BOWLS CENTRAL
performance greens program

Soil Analysis Report for

St Chads BC

22 October 2025

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Club: St Chads BC Date: 22 October 2025

Lab Results	This Analysis	Previous Analysis	Change	Guideline Target
Nutrients Exchangeable				
Calcium ppm	1150.0	1155.0		600 - 1,200
Potassium ppm	117.7	67.3		80 -120
Magnesium ppm	67.8	67.3		40 - 65
Sodium mg/L	31.0	29.0		2-30
Nutrients Available				
Phosphorus ppm	11.6	9.2		5 - 15
Iron ppm	147.4	154.9		20 - 60
Sulphate ppm	43.6	89.7		25 - 60
Manganese ppm	6.1	2.4		6 - 8
Copper ppm	2.7	4.7		2 - 5
Zinc ppm	7.1	15.0		3 - 6
Boron ppm	0.5	0.6		0.7 - 1
Physical Analysis				
Cation Exchange Capacity meq/100ml	11	11		7 - 15
Electrical Conductivity (sat CaSO4) uS/cm	2114	2084		1900 - 2100
Organic Matter %	6.6	4.4		6%
pH	6.2	6.9		5.5-6.5
% Base Saturation	Base Saturation	Base Saturation		
% Base Saturation Calcium	52.3	52.5		55 - 70
% Base Saturation Magnesium	5.1	5.1		3 - 10
% Base Saturation Potassium	2.7	1.6		2 - 3%
% Base Saturation Sodium	1.2	1.1		0.2 - 2%
Total % BS of Key Elements	61.4	60.3		60 - 80%
% Saturation other Cations H, Al, etc	38.6	39.7		20 - 40
SOIL TEXTURAL ANALYSIS %				
SAND	70	Soil Textural Class will only change significantly from year to year if top dressing is continued, although small variations due to sampling are common.		
SILT	18			
CLAY	12			
TEXTURAL CLASS	Sandy Loam			
Key:	No Change or Insignificant Change =			
	Improved =			
	Declined =			

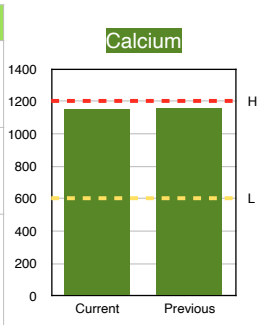
Nutrients Exchangeable

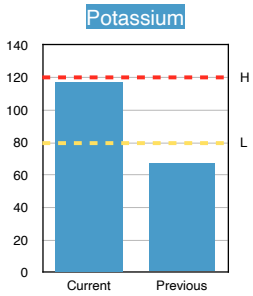
Calcium

Calcium should be the largest available nutrient for healthy grass growth, strong cell walls, nutrient availability and the correct pH. Plant available Calcium is often deficient in sandy root zones especially if excess Phosphate has been applied in the past.

The chart on the left shows where your Calcium levels lie in respect of the ideal range in parts per million (ppm). Within these parameters an increase in Calcium is usually a good sign as it is a key element in influencing the chemical balance within the soil.

If Calcium is lacking in your soil and the pH is low, there will sometimes be a benefit in applying Calcium and the most suitable formulation for that will be indicated in the Recommended Greenkeeping Programme that accompanies this report. Calcium application isn't always recommended as other factors such as Sulphate, Iron, CEC and Organic Matter levels are taken into account when making recommendations.





Potassium

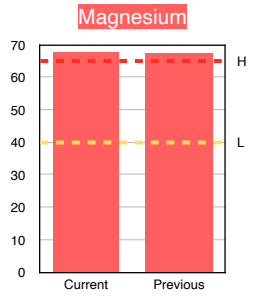
Potassium activates the enzymes used in protein, sugar, and starch synthesis. It is vital to many important plant processes. The correct amount of plant Potassium improves drought tolerance, cold hardiness and disease resistance.

Potassium ions are highly soluble and leach easily from sandy soils so frequent application is often required especially in the autumn and winter months when its properties help to keep grass plants healthy.

The ratio of Potassium to Magnesium when measured in ppm will ideally be about 1.5 - 2:1.

You will see a recommendation for a high Potassium, low salt fertiliser application in the Autumn and again in mid winter. This helps to keep Potassium levels up so that plant health is optimised.

