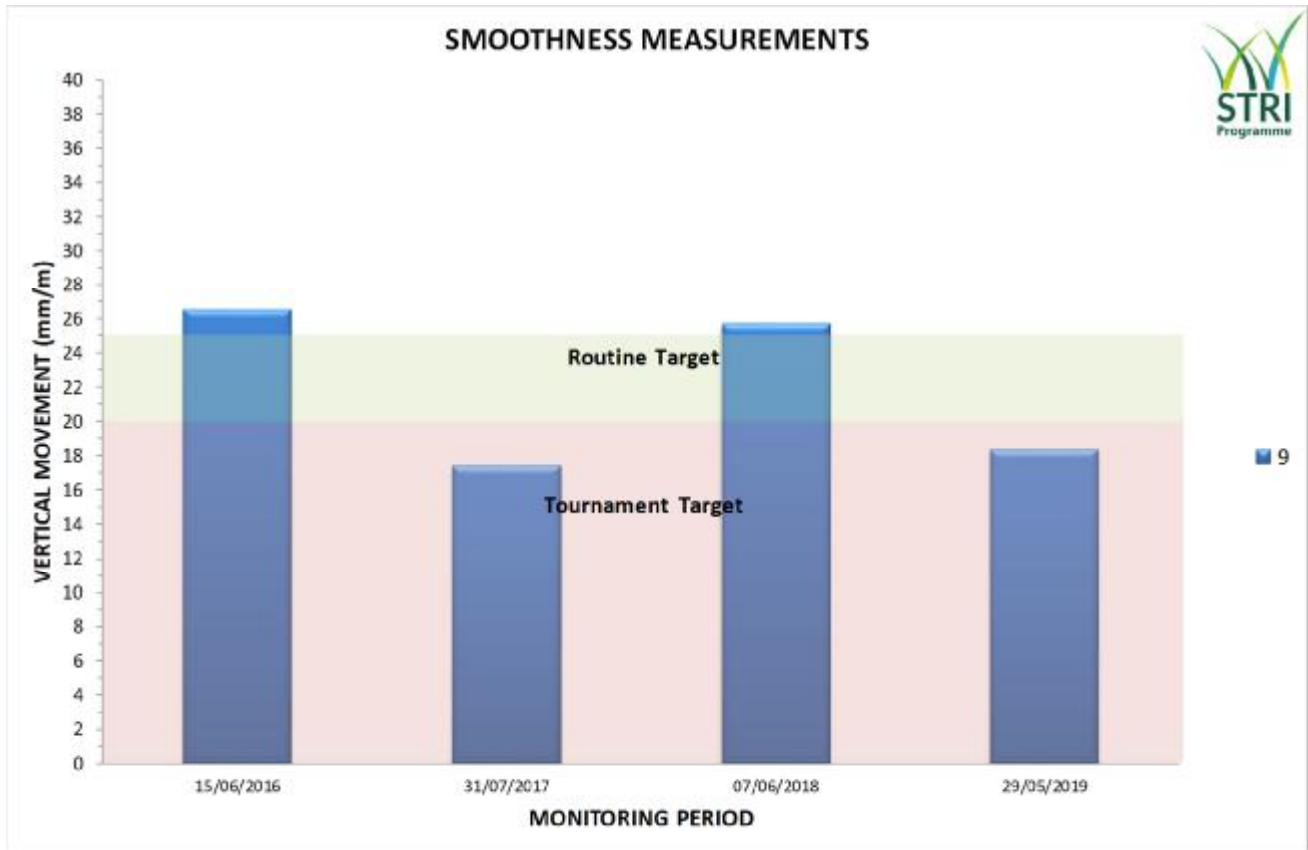
Average soil water content remains within target range for the three indicator greens tested on the day of the visit but is less consistent than last year. A greater than desirable variance was evident (i.e. 16-38%) between the individual moisture readings taken within each green and between the respective putting surfaces. Greater parity is key to consistent surface performance.



