



FAVERSHAM GOLF CLUB

**PSDLabosport
T2GBenchmarking Advisory Report**

MARCH 2016

**Professional Sportsturf Design (NW) Ltd
42 Garstang Road
Preston
PR1 1NA**

Tel: 01772 884450

Fax: 01772 884445

Email: consultants@psdagronomy.plus.com

FAVERSHAM GOLF CLUB

T2GBenchmarking Advisory Report

1. Introduction

The Club continues to enjoy continued periods of quality throughout the course which is a credit to all involved at the Club.

The overall condition of the course and specifically the Greens was very good and remains some of the best observed. This sets a strong foundation for the remainder of the 2016 season and allows more freedom to push the performance of greens.

The objective of T2GBenchmarking is the continued monitoring of standards and greens agronomic behaviour in order to decide on allocation of resource.

The following report outlines observations, test results and recommendations for the forthcoming months.

2. Executive Summary

- Overall, the greens appear to have benefitted largely due to the prescribed maintenance programmes and the commitment of the Club to these programmes which is a credit to the course team.
- Moisture contents and organic matter content continue to be within desirable target ranges.
- Root depths and density have improved in the last 12 months. It is recommended the Club continue with root development programmes previously prescribed.
- Some level of turf recovery on a section of the 9th green needs to be implemented to avoid further ingress of algae and silver tipped moss but other than this turf cover is in suitable condition throughout. Thinning of adjacent tree stand is recommended where possible.
- Renovations for April can be reduced in disruption and will allow the Club improved freedom to push greens performance in late February and March.
- Greens' Potassium and Phosphorous levels are slightly below ideal levels and will require improvement through 2016. PSD have provided a bespoke fertiliser programme.
- In addition continuation of frequent lighter applications of nitrogen and monitoring of clipping yields is recommended.
- Worm control has been a major issue due to winter weather conditions, this has occurred throughout the region. Strategies for control are recommended within the report.
- Trialling a hybrid system on the 16th tee was discussed to improve surface stability. Further information regarding this system is highlighted within the report.

- It is recommended the application of sand to walk off areas continues in conjunction with fertiliser and seeding applications as the Club continues to cater for increased winter wear.
- Reshaping of green surrounds was discussed, reducing these in and around green complexes will improve presentation of green complexes and turf quality.

3. T2G Benchmarking

Tee to green benchmarking (T2GBenchmarking) has the ability, to assist course managers and golf Clubs, in identifying a clear playing quality and agronomic position for both their greens and courses.

Determined in conjunction with the Club, the following benchmarking has been used as part of the advisory visit.

On Greens:

- Moisture content
- Root depth
- Species composition
- Organic matter content

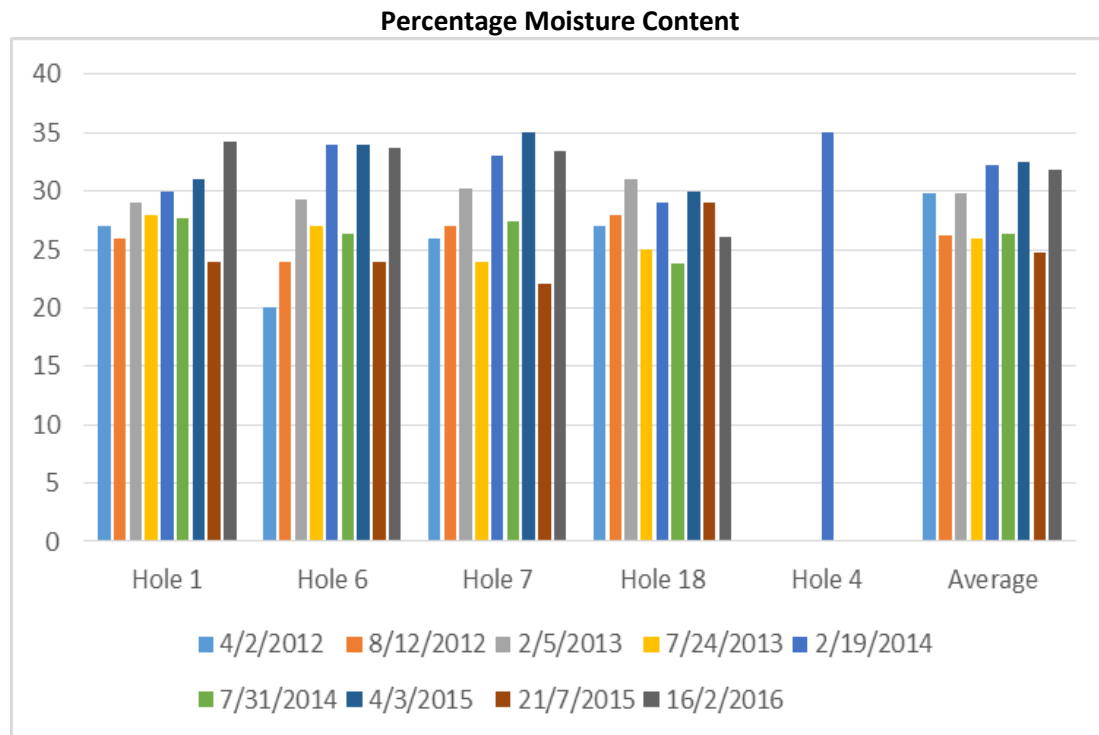
In addition, the greens were analysed for pH and nutrients. The greens were not measured for firmness due to presence of frost during the visit.