Potassium levels can fluctuate sometimes widely from test to test, but this is quite common in sandy soils due to the tendency for it to leach and also due to the fact that plants exercise a process known as luxury uptake, where they take in amounts of Potassium well in excess of their obvious physiological needs. It's possible that this reflects a kind of "knowledge" within plants that Potassium will often be scarce.

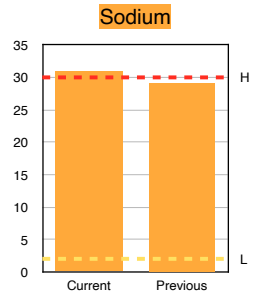


Magnesium

Magnesium is important for photosynthesis because it forms the central atom of chlorophyll.

It is an activator for many critical enzymes, essential for carbon fixation and metabolism. Low Magnesium decreases photosynthetic and enzymatic activity leading to premature ageing of the plant.

Magnesium interacts with Calcium and Potassium on cation exchange sites. For maximum nutrient availability the ratio of Calcium to Magnesium should be in the range 7-10 : 1



Sodium

Sodium in small quantities is a plant nutrient that aids metabolism, carbon fixation and synthesis of chlorophyll. However, in excess it reduces water uptake and limits enzyme production.

It is rare to find excessive Sodium in amenity turf root zones unless recycled waste water is used for irrigation.

Excess Sodium can be counteracted with Mycorrhizal fungi which limit plant Sodium uptake.

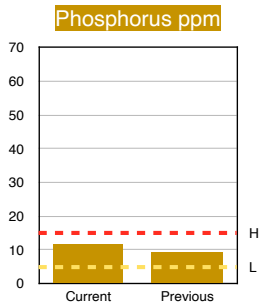
Excessive Sodium is unusual in UK bowling green soils.

Nutrients Available

Nitrogen

Nitrogen is not usually measured in soils as it is very soluble and levels quickly change. Nitrogen may be applied in the form of organic or inorganic fertilisers. However, healthy root zones with an active soil food web may produce up to 50Kg nitrogen per hectare per year by converting the proteins and carbohydrates in root exudates to ammonium.

Care should be taken to ensure excessive nitrogen is not applied. Excesses can cause soft, lush growth and dark green foliage, whilst leaving the plant susceptible to disease. Nitrogen deficiency is visible as yellow leaves, low sward density and poor slow growth.



Phosphorus

Phosphorus is essential for grass growth and is critical in most plant metabolic and enzymatic processes essential for growth.

Phosphate is needed for seed development and root growth, but it is seldom lacking, except in new sand based root zones but rapidly becomes unavailable without microbial solubilisation.

Mycorrhizal and bacterial activity release phosphate for plant growth, so fertiliser additions are normally only required in early spring to repair winter damage and for new constructions.

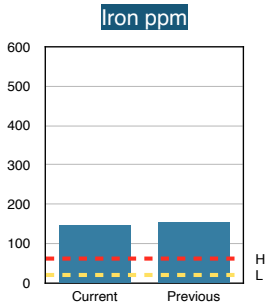
Iron

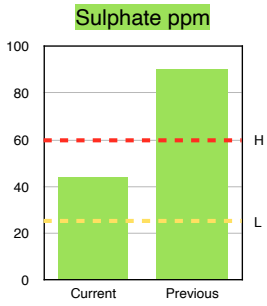
Iron is taken into the plant in Fe2+ and Fe3+ forms. It is used in protein functions, as a catalyst and for respiration and photosynthesis. It is also used in plant defence because it binds tightly to proteins rendering them inaccessible to pathogens.

Iron deficiencies result in chlorosis (yellowing) of young leaves. High levels of Iron can build up in rootzones and have fungicidal (against beneficial fungi as well as pathogens) effects, which create root breaks and compaction; reducing the ability to grow perennial grasses and degrade thatch.

Excessive soil Iron may contribute to the locking up (making unavailable to plants) in the soil of Phosphorus, Potassium, Manganese and Copper.

Iron deficiency is unusual in bowling green rootzones, but excess built up Iron is common. This will often be accompanied by high Sulphur levels indicating anaerobic soil layer and/or excessive thatch build up and low pH.





Sulphur

Sulphur is an essential turf grass nutrient. It has a role in many enzymes and is involved in carbon fixation, photosynthesis and plant defence.