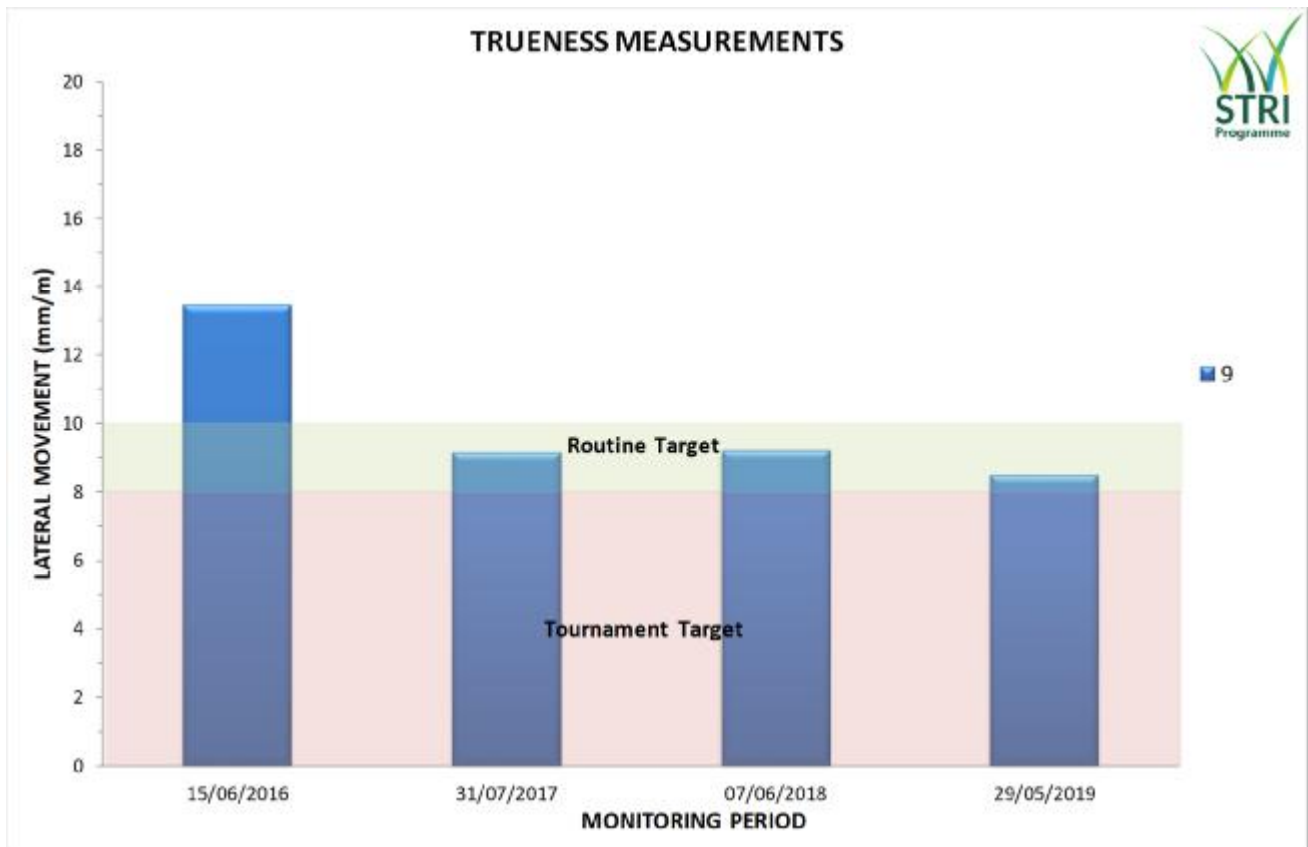
Surface firmness values have increased year on year on the 9th green to sit comfortably towards the top of optimum target range at an average of 26%. This highlights the importance of regular aeration and sanding practices which continually improve drainage characteristics to promote better moisture management, resulting in increased surface hardness and overall performance.

Wollaton Park Golf Club

Objective Data (continued)



Surface smoothness, at an average of 18mm/m against a target of less than 25mm/m, is back within tournament range which is excellent considering the relatively slow start to growing conditions this year and the recent prevalence of *Poa annua* seed head activity.