3.1 T2GBenchmarking Greens' Results

3.1.1 Greens Moisture Content

Moisture is an essential component in maintaining plant health and aeration, determining the firmness characteristics in greens. As important, moisture content if managed correctly can also manipulate the species composition in greens. Moisture content is measured using an internationally recognised, standard TDR100 spectrum moisture probe with 6.5cm deep prongs.

Volumetric Moisture Content	Target species	Playing quality
27% >	Encourages poa annua	Promotes soft greens
23-27%	Encourages bentgrass and poa annua mixture	Promotes moderate firmness
17-23%	Stresses poa annua and encourages bentgrass and fescues	Promotes firm greens
<17%	Drought poa annua and encourage fescues	Promote very firm greens



Average soil moisture content was again satisfactory and remained on a relatively similar level to the previous two winter time readings. This is especially impressive considering the record amount of rainfall that has fallen during winter. Only courses with USGA greens are managing to maintain these moisture levels.

Overall the readings shown above demonstrate an effective use of aeration and topdressing through the summer and are indicative of greens that sustain healthy infiltration rates in most situations. This should continue through 2016.

Overall winter moisture content is indicative of a healthy upper profile.

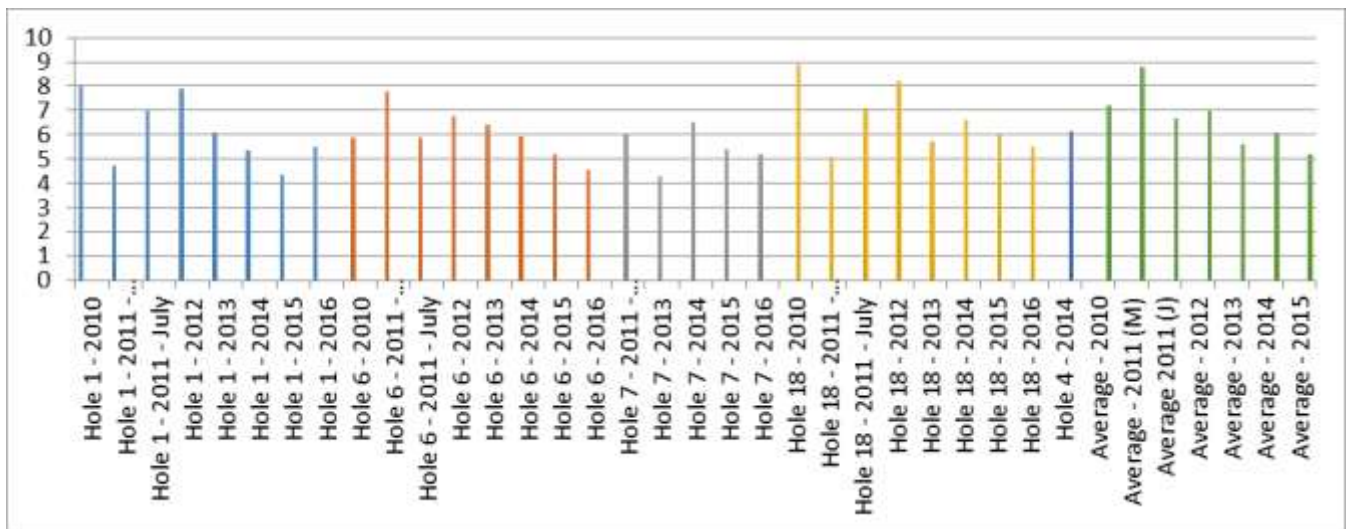
3.1.2 Organic Matter Analysis

Also known as thatch, matt and fibre, the management of organic matter in the soil profile is essential. Where organic matter increases above tolerable levels we will start to experience:

- Increasingly softer greens, especially in wet periods.
- Slower green speeds.
- Increased maintenance costs.
- Increasing chance of pest and disease outbreaks.
- More dry patch turf damage affecting turf quality and appearance.
- Increasing Poa annua content.