Low Sulphur levels produce chlorosis (yellowing) of younger leaves.

It is only taken up by the plant as Sulphate SO42-, but microbial activity is necessary for the conversion. Many fertilisers contain Sulphates.

Sulphur is very mobile within the rootzone. If Sulphur levels are high it suggests poor drainage or more commonly Excessive Thatch accumulation at the surface is allowing Sulphur to build up.

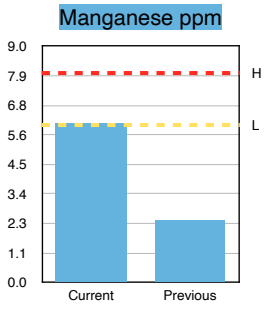
In the absence of oxygen, toxic sulphides may form.

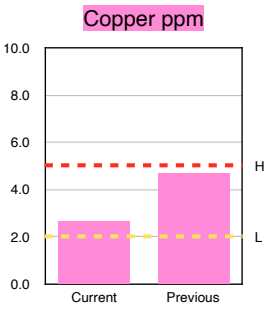
When your test indicates high sulphur levels you will usually see a recommendation for increased physical aeration such as pencil and hollow tining.

Carrying out work to boost microbial activity (via Compost Tea and Bio-Stimulants) to flocculate soils and convert Sulphur to plant available Sulphate is commonly recommended too.

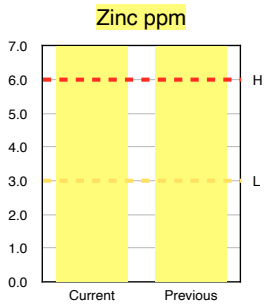
In soils showing very high levels of Sulphur I will often recommend the addition of Liquid Aeration to your Compost Tea programme.

Manganese
Manganese is important for the production of chlorophyll, photosynthesis, enzyme functioning and the plant defence mechanisms.
It is used in the production of inhibitory compounds, phenolics, phytoalexins and physical plant defences.
Manganese is often deficient in sandy and alkaline soils. Leaf chlorosis (yellowing) in new growth can be a sign of Manganese deficiency and low Manganese is sometimes implicated in the occurrence of Take All patch disease.
For most high sand soils, I will often include monthly applications of Super Concentrated Seaweed Liquid which will help to build Manganese levels as well as many other important micro nutrients.
Occasionally, it might be necessary to apply more highly concentrated doses of Manganese, especially in cases of Take All Patch outbreaks.

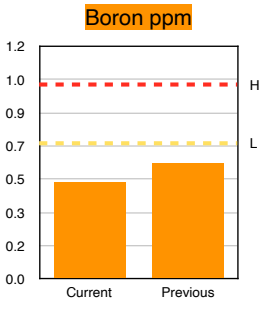




Copper (Cu)
Copper plays a part in enzymatic processes and is important in use of Nitrogen within the plant.
It assists in root growth and plant defence mechanisms; physical and chemical.
It is fairly immobile in soil and activation is dependent upon microbial activity in soil organic matter (humus), so where Humus levels are low it can be lacking in availability to plants.
Liquid Seaweed applications will normally be sufficient to supply enough Copper, where there is a deficiency.

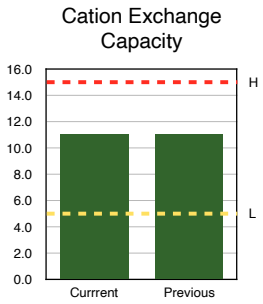


Zinc
Zinc assists chlorophyll production and carbon fixation.
Plants use Zinc as part of their internal defence mechanisms and it is a catalyst for enzyme production.
It has reduced availability in alkaline soils and soils with high available Phosphorus, Magnesium, Copper, Boron and Iron.
The regular Liquid Seaweed applications in your programme will assist in maintaining and/or building Zinc levels in your soil.



Boron
Boron plays an important role in the development and growth of new plant cells.
It has a role in chemical and physical plant defence; cell wall lignification and increased toxicity of phenols and stimulation of the hypersensitive response.
Boron is required in very small quantities, and your regular Liquid Seaweed applications are sufficient to maintain good levels.

Physical Analysis



Cation Exchange Capacity (CEC)

Cation Exchange Capacity measures the number of negative anions to which positive cations can bind. Cations include Calcium Ca, Potassium K, Magnesium Mg, Sodium Na, and Hydrogen H.