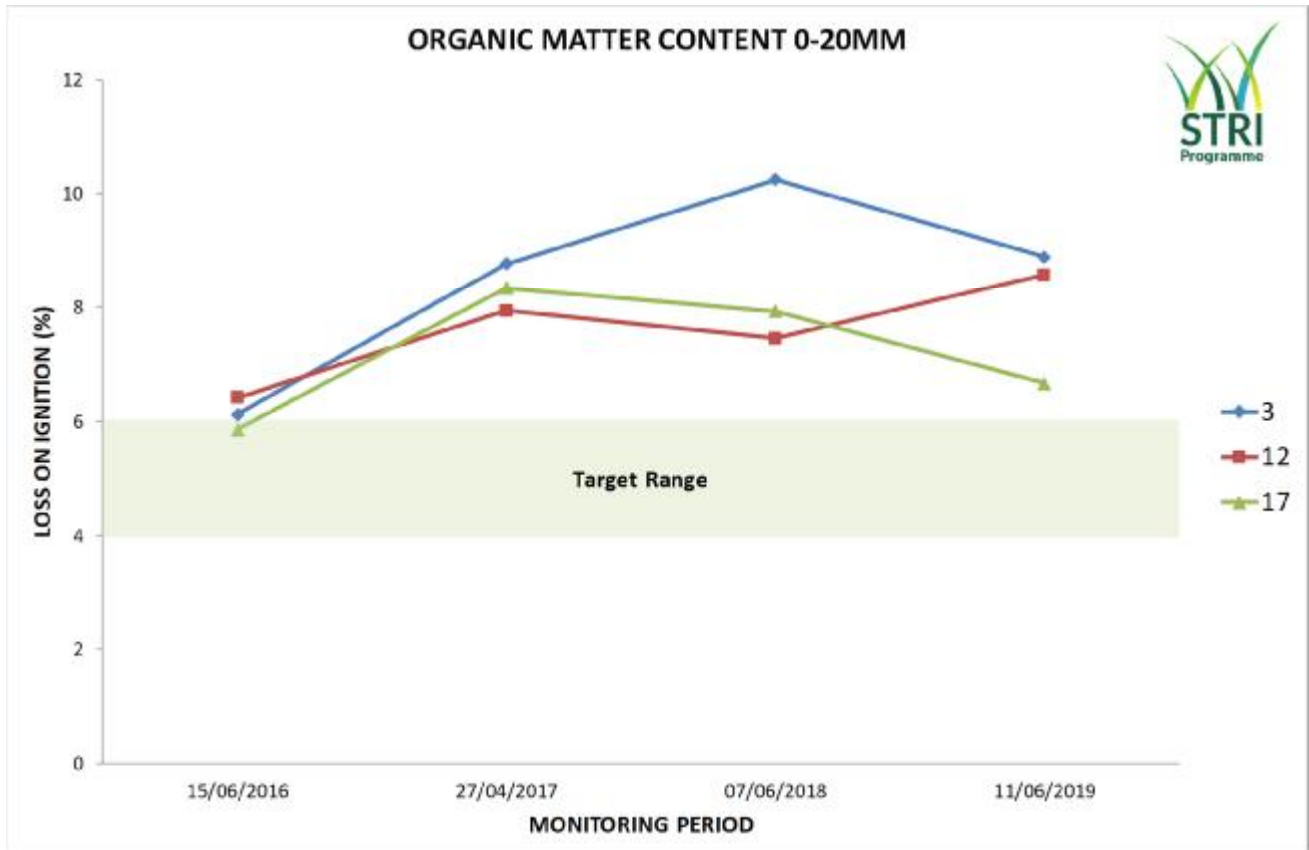
Similarly, greens trueness or lateral deviation on ball roll, has also improved to sit just above the tournament target range of less than 8mm/m. As stronger growth conditions return the imbalance between the growth rates of the respective grass which constitute the sward in conjunction with surface refinement practices and regular sanding so improve this further.

