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MILFORD HAVEN GOLF CLUB

Advisory Report on the Golf Course

Report Date: 21st May 2018
Consultant: Paul Woodham

Milford Haven Golf Club

Date of Visit:	Tuesday 1st May 2018
Visit Objective:	Review of course condition and agronomic performance.
Present:	David Evans – Club Manager, Kevin Rawlins – Course Manager Paul Woodham – STRI Ltd.
Weather:	Dry. No significant rainfall during the week ahead of inspection. Prevailing and extended wet and unseasonably cold winter/spring conditions.

Headlines

- Club objectives for continued improvement include; 1. Achieving greater consistency in green performance (firmness, speed, smoothness), 2. Improving tee surface levels, and 3. Improving bunker playability and sustainable maintenance. Other objectives are noted in the Clubs very comprehensive and well written Course Policy Document, but the focus should be on these three key areas.
- The course is kept very tidy with past investment in green reconstruction serving the Club well. More recent investment in the extension of cart paths is also a wise move.
- 1. All putting surfaces showed similar sward characteristics irrespective of age and construction type. Winter disease pressure had been well managed, but the challenge will become harder with further withdrawal of contact/curative acting fungicides.
- Disease scarring was only observed on the weakest green (5th soil construction) where soil structure is more compact, natural drainage impaired, and excess organic matter (thatch) more restrictive.
- Remnants of localised dry patch scarring was noted mainly in the outer edges and close to the top of contours in the USGA greens. Development of dry patch is a risk where organic matter excessively dries out. There is no provision for preventative wetting agent treatment which could help.
- Organic matter levels were sampled from two USGA greens (problematic 7th and more average 15th) and the soil-based green at the 1st. Organic matter is well diluted but layered in some greens i.e. 7th and holding moisture even above the free draining USGA construction foundations.
- There is a restrictive soil texture layer at ~110-120mm depth which is slowing drainage. This is likely to be deposits from the relaying of the replaced turf during reconstruction some 15-18 years ago.
- Greens cultural maintenance is limited in terms of aeration and some revisions are needed to increase the frequency of treatments.
- Fertiliser input is high and needs to be reduced as excessive nitrogen use will be the fuel for the production of organic matter, which in turn will lead to slower and less consistent green speed and performance. This is likely to be the most positive change the Club could action.
- 2. Tees are a mixed bag of surfaces which are largely functional but with some which require levels improvement i.e. 1st, 12th yellow. The newer tees (16th medal, and 18th) are well placed but not constructed to a standard capable of withstanding high usage/wear.
- The new tees are lacking appropriate rootzone quality. The soils will be prone to compaction and uneven settlement. The reclaimed turf is poor in grass species and has high soil content. The new tee development at the 16th hole needs a rethink to allow better resourcing and more time for construction.
- There is an opportunity to improve the playability of the 14th hole by building a new tee adjoining the medal tee. This is a much better line into the green.
- 3. Bunkers were well presented but some of the aged revet or soil wall faces are eroding and in need of renovating. The use of artificial turf revets could be considered and would be ideal for longer term cost and maintenance savings. This system needs only to be considered where necessary as many of the bunkers would not suit a revet design.
- The work to fill in bunkers is ideal, and I advise the Club to look for opportunities to reduce maintenance and resource costs with further reduction in bunkers. It is important to resource bunker improvement projects appropriately, allowing for contouring and shaping of the bunker surrounds.
- In summary, the course presented well considering the limited resources available. Cultural management revisions are required if greens consistency and performance is to be improved i.e. reduced fertiliser and improved aeration. Tee levelling and construction methods also need revising.

Key Actions

- Reduce fertiliser input to greens – objective is to reduce nitrogen input to control growth for improved the consistency of performance and limit organic matter production.
- Increase deep aeration to greens: Option for smaller diameter Verti-Drain tining or more practicable would be introduction of the deep slit tining.
- Revise tee construction and renovation methods to improve soil structure and alleviate future maintenance issues. Remove sleeper walls where necessary i.e. 16th.
- Reduce the quantity of bunkers with continued work to fill in bunkers and create grass swales.
- Investigate options for using artificial re-vetting in bunker faces which are prone to erosion.