Ideally, sports turf rootzones should have a CEC above 7 meq/100gm for efficient nutrient retention. The higher the CEC the more nutrients that can be held within the root zone without the risk of leaching.

Negatively charged particles in soil are found in clay and humus which are both very low in sand based rootzones, often to the detriment of Cation Exchange Capacity

However, fully degraded organic material (Humus) also contributes greatly to CEC, so it can be increased by degrading thatch and converting it to humus. This is helped by the regular application of Compost Tea and Bio-Stimulants such as Seaweed and Molasses

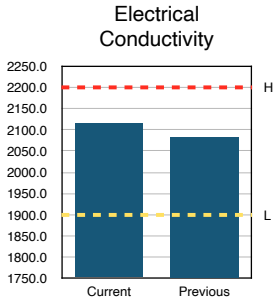
In cases of very low CEC results, I will often recommend a short term addition of CEC enhancing minerals such as Traceolite to your Recommended Greenkeeping programme.

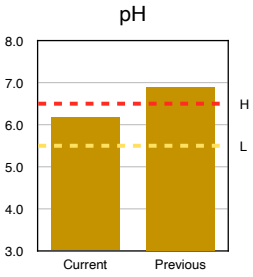
Electrical Conductivity

Electrical Conductivity of the soil solution is an indirect measurement of the salt content. As salinity increases plants are unable to extract water efficiently from the soil, which exacerbates any water stress conditions that may already exist.

High electrical conductivity is caused by high levels of mineral salts in the irrigation water or continued use of inorganic fertilisers with a high salt indexes such as Sulphate of Iron (Ferrous Sulphate) and Ammonium Sulphate.

It may be reduced by using organic low salt index fertilisers and the efficient use of irrigation water.





pH

pH measures the number of exchangeable hydrogen ions in the soil. Acidic soil contains more hydrogen ions. When working with biologically active soils, pH is often lower in the rhizosphere around the plant roots where bacteria metabolise on the root exudates and produce organic acids.

In soils with an alkaline pH, greater than 7, certain elements particularly phosphate and manganese can be ‘locked up’. The optimum pH of 5.5 to 6.5 is ideal for fine leafed grasses.

Slightly Acidic root zones favour the development of beneficial fungal hyphae in the presence of the correct food sources. Fungi are important for thatch degradation, disease suppression and perennial grass growth.

However, very low pH below 5.5 is usually a sign that there are problems in the rootzone, usually related to thatch build up, soil compaction or both.

The physical aeration recommendations in your Recommended Greenkeeping Programme will reflect this and there might also be a recommendation to apply Liquid Aeration and/or other soil amendments related to correcting low pH.

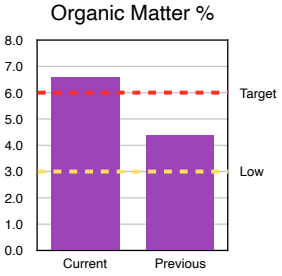
The Soil Organic Matter (Humus)

Soil Organic Matter is made up of the decaying remains of plants, microbes and animals.