Objective Data (continued)

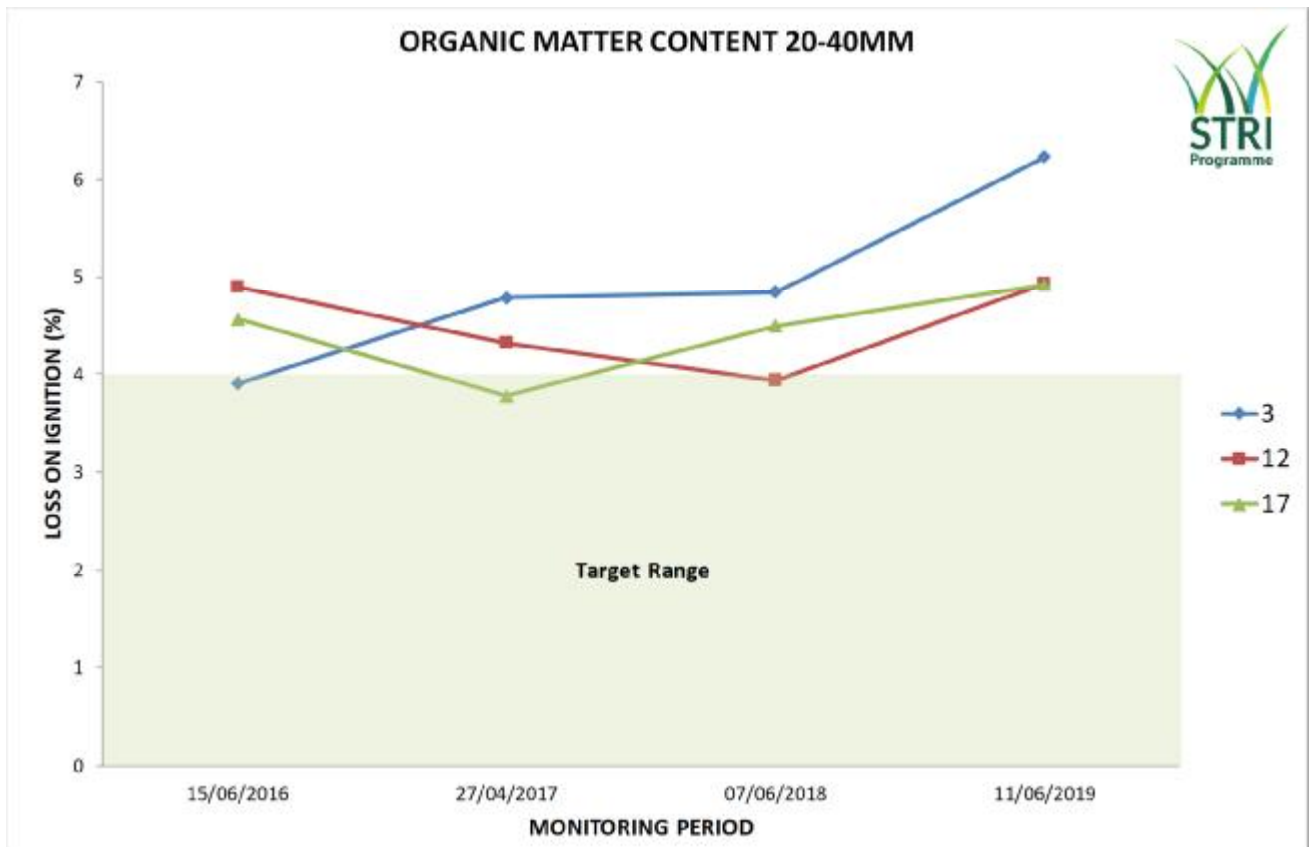


Green speed has improved significantly since last year and was recorded just above the tournament target ceiling of 10 ft 6 inches. It is recommended that a general target green speed of between 9ft and 9½ ft is more than acceptable for routine daily golf and enjoyable for all levels of golfer with the option to either double-cut or roll to get an extra 6 inches of speed for special events. This is particularly relevant as green smoothness and trueness is so favourable at present which can be quite daunting if green speed is also relatively quick.