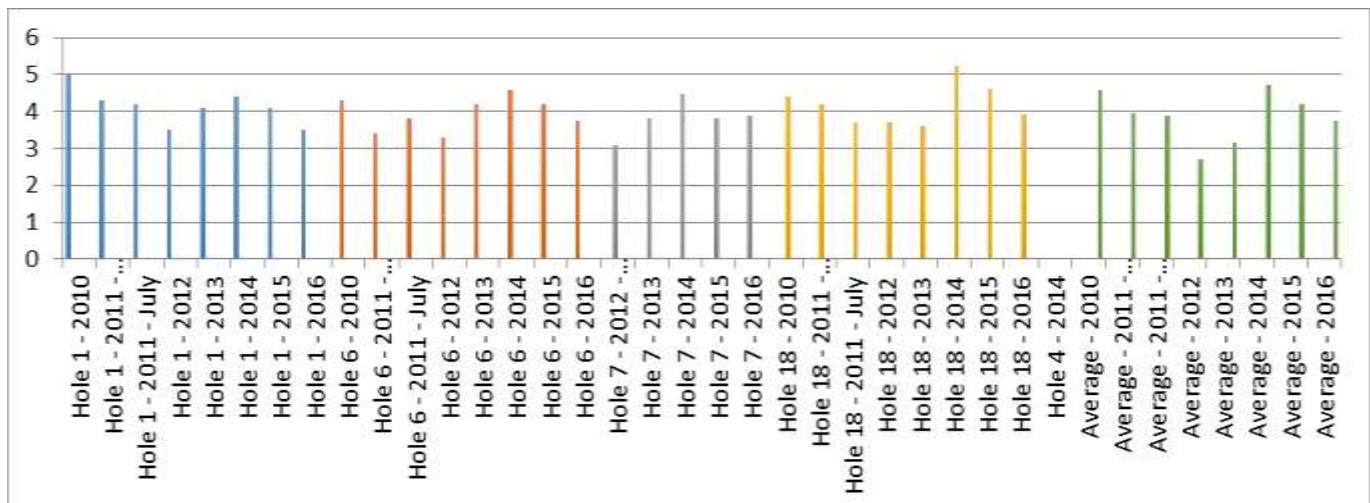
PSD Labosport measure organic matter content at 20mm depths in the soil profile, using Loss on Ignition methodology, to ASTM approved methods. Through this process, a detailed understanding of desirable organic matter levels and the effectiveness of renovations has been developed. The results from 4 greens at 0-20 and 20-40mm are presented in the following graphs with added comments.

Organic matter (%) at 0-20mm



- Average organic matter levels remain within desirable levels and continue on the overall trend of reduction.
- Continuation of application of sand topdressing volumes and consistent aeration practices will be important in maintaining these trends over the next 12 months.
- OM levels within hole 1 have increased but remain within desirable levels. Specific green topdressing volumes are not deemed necessary at this time and continuation of 18 hole maintenance strategy is recommended.
- OM content in all other greens has reduced in the last 12 months.
- A steady and ongoing reduction is desirable with a desired range of 4% and lower.

Organic matter (%) at 20-40mm

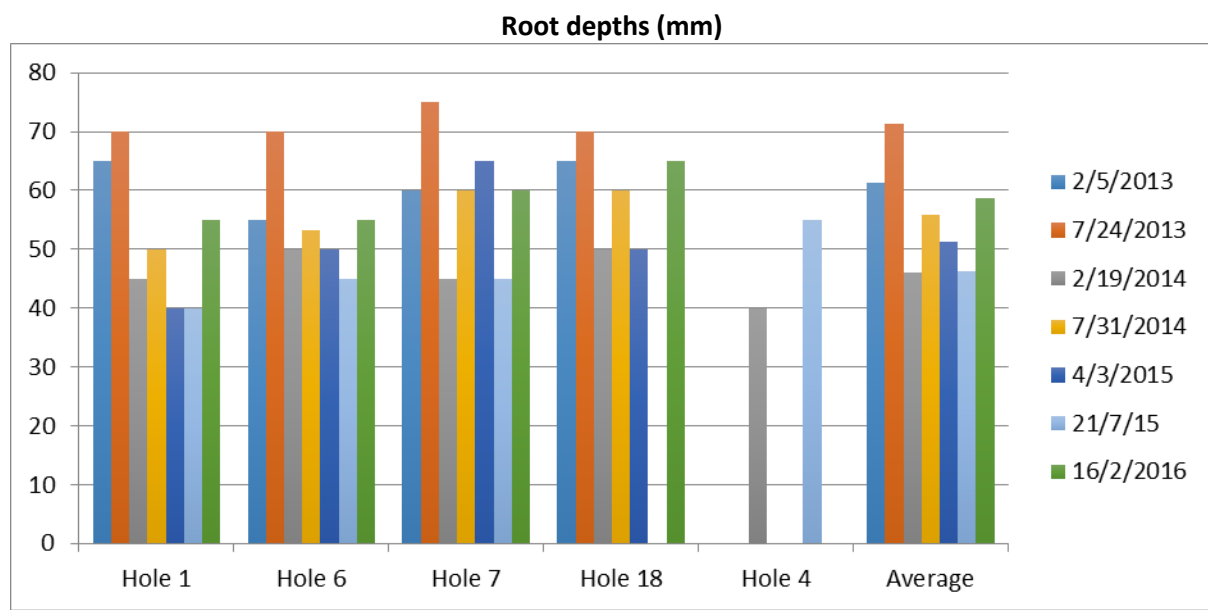


- Average organic matter levels remain within desirable levels at this depth.
- Each individual hole has seen the reduction or maintenance of organic matter content at this depth which is encouraging.
- The readings also highlight aeration practices and moisture management have been good over the last 12 months, despite unprecedented amounts of rainfall.
- Organic matter at 40-60 and 60-80 are well within desirable ranges.

3.1.3 Greens Root Depth (mm)

Roots provide access to moisture and nutrition. Deeper roots are highly desirable and encourage increased access to moisture and nutrients, making turf more resistant to drought and less dependent upon regular and/or high nutrient applications.