Objective Measurements

Measurement	Average	Target Range
Organic Matter 0-20 mm (%)	5.3%	4-6%
Organic Matter 20-40 mm (%)	3.7%	<4%
Organic Matter 40-60 mm (%)	2.9%	<4%
Organic Matter 60-80 mm (%)	2.3%	<4%
Soil pH	5.9	5.0-6.0

Key: In Target | Marginal Variance | Out of Target

Figure 1: Greens sward conditions are seen to be similar on both sets of greens (USGA vs soil base). Swards are a dominant blend of Poa annua ssp with bentgrass. Poa annua was seeding at the time of inspection but not too disruptive. Fusarium patch disease was discretely active but not a major concern.

Figure 2: Fusarium patch ((microdochium patch) scars could be seen in the weaker 5th (soil base) green. Anthracnose disease was a secondary infection and still active although not requiring treatment.

Figure 3: The 5th green profile offers clues to issues linked to poor drainage with previous attempts made to deep aerate and integrate sand. The upper 60mm is distinctly darker and more organic even though the upper 150mm is a well-structured sandy texture uniform rootzone.

Figure 4: The 18th green is typical of the majority of the course soil-based profiles. Root depth and development is good. Organic matter is well diluted but liable to influence excess softening of the surface at times of wet conditions.

Figure 5: USGA green profiles are well structured but again with discrete but excess accumulation of organic matter (thatch) in the upper 50mm. The profiles are uniform in the top 110mm but note a layer of rich soil at this depth which has the potential to perch water.

Figure 6: The 7th green USGA profile is less uniform and shows layers of organic matter and the soil layer is more restrictive.

Figure 7: Measurement of soil moisture content at various depths in the 7th green. Excess moisture does not efficiently release until the 110mm layer is breached.

Figure 8: The only other surface blemish was remnants of dry patch damage. This is largely seen in the perimeters or tops of slopes where greater stress is often experienced at times of hot and dry conditions.

Figure 9: A review of bunkering considered opportunities to improve the sustainability and playability. The 18th hole may need a rethink with new bunkering along the right side of the hole in addition to strengthening the tree line.

Figure 10: Work to reduce the amount of bunkers is ideal as there should be a focus on long term course maintenance capabilities. Contours are still interesting and challenging, typically blend well into the fairways and green surrounds.

Figure 11: There are many different bunker designs. The flash face bunkers are functional although sometimes boring i.e. left side 12th. Subtle contouring around the bunker surrounds would help although not seen as a priority.

Figure 12: The revet wall faces are more of a problem where the walls are eroding i.e. 14th. There is more of a requirement to improve shaping and consider option for alternative methods of re-vetting.

Figure 13: Tee grass cover is good and the course hugely benefits from the use of winter tee mats. Sward texture is often coarse and in need of refinement. Weed control is another requirement.

Figure 14: Tee surface levels require improvement on several holes, including the 1st. Works to level the tees needs to be appropriately resourced.

Figure 15: The new 18th tee is positioned well but is on the small size and likely to struggle to cope with wear, especially as the profile and turf quality is substandard.

Figure 16: The back 16th tee is poor. Levels are uneven and there is no need for the sleeper edges. They only serve to complicate maintenance and create an unnecessary hazard.

Figure 17: Work has started on the new 16th intermediate distance back tee. The soil levelled out is ok as a subgrade structure but not good enough as a rootzone. The soil will be prone to compaction and associated issues.

Figure 18: The new 18th tee profile reveals potential issues where a soil turf is sandwiched between the heavy texture topsoil with a thin band of sandy texture soil. This will lead to poor rooting, poor drainage and high wear/settlement.