Soils Laboratory Data

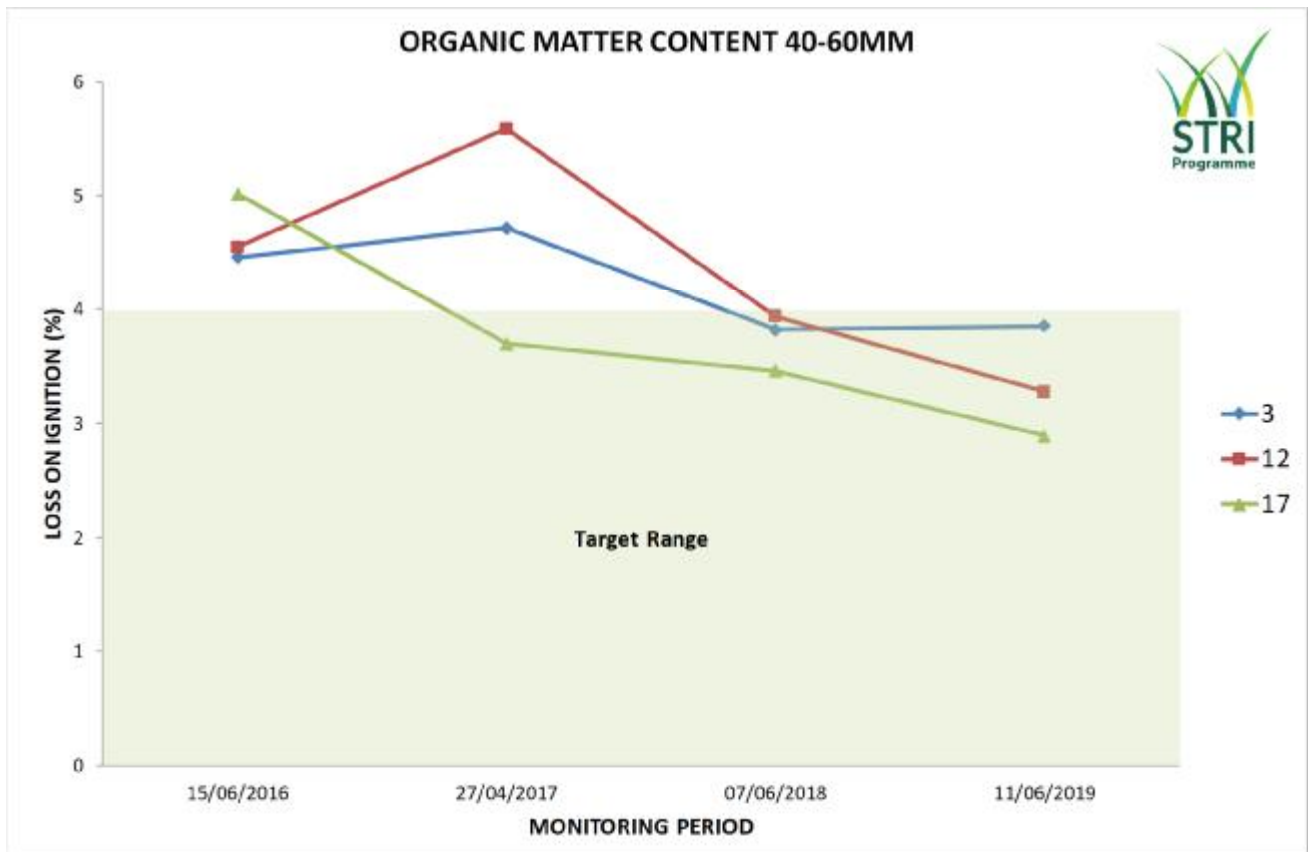


Mixed results were evident in the changes to organic matter levels in the top 20mm of the indicator greens. The 3rd and 17th greens showed encouraging reductions which is admirable given the increased water applications entirely necessary during 2018 to combat drought stresses which in itself contributes to thatch production, which could explain the slight upturn evident on the 12th green.