Where actively encouraging *Poa annua* greens it should be recognised *poa annua* rooting depths will rarely be beyond 60-70mm in summer and 50-60mm in winter due to the nature of the plant.



Root depths were improved on summer readings, again highlighting the benefits of undertaking regular aeration procedures through the growing season. The root depths noted were similar to 2013 levels which is close to the ideal levels for *poa* based greens in winter golf.

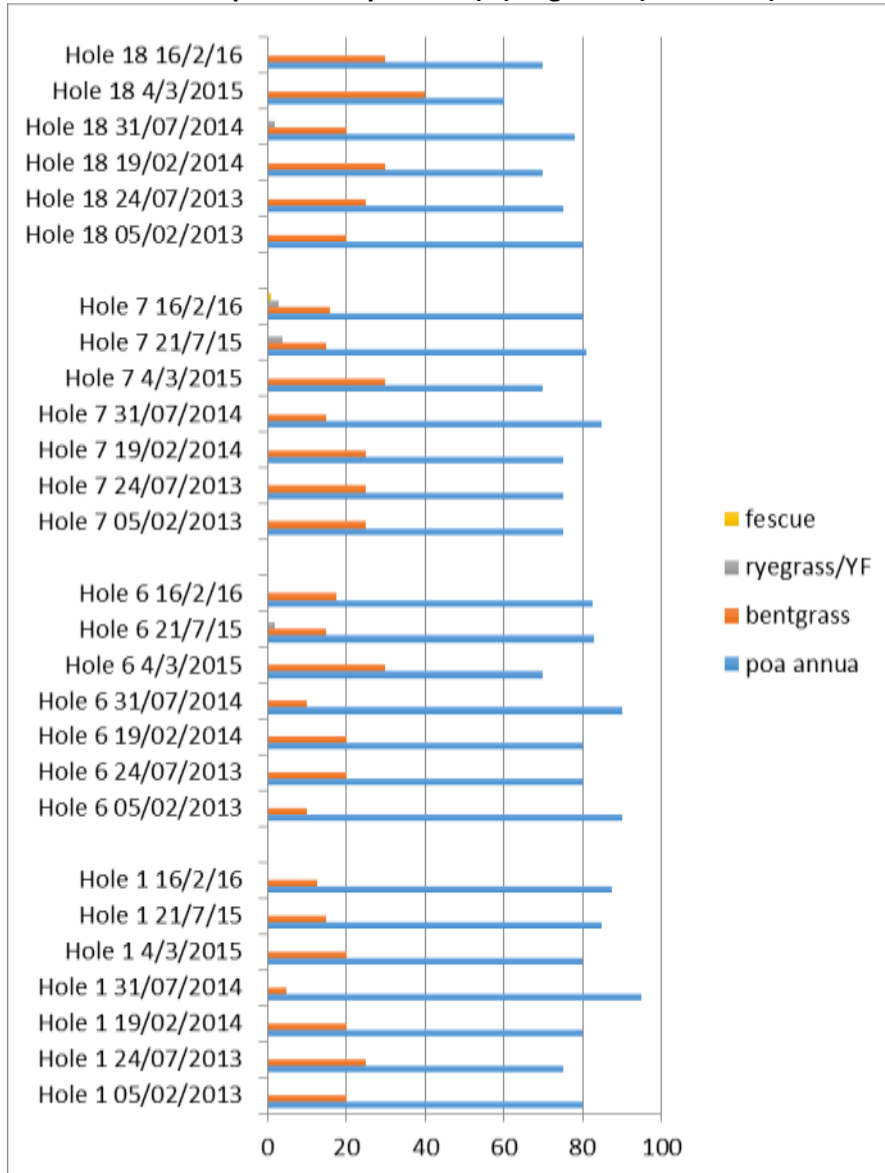
Root enhancement programmes continue to be encouraged to further increase root mass and depth where possible. This will also help reduce the occurrence of anthracnose during periods of high pressure in the summer and aid general plant health.

3.1.3 Greens Species Composition/Coverage

During the visit species composition was monitored and the levels of *poa annua* content noted. Species composition is monitored to detect broad changes across the greens.

We have historically decided collectively to manage greens for performance and accept any increase of *poa annua*.

Greens species composition (%) in greens (estimated)



Poa annua and bentgrass continue to be present in most greens at a similar level to previous years. The most notable difference during the visit was the continued presence of ryegrass and Yorkshire Fog on the 7th green.

Although this will have a slight effect on playability, it will have a greater impact on general aesthetics of the greens and where possible patches of Yorkshire fog in particular should be regularly raked and overseeded in an effort to outcompete this grass.

If possible, small patches could be replaced using a turf doctor or using turf from a nursery green. Taking this into account, the current levels of both grasses continue to be very low and incorporating targeted remediation at the next renovation may be a worthwhile exercise. PSD continue to endorse the use of Rescue the selective graminicide applied via knapsack to these areas.