Recommendations

Greens

- The current fertiliser programme needs revising to reduce the amount of nitrogen applied. This will improve surface performance and consistency. The Course Maintenance Standards document states the monthly application of Nutri Smart 14.2.10 granular fertiliser at 30 g/m². This calculates to 42 kg nitrogen/ha at each application (Mar-Sept). I am sure that the frequency of application occasionally widens due to growing and weather conditions but 7 applications accounts for 294 kg nitrogen/ha and then topped up with liquid feed. The document works out at 340 kg nitrogen/ha. This is three times the amount required as a guideline. Nitrogen stimulates growth so the excess nitrogen used will only promote excessively strong and soft growth which will hold back green speed and surface performance, as well as contributing towards the production of organic matter.
- I suggest a complete revision of fertiliser selection and maybe use of slow and controlled release products. The first step is to discuss these recommendations with the Clubs chosen fertiliser supplier and come up with a programme for review. My guideline would be as follows and I am using ICL as an example, but similar products can be used:
  - Early March – ICL 11.5.5 Cold Start @ 30 g/m²
  - Mid-April – ICL Sierraform GT 16.0.16 @ 20 g/m²
  - July – Nutri smart 14.2.10 @ 20 g/m²
  - Sept – K Step 6.0.27 @ 25 g/m²
  - Nov – Invigorator 4.0.8 @ 35 g/m²
    - All applying 136 kg N/ha (this is still high but a big reduction). USGA greens can be topped up with the liquid feed but do so sparingly.
    - Review results.
- Aeration needs to be increased. It would be easy to advise 4-6 week intervals for solid tine aeration but the Club doesn't have the equipment and may struggle to manage the work. Soil based greens will require three Verti-Drain aeration treatments during the year, applied at times when conditions are receptive to treatment i.e. not during wet winter conditions.
- One option for increasing aeration on all greens, an with speed/ease is to introduce slitting using a tractor or truckster mounted unit such as http://greentek.uk.com/products/aero-quick/. The frequent application of shallow spike sarel rolling should continue but this is not penetrating the layers of organic matter and soil texture interface which is perching water in the USGA greens.
- Be on guard for the development of dry patch, fairy ring disorder and excess drying/wilt. Our observations noted the remnants of dry patch damage in the peripheral areas of greens. Automatic irrigation delivered through the sprinklers will not meet the demands for controlling localised issues. Hand watering will always form a vital part of summer greenkeeping maintenance to target dry areas with additional water.
- The use of curative wetting agent tablets, applied in a hose hand gun applicator, can aid water penetration through water repellent soils.
- The Club is not currently including a widespread greens treatment of preventative wetting agent. I understand that this is largely due to cost. Soil conditions will therefore have to be managed more carefully and look out for the early development of water deficit issues.

Tees

Levels improvement – major correction

- Surface level improvement is required on several tees. Unfortunately, this is rarely as simple as cutting turf, raking out a new shallow level of rootzone, before replacing the original turf. The methods required are as follows:
  - Strip the existing turf
    - Note that the existing turf quality is typically a blend of coarse textured and/or weak performing grasses, but more problematic is the accumulation of thatch and high silt/clay soil content. Problems will be encountered where a soil turf is replaced above a sandier texture rootzone.
    - Discard the turf or store to use on tee surrounds.
    - Strip any remaining organic matter thatch.
  - Strip and stockpile any remaining topsoil for use on surrounds.
  - Re-grade the subsoil formation to create a firm and uniform depth foundation for placement of a minimum 150mm depth rootzone. Grade a 1:100 rise to an elevated fairway or a 1:100 fall to a lower fairway.
  - Set out site pegs to mark the depth of rootzone placement. Note that a greater depth 200mm formation will be required in secluded or wetter areas. It is unlikely that subsoil pipe drainage will be required if the rootzone properties meet requirements and sufficient depth of construction is achieved.
  - Select a tee grade rootzone such as a 70:30 sand:soil or sand:compost (approved compost or green waste). Place and firm in 75mm depths and grade to a uniform finish.
  - Create a lightly raked turf bed and apply a pre-seed granular fertiliser in preparation for turfing.
  - Select a quality tees grade turf grown on a sandy texture rootzone which is free from stone, silt and clay contamination. The turf mix shall ideally be a fescue/dwarf perennial ryegrass blend or straight dwarf perennial ryegrass.

Levels Improvement – minor correction

- Strip and discard existing turf, including removal of thatch.
- Lightly cultivate the existing topsoil to make the top mobile for redistribution. Take the opportunity to alleviate any profile compaction and consider the need for installing drainage if the tee is in a wetter location. Ensure that the final profile is uniform where the soil has been redistributed i.e. take care not to create a shallow depth profile in high spots.
- Import a tees grade sand/soil rootzone. Blend in a minimum 50mm depth and level out to the pegged levels.
- Follow the procedure for preparing a turf bed and turfing with a tees grade turf.