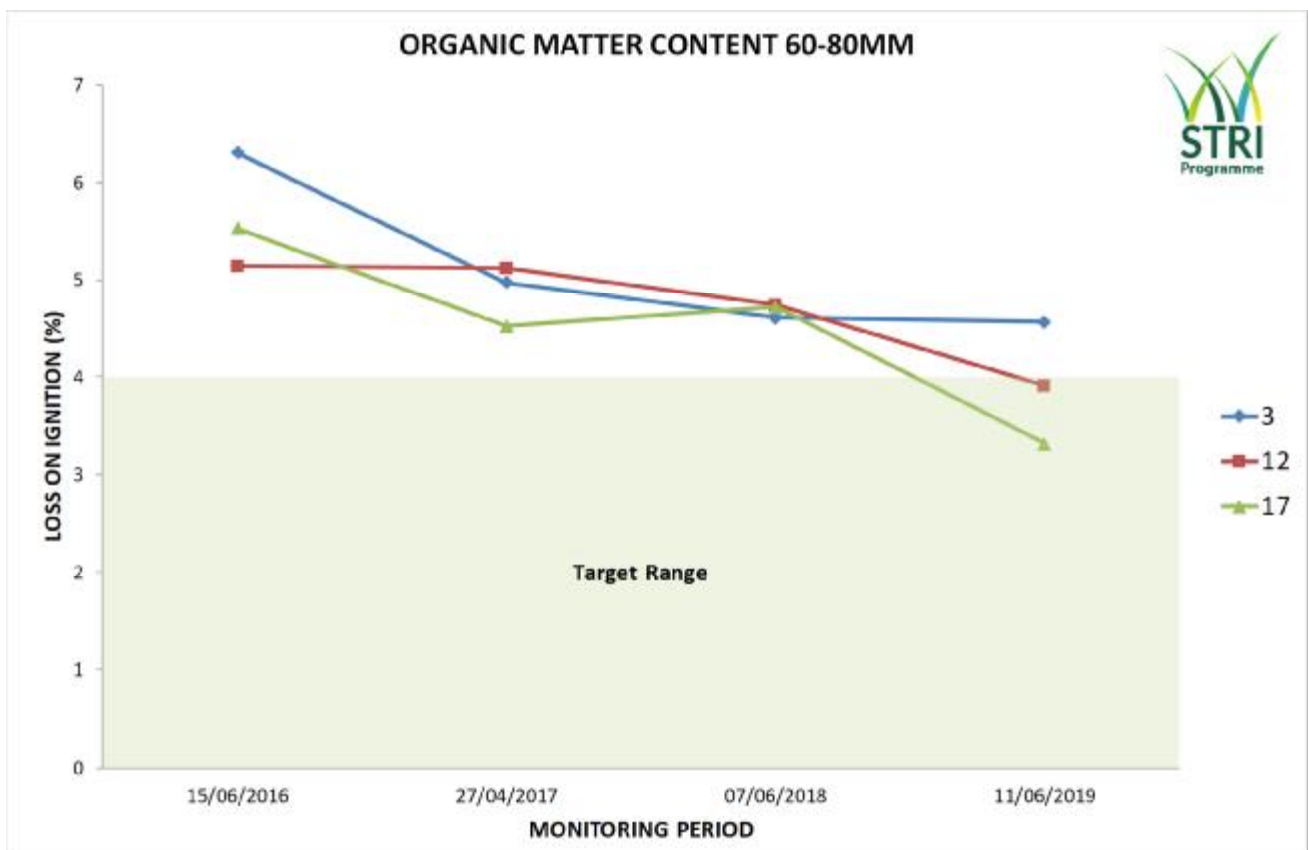


Thatch levels at the 20-40mm horizon have risen across all three indicator greens. This highlights the focus for continued aeration and sand integration to depth to promote the degradation of thatch and to improve drainage characteristics throughout the entire profile to support a strong and healthy sward and optimise surface performance.