3.1.5 pH and Nutrient Analysis

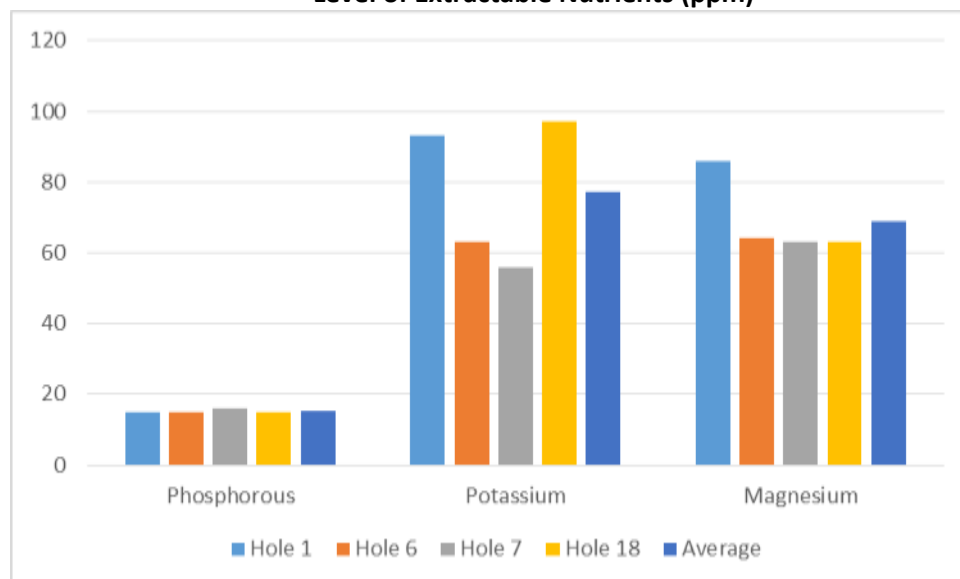
During the visit each tested green was analysed for pH level and nutrient availability. The pH level gives an indication of how acidic or alkaline a green may be. Too far either side of neutral (pH 7.0) and this will have an effect on natural break down of organic matter by soil living microorganisms and availability of nutrients. As a general rule, a pH range of between 5.5-7.5 is deemed satisfactory. As we are accepting poa annua, a slightly higher pH of 7 is desirable.

Nutrient availability analysis gives an understanding of how fertiliser inputs will require management through the upcoming growing season. The ideal scores for potassium and phosphorous within fine turf are given in the tables below. Where readings are low, these will require increasing to satisfactory levels. Ideally, lab analysis of available nutrients should be taken once every 12 months where possible.

Target ranges for Phosphorous and Potassium

Category	Phosphate P ₂ O ₅ mg/l	Potassium K ₂ O mg/l
Very low	0-15	0-35
Low	16-30	36-60
Medium	31-50	61-90
Satisfactory	51-80	91-170
High	>80	>170

Level of Extractable Nutrients (ppm)



Phosphorous

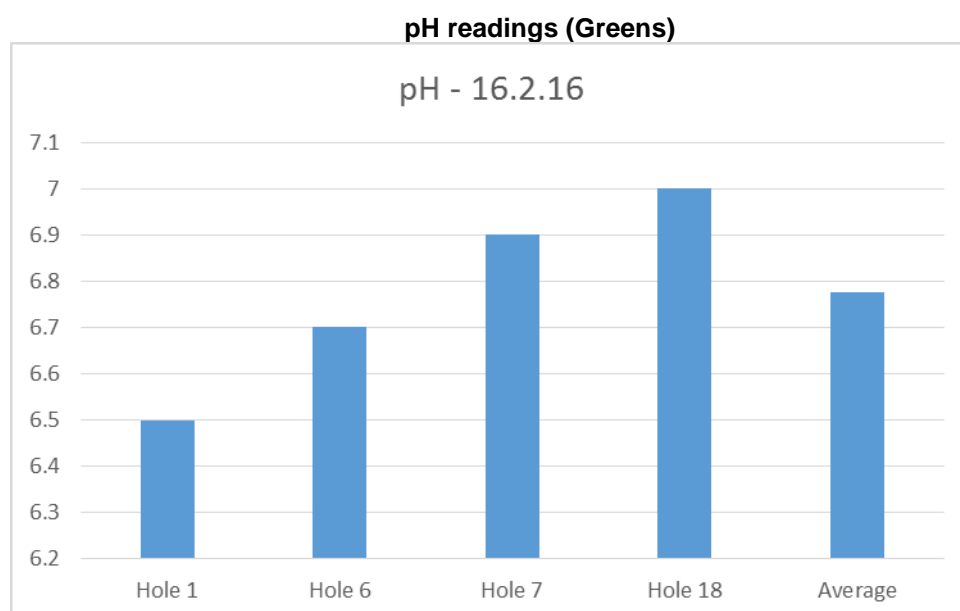
- As can be seen above, Phosphorous levels are below ideal levels.
- The average score between all greens was 15.25mg/l, with a range of 1 between all readings.
- It is advised that an application of a phosphorous containing fertiliser (10:10:10) is applied to the greens in spring, as recommended later within the report (section 4.1.2) with renovations. This should be repeated in august as well.
- No further action is required.