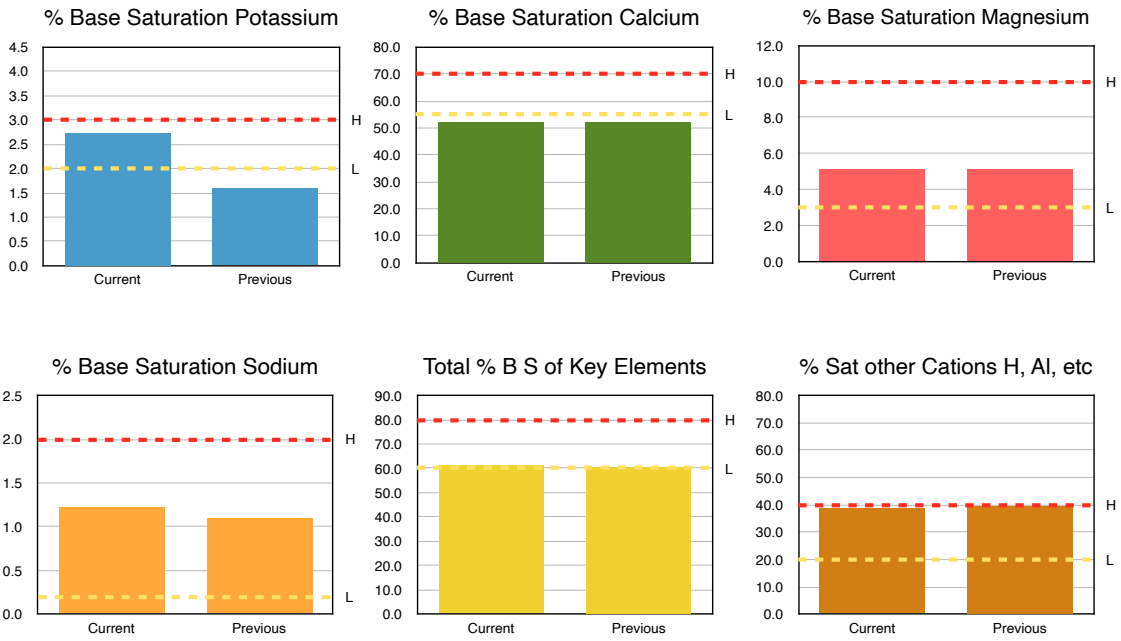
Preferably, comprising 5-6% of the root zone, it plays an essential role in supporting the microbial activity needed for nutrient retention and recycling, disease suppression and perennial grass growth.

Physically, it provides good soil structure, drainage, enhanced root growth and promotes the water and nutrient holding capacity of the soil.

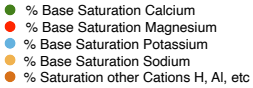
Your programme includes several Humus enhancing recommendations including physical aeration to promote aerobic microbial activity, Compost Tea and natural Bio Stimulants such as Liquid Seaweed and Molasses



The Base Saturation of Cations
The Base Saturation is the percentage of the total Cation Exchange Capacity occupied by the 'Base' or alkaline cations (Calcium, Magnesium, Potassium and Sodium).
The ratio of Calcium : Potassium : Magnesium when measured in parts per million (ppm) should be about 7-10 : 2 : 1 producing Base Saturation percentages of approximately 60-70% Calcium, 3-10% Magnesium, 2-5% Potassium, 0 – 2% Sodium.
In most amenity turf rootzones the remainder are hydrogen H 10-15% and other cations (2-5%) providing a pH of 5.5 - 6.5%
If the percent Base Saturation falls outside these ranges nutrients may not be available to the plant. High levels of exchangeable Calcium can reduce the uptake of Potassium and Magnesium, likewise high levels of exchangeable Potassium can reduce the uptake of Magnesium.



Previous Test **This Test** **Ideal Base Saturation**



Soil Textural Class

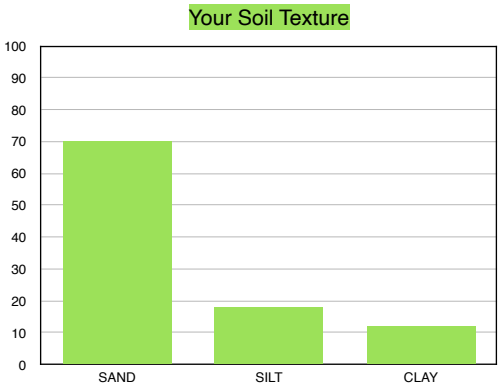
Soil Texture is classified by the percentages of Sand, Silt and Clay contained within the sample and is given a Textural Class according to the Soil Texture Triangle

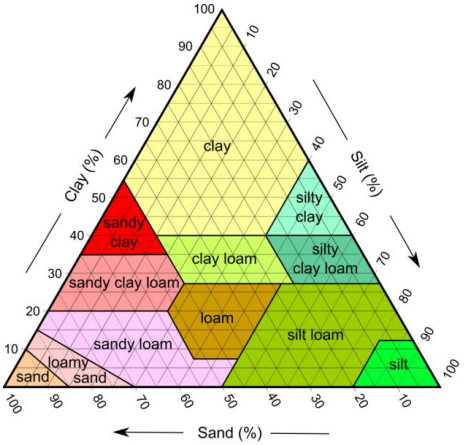
For a high performance bowling green we ideally want to strike a fine balance between a green's ability to drain well and it's ability to retain sufficient and reliable nutrition and moisture to the fine, perennial turf grass plants we aim to encourage.