Soils Laboratory Data (continued)



Thatch accumulation at a depth of between 40 and 60mm on all the indicator greens remains within target range, staying just below 4% on the 3rd hole and showing an encouraging reduction on both the 12th and 17th green.



At 60-80mm deep the organic matter levels have reduced marginally on the 3rd green but are still above optimum target range. Encouragingly both the 12th and 17th green at the same depth have seen thatch levels fall to sit within target but this does negate the need for continued aeration, using different tines and varied methods (i.e. Air2G2) to work the entire profile to depth.

ORGANIC MATTER CONTENT

CLIENT: WOLLATON PARK GC
ADDRESS: WOLLATON PARK,
NOTTINGHAM,
NOTTINGHAMSHIRE, NG8 1BT

DATE RECEIVED: 03/06/19
DATE REPORTED: 11/06/19
RESULTS TO: MEB

TEST RESULTS AUTHORISED BY:
Michael Baines, Laboratory Manager

CONDITION OF SAMPLE UPON ARRIVAL: MOIST

SAMPLE NO	DESCRIPTION	LOSS ON IGNITION (%) [*]
A17742/1	3 0-20 mm	8.89
	20-40 mm	6.23
	40-60 mm	3.85
	60-80 mm	4.56
A17742/2	12 0-20 mm	8.57
	20-40 mm	4.93
	40-60 mm	3.28
	60-80 mm	3.91
A17742/3	17 0-20 mm	6.66
	20-40 mm	4.92
	40-60 mm	2.89
	60-80 mm	3.32

* ASTM F1647-11 Standard Test Methods for Organic Matter Content of Athletic Field Rootzone Mixes (Method A)



Testing Certificate 2159 - 01

THE RESULTS PERTAIN ONLY TO THE SAMPLE(S) SUBMITTED AND TESTED

STRI

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SOIL CHEMICAL ANALYSIS

CLIENT:

WOLLATON PARK GC

RESULTS TO: **MEB**

DATE RECEIVED:

03/06/2019

Lab No.	Source	pH	P ₂ O ₅ (mg/l)	K ₂ O (mg/l)
A17742/1	GREEN 3	5.7	6	108
A17742/2	GREEN 12	5.7	8	123
A17742/3	GREEN 17	5.7	8	87

Mr M A Baines, Soil Laboratory Manager

THE RESULTS PERTAIN ONLY TO THE SAMPLE(S) SUBMITTED AND TESTED.