Potassium

- Potassium levels on average fell within the 'medium' availability although they will require improvement.
- Due to the inherent solubility and leaching potential of this nutrient, it is advised that potassium inputs are increased slightly over the coming year to approximately 200 units of Potassium over the following 12 month period.
- This is also considered within section 4.1.2 below

Magnesium

- Magnesium levels are currently deemed adequate (the ideal level is approximately 54ppm) and will not require significant alteration. No magnesium should be added to allow these to drop a little to aid the K and Mg ratio.
- This will require monitoring next year.



All of the greens were very similar in their respective pH analysis results and fell within the suitable target range of 5.5-7.5 for fine turf. No further action is required.

Interestingly, the pH results are slightly acidic despite the generally chalky parent material in the area. This will have an advantageous effect on worm control on greens which was noted as an issue during the site visit. It is expected once irrigation applications commence this will increase with alkaline borehole water. However if this continues a switch to non-acidic forms of fertiliser will have to be considered in 2017.

3.1.5 Greens Turf Cover

Grass coverage was generally excellent, being close to 100% in most situations. The back section of the 9th green remained the only area that was suffering from an amount of turf loss and corresponding ingress of silver tipped moss.

Where possible, these areas should be frequently raked and overseeded to ensure recovery in 2016. It is especially important to remove silver tipped moss where possible and an amount of hand weeding to ensure sufficient removal would also be beneficial. Use of Mogeton will also effectively manage moss content.

It is PSD recommendation to switch from overseeding with bentgrasses to 'Twoputt' meadowgrass (poa annua). It is felt the 9th green has continued to struggle slightly due to levels of shade across the green from early autumn to late spring. This remains an issue despite recent thinning of the adjacent tree stand.

The pictures below highlight the difference between the 18th and 9th greens in terms of shade ingress. Overseeding with fine leaved meadowgrasses will provide a competitive advantage over bentgrasses which can struggle in areas of shade. Further thinning of tree cover where possible is also advised.



Examples of excellent greens coverage (left – 18th Green) and shady conditions on 9th green (right – 9th Green)

3.1.6 Walk-off Areas and Worm Casting

It was reported by the Club that the application of sand on walkways had allowed for reduced surface smearing and improved turf retention through winter. It is PSD recommendation to continue with the sanding operation on walkways where possible and also to continue to manage course usage with roping and trolley/buggy bans etc. immediately following heavy rainfall and frosts. This will help reduce wear throughout the course.

Worm casting is a continuing issue on site through winter, especially on tees and walkways. With reduced chemical options, worm casting is becoming more of an industry issue.

At Faversham the naturally alkaline soil pH, record rainfall and mild temperatures through winter have further encouraged worm casting. It is PSD recommendation to look to try and acid based fertilisers (such as iron sulphate) immediately prior to applications of Carbendazim during the high risk period for casting. Increasing frequency of application to 3-4 per year should be sufficient.

In addition, switching/caning of the tees and affected areas should be carried out during morning course set up and prior to mowing operations.



Worm casting on 7th tee

Tourturf Tag have produced a number of granular products which have been shown to force worm casting and reduce worm populations' overtime. As an accompaniment and alternative to Carbendezim feedback would indicate a trial of the product in 2016 would be worthwhile.

4. Discussion and Recommendations

4.1 Maintenance objectives

From the site visit the following is a list of priorities and goals for the 2016 season:

1. Recovery of full grass cover on 9th green.
2. Reduce height of cut on greens to promote speed and smoothness in March.
3. Fertiliser inputs and monitoring of clipping yields recommended.
4. Continuation of sand topdressing amounts and wetting agent programmes
5. April 2016 renovation
6. Further development of root system
7. Worm casting control and trial of Tour Turf Tag Pro
8. Review green complex mowing procedures and patterns
9. Recovery plan for walk-off areas and continued preparation for 2016 winter
10. Consider Hybrid option on 16th tee

4.1.1 Recovery of grass cover on 9th green

1. Overseed these areas with recognised 'Twoputt' poa annua seed. Overseeding of the areas will be required in conjunction with raking every 3-4 weeks until full turf cover is achieved.

2. Spot fertilising increasing the rate of growth in existing plants to promote recovery is recommended. Applications of renovation fertiliser ASAP after the visit is recommended to drive growth.

3. Further thinning of adjacent tree stand. Where possible look to reduce the tree coverage to a level where there is at least 50% improvement in light levels.

4.1.2 Fertiliser Inputs and Monitoring of Clipping Yields

Following receipt of the nutrient analysis, the application of Potassium containing fertilisers will be a key component of the fertiliser programme in 2016. In addition, Phosphorous levels will require improvement to help sustain the levels of meadow grasses currently within the greens.

As such, PSD have provided a bespoke guideline fertiliser input table for the months February to December. Please see below:

Fertiliser	Rate (kg/ha)	Months of year												Total Annual N	Total Annual K	
		F	M	A	M	J	J	A	S	O	N	D	J			
Fert 10:10:10	250			x1					x1						50	50
Liquid fert 1						x2	x2	x2	x1	x2					50	55
Liquid fert 2			x2	x2	x1										20	90
Liquid fert 3		x1									x1	x1				28
Iron Sulphate		x1							x2	x2	x2	x2			120	229
Liquid fert 1 - 25kg/ha Ammonium sulphate and 12kg/ha Potassium sulphate																
Liquid fert 2 - 25kg/ha Potassium nitrate																
Liquid fert 3 - 20kg/ha Potassium sulphate																

The monitoring of clipping yields should commence as soon as possible to provide a day to day understanding of how the greens are reacting to fertiliser inputs. The target remains to keep application frequency of nitrogen containing fertilisers to approximately 1 in every 10-14 day cycles.