Constructing New Tees

- Follow the principles for major levels reconstruction (selection, depth of and placement of rootzone) once a stable and appropriately graded subsoil formation is constructed.
- Avoid the use of sleeper retaining walls where possible i.e. the 16th rear tee does not need this. It is much easier and safer to have a maintainable grass bank (assess the degrees of slope angle and how this is to be maintained with the available hand or ride-on equipment).
- On-site advice was given to suspend the works on the new 16th tee to allow more time for resourcing the project correctly and consider reshaping the tee and moving it further back from the steep drop off.
- The sizing of tees will impact on the cost of construction. The table below offers some guidance on size. It is possible that the Club could make greater use of some existing ladies tees i.e. 7th where the available

tee space is big enough to accommodate some general play for golfers who may want an easier golfing experience.

Bunkers

- There is no one design or construction method which would currently suit all bunkers on the course. The deeper greenside bunkers could benefit from re-revet renovation/reconstruction as the faces are presently exposed to erosion. This leads to contamination and playability issues.
- Re-revetting could be done using natural turf. This ideally needs to be a thick cut downgrade fescue turf with a good thatch layer for strength. Avoid using clay/silt-based turfs and rank grass species as these will quickly erode and become problematic for ongoing maintenance.
- The use of artificial turf for re-vetting is becoming increasingly popular. Systems such as Ecobunker and Durabunker offer solutions and ready supply of turfs. I would advise that the top two rungs of turf are finished with natural re-vetting turf (high quality) to minimise the risk of the turf browning off, especially in south facing aspect locations.
- The use of re-vetting would not suit all bunkers. Many holes have high sand 'flash' faces. These work well, especially where protruding out of the ground to offer definition and catch wayward shots which would otherwise run off down slopes.
- Keep the designs simple and functional. More importantly, look for further opportunities to reduce the number of bunkers. The Club operates a tight ship and has little resources for maintaining bunkers. That being said, the Club may need to adjust the bunkering at the 18th hole, or preferably strengthen the right side rough with additional planting (see below).
- Further points to mention include the need to create shaping which encourages surface run off water to divert away from bunkers, and to accept that bunker improvement projects need to be adequately resourced. We typically see courses trying to reconstruct bunkers as key hole surgery. There should be at least 30% working area around the bunker to ensure the ground is contoured and the profile incorporates a good depth of growing medium (i.e. avoid spreading the reclaimed bunker sand as topsoil or using the subsoil only).

18th Hole

- The Google earth™ image shows a straight-line distance of 272 yards. The image is not up to date enough to show the position of the new tee. There is a 'risk and reward' shot for the big hitters to take on the bunkers and reach the green. This is something that the Club is trying to discourage. Shortening the hole demonstrates that the Club is taking reasonably practicable steps to reduce the risk of balls leaving the boundary.

- Rather than adding new bunkers, I would propose that the Club extends the tree line with strategic planting of pine copses. It is understood that similar schemes have been tried and failed in the past but there should be no reason to expect continued failure if the trees are planted with drain pipe collars to allow watering direct to the root ball.

Signed

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STRI

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ORGANIC MATTER CONTENT

CLIENT: MILFORD HAVEN GC

ADDRESS: WOODBINE HOUSE,
HUBBERSTONE, MILFORD HAVEN,
PEMBROKESHIRE, SA73 3RX

DATE RECEIVED: 08/05/18

DATE REPORTED: 18/05/18

RESULTS TO: PW

TEST RESULTS AUTHORISED BY:

Michael Baines, Laboratory Manager

CONDITION OF SAMPLE UPON ARRIVAL: MOIST

SAMPLE NO	DESCRIPTION		LOSS ON IGNITION (%)*
A16827/1	1	0-20 mm	5.25
		20-40 mm	4.20
		40-60 mm	2.78
		60-80 mm	2.64
A16827/2	7	0-20 mm	5.17
		20-40 mm	3.74
		40-60 mm	3.00
		60-80 mm	2.34
A16827/3	15	0-20 mm	5.51
		20-40 mm	3.07
		40-60 mm	2.83
		60-80 mm	1.97

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

ACCREDITED

Testing Certificate 2159 - 01

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

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SOIL CHEMICAL ANALYSIS

CLIENT:

MILFORD HAVEN GC

RESULTS TO: **PW**

DATE RECEIVED:
08/05/2018

Lab No.	Source	pH	P_2O_5 (mg/l)	K_2O (mg/l)
A16827/1	GREEN 1	5.9		
A16827/2	GREEN 7	5.7		
A16827/3	GREEN 15	6.1		

Mr M A Baines, Soil Laboratory Manager

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