This is best achieved by a soil that is very high in sand content when compared to soils more suited to other uses such as gardening or farming. However, to ensure there is sufficient scope for the soil to retain enough moisture and hold onto enough nutrition the sand content will ideally be between 75 and 85%. Greens with significantly more sand than this very often exhibit persistent and frustrating problems. These often include Localised Dry Patch/Hydrophobic Soil, excessive thatch build up, moss infestation and frequent disease outbreaks in thr autumn and winter months.

The ideal classification on the Soil Texture Triangle to achieve this balance is Sandy Loam. This is the classification I sometimes refer to as Peak Sand. Beyond this, greens can be very difficult to manage and usually need a prolonged period of renovation before you will see the full advantage of the Performance Greens Programme

It is not usually possible to reverse engineer an excessively sandy green back to Sandy Loam as adding silt and clay to greens is fraught with other problems. However, by working diligently on the soil biology to build humus levels the properties associated with the missing clay and silt can be replicated. I will sometimes also recommend short term mineral adjustments within your Recommended Greenkeeping Programme to help the soil re-building process where it is thought to be appropriate.





Localised Dry Patch (LDP)

Greens that are beyond Peak Sand can very often suffer from LDP (explained here). The areas affected in this way will show large brown patches in summer that don't accept water and will be susceptible to moss invasion and shrinkage, making the surface uneven. When the turf is affected by LDP, the green will sometimes seem unable to accept water after heavy rain or irrigation even although the underlying soil will be powder dry.

In addition to the work to improve the soil's biology, I will often recommend the application of LDP remedial work such as the use of various types of wetting agents and other bacterial LDP recovery materials. Of course the main issue with these problems is water, so hand watering known dry spots regularly and preferably before visible signs of trouble is recommended.

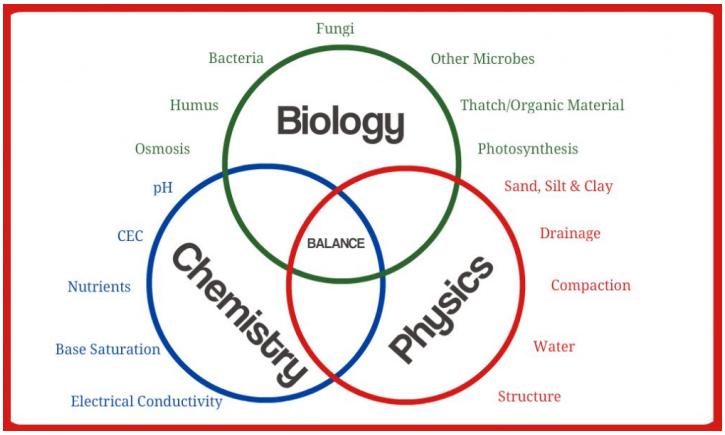
Additional Reading

The Physical Texture of the soil is one of the most critical elements of successful greenkeeping.To help explain the likely effects and influences soil texture can and might have on your green I have written a 5 part series of articles explaining these starting here:

Soil Texture Part 1 (subsequent articles link on from this one)

Balanced Greenkeeping

Performance Greens happen when there is a good balance between the Biology, Chemistry and Physical aspects of the green/ soil eco-system and it is quite often a struggle at first to get these into balance. This difficulty is usually due to decades of the over use of pesticides (fungicides in particular), high salt chemical fertilisers and the over-use of sand as topdressing, which leaves greens beyond what I've termed Peak Sand (too sandy), soil chemistry that out of balance and very little to speak of in terms of active soil biology. Greens essentially become inert.



Performance Greens Programme Recommendations

This report represents the Chemical and some of the Physical attributes of the soil under your green at the time of testing and can be used as a guide for maintenance in the coming months. However, you shouldn't rely solely on the chemical analysis of your green when deciding on the maintenance regime required. This will be influenced by the physical, biological and chemical condition of your soil and the current condition of your turf in terms of grass species, thatch depth, disease outbreaks etc. All of this is explained in detail in Performance Bowling Greens.

The Performance Greens Program is designed to encourage a living, biologically rich soil that allows for the provision of smooth, true and fast greens that are predominantly inhabited by the fine perennial species such as fescue and bent grasses.

Please see the accompanying Recommended Greenkeeping Programme for more details for details of the maintenance to apply in the coming 12 months.