Monitoring clipping yields will allow an immediate understanding of why greens are slow or quick. As a guideline, greenstaff should be removing between 1.5-2 boxes of clippings for all 18 greens throughout the spring/summer/early autumn periods, excluding renovations where bursts in growth are desired for recovery. This can then be used as a guideline for input requirements from this point.

Utilisation of this method will also help ensure that green speeds remain close to target ranges.

4.1.3 Sand topdressing

With reduced renovation intensity proposed for 2016, an increased emphasis on dilution is required. The following sand topdressing is recommended for 2016.

Month	J	F	M	A	M	J	J	A	S	O	N	D
Topdress		5	5		10	10	10		7	5		
Renovation				35/40				35				

4.1.4 Wetting agent

Due to the well aerated healthy rootzone, as has been experienced historically, Faversham continues to be at high risk of dry patch and fairy ring disease.

As per usual we advise the Club to get their irrigation system started early (March) and commence wetting agent applications on ASAP.

It is recommended the Club commence a wetting agent programme in March using a reputable product such as Breaker, Revolution, Qualibra, H2Pro on a monthly or three weekly basis until at least August.

Irrigation should also be up and running by early March unless extreme cold weather is foreseen.

4.1.5 April Renovations

Given the current status of the greens, it is felt the renovations can continue to follow a reduced programme of works in comparison to previous years. This is a credit to the work and commitment of the Club to previous recommendations. Please see below for recommendation:

2016 April renovation – Solid tine and topdress

1. Apply a 9:7:7 (or similar) granular fertilizer at 250kg/ha a minimum of 5 days prior to renovation.
2. Ensure greens are actively growing and no dry patch is present.
3. Verticut greens with 1-2mm blades in three directions to a depth of 3-4mm and 10-15mm spacings.
4. Solid tine greens with 12-14mm tines to a minimum depth of 40mm at maximum 35x35mm spacing. For worst/moisture retaining greens carry this operation out 3-4 times at a slightly different angle for each pass.
5. Sand dress greens with 35-40t/ha.
6. Brush sand into the profile (using counter rotary brushes) to fill scarification lines and tine holes.
7. Roll surfaces to smooth.
8. Apply additional sand dressing to smooth the surface 5-10 days post renovation and repeat as required.
9. Spoon feed nitrogen (ammonium & potassium sulphate) as required to promote turf growth and recovery.

4.1.6 Development of root system

Although root depths were at a satisfactory level, it is felt the continuation of root development procedures will be required through the growing season. Whilst increasing root depth and density is not achieved instantly, applications of cold treated seaweed, humic acids and liquid mycorrhizae (in a tank mix if possible) as a bi-weekly operation would be beneficial. These can be combined with scheduled fertiliser programmes where products allow.

Working the applications into tri-weekly spike, cut and roll operations would allow the tank mix to reach further into the profile than if applied directly onto the surface and watered in.

In addition to product based programmes to improve rooting, it should be understood the majority of benefit will come from creating physical channels. The Club should continue routine spiking with 8-10mm tines between renovations where possible. Pads of intensely spaced tines can be purchased to increase the impact of what is otherwise very low impact works.



Pads of small tines achieve double the impact with each pass.

4.1.7 Worm casting control

Faversham Golf Club continue to experience challenges with worm control on green to tee areas and tees in particular. Reaction to use of Carbendazim was mixed.

A review of spraying practices was conducted and no specific issues appear apparent with use of 'pH buffer agents' being implemented. For additional consideration, use of Iron Sulphate can be made 1 day prior to Carbendazim use to further acidify the surface pre-application. This can help achieve further longevity. Increased frequency of applications can also be carried out.

Turftour Tag 'organic' worm suppressant continues to receive positive feedback elsewhere and it is recommended where suitable that this is utilised at Faversham. A trial should be implemented in 2016 on key areas going into winter.

It is apparent if the Club wishes to sustain winter turf standards and subsequently improve spring conditions, worm control will have to be considered. At present this is having a noted impact on turf quality in localised areas of the course.

4.1.8 Bunker drainage

It was reported during the site visit that a number of bunkers on site had suffered from retention of water during the winter period. This is not surprising given the unprecedented amount of rainfall.

Drainage was discussed and it was felt that on top of ordinary maintenance, improvement in bunker performance could be achieved with minimal disruption. This is best carried out in September/October.

Due to the presence of chalk within the course, location of outlet chambers should not be a requirement for drainage installation. Where possible, the following procedure should be undertaken within bunkers where drainage is required:

- 1) Build soakaway
- 2) Remove bunker sand using a digger/back actor
- 3) Cut trenches for drainage installation
- 4) Lay pipes and connect into main collector drain
- 5) Feed the main collector drain to the soakaway
- 4) Backfill with grit and rootzone (where required) and seed drain lines where appropriate (PSD advice on suitable specifications of grit and rootzone backfill can be provided as required)
- 5) Refill bunker and consolidate sand

Prior to soakaway installation a soakaway test should be carried out by a civil engineer in areas suitable to service bunker complexes where appropriate.