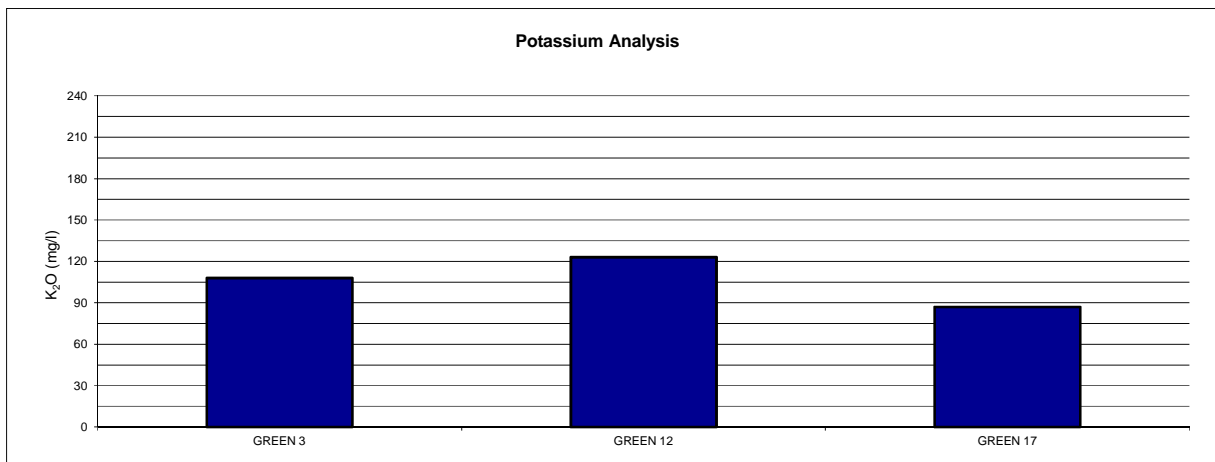
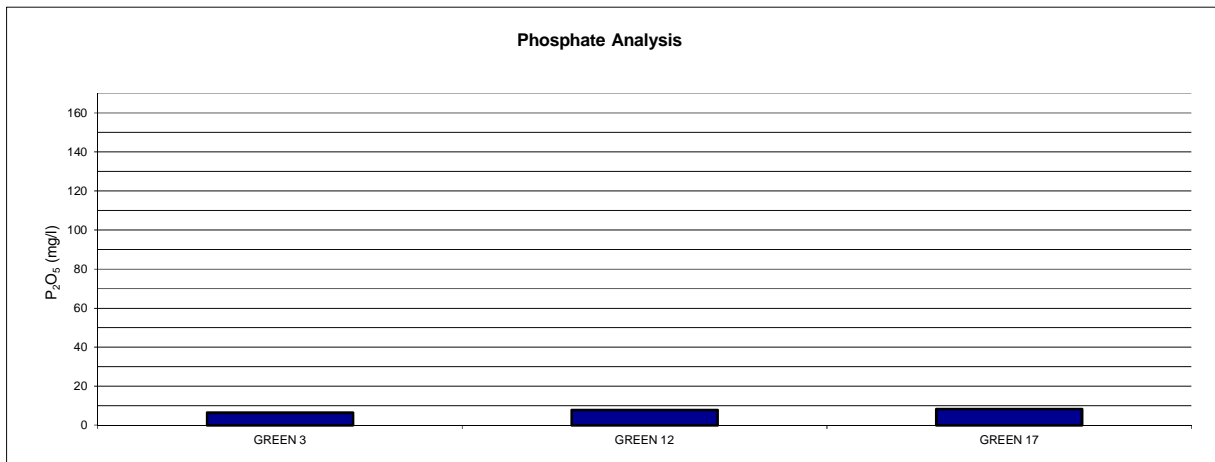
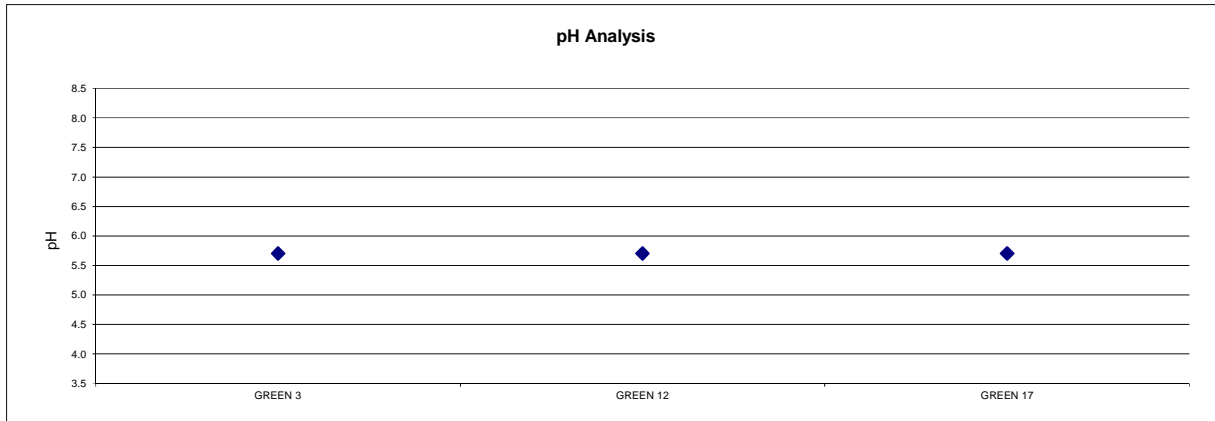
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SOIL CHEMICAL ANALYSIS

WOLLATON PARK GC

Date: 03/06/19



THE RESULTS PERTAIN ONLY TO THE SAMPLE(S) SUBMITTED AND TESTED.