As an example of typical cost, pipe installation is approximately £8/linear metre (contractor costs) and soakaway installation is approximately £600-800 or more depending on the dimensions required.

Where required PSD can provide specifications and further advice on drainage instalment.

4.1.9 Green Complex Mowing Procedures and Recovery Plan for Walk-off Areas

The singular collar cut surrounding the greens was discussed during the visit. This is the normal presentation on most courses in the UK at the present time, particularly in a parkland setting.

Improvement of the immediate 10m green surrounds is possible and can be achieved by bringing fairway cuts around the green into these areas. In addition to this green to tee traffic areas are also under consideration.

Carrying out the following procedures will help improve turf quality within these areas.

Fertiliser & growth regulator

Spring 2016 (April) – Apply a 7:0:14 or similar at 250kg/ha.

Summer 2016 (May-Sep) – Commence applications of 30kg/ha Headland Xtend and 1.4L/ha Primo Maxx (or similar).

Autumn 2016 – (Oct-Nov) – 2 x applications of 25kg/ha of Iron Sulphate. Small amount of nitrogen as required.

Cutting heights and frequency

Presently immediate green surround is treated as a 'cut rough' immediately outside the collars. There is an ability to drop these areas down to fairway/collar height once irrigation is in place to prevent turf cover loss.

Whilst some work on irrigation heads and system extensions are required, it is PSD's opinion some work can commence on this to facilitate reduced height of cut in the next 1-2 years.

Careful consideration will be required to shape cutting patterns such as to facilitate reduction in heights and similarly where to leave at current heights.

- It is recommended flat and low areas be gradually reduced to fairway height through the course of 2016.
- Where feasible mounds should be left and cut at rough height, to avoid turf cover loss.
- As an option where hand watering can be sustained/is available mounds could also be reduced down to height.

Some amelioration and additional amendments such as green water could be solid tined into top of mounds to help with moisture retention. This could be carried out 2 x annually. In addition mowers may need to be reviewed to allow for effective mowing over some mounds to avoid scalping.

Sand topdressing/Overseeding

It is recommended during the height reduction process that 2 x topdressing with 5-7mm of is carried out per annum.

This should commence on green to tee traffic areas usually subject to high turf cover loss during August and again in October to build a 'clean' sandcarpet going into winter pre-worm and traffic activity.

In addition, perennial ryegrass seed (where appropriate) should be drill seeded into these areas at in conjunction with sand topdressings. A seeding rate of 20g/m² should be sufficient for the first overseeding procedure.

It is recommended where undertaken that the 1st or 18th greens are trialed first.



Typical collar cut that merges directly into the semi rough

4.1.10 Use of Hybrid Option in 16th Tee

It was confirmed during the visit that the 16th tee had struggled with loss of coverage due to poor establishment of grasses and surface stability. This is not surprising given the microclimate and the hole being a par 3. It was agreed that where required a trial of the Motz-Hero system could be undertaken in an effort to improve this.

Product description

An artificial knitted carpet between 40-60mm deep that is topdressed with rootzone and established with natural grass. Artificial fibres extend through the rootzone but provide high levels of inherent stability and a synthetic turf cover. The number of fibres can be altered to suit the application. There is no backing of the system to allow root development following installation. The system can be grown in situ or off site and turfed as required. In FGC's case it would probably be preferable to grow-in onsite.



Fibre and backing of Motz Hero system allowing improved development of root system

Works would include:

- Strip surface vegetation
- Add rootzone material to base and build up levels
- Install drainage (if required)
- Amend irrigation heads
- Apply sand carpet
- Install Motz Hero carpet

Where the Golf Club are interested in carrying out this trial they should contact PSD to confirm. Prices for installation or supply can be forwarded at this point. If undertaken, it is believed the Club would be the first golf Club to utilise this system in the UK.

5. Summary of Visit

Faversham Golf Club is at a point where greens performance is starting to plateau at a very good level following a period of improvement. Much of this is due to the Course Manager and his team continuing to be committed to the proposed working programmes.

At present the greens are in excellent condition and continuation of previously stated maintenance procedures can be undertaken.

The improvement in the greens allows more freedom for improvement works to be implemented on other playable areas including tees and green surrounds. Where possible, the 16th tee can be trialled with installation of hybrid systems. This will aid surface stability on the tee where grass coverage is difficult to maintain. The maintenance procedure for green surrounds and walk-off areas will provide an improved aesthetic appearance and retention of turf coverage. Worm cast control will be a key part of this.

The nutrient analyses undertaken during the visit highlights that the greens are in a stable condition but will require improvement in phosphorous and potassium content over the following 12 months. A bespoke fertiliser programme has been provided to allow for suitable growth through the 2016 season. It is PSD recommendation that clipping yields are monitored to ascertain when fertiliser inputs are required.

Further advice is contained within the report to help with projects the Club are thinking of undertaking throughout 2016 and beyond. Should you require any further assistance through the year, please do not hesitate to contact us.

C Henderson & J Brierley
March 2016
G/018/FGC/294/R/160321