

# GREENKEEPER

*International*

# BINDERS

*Now you can keep your  
copies of the industry's  
premier magazine in perfect  
condition – all the time!*

It might have been a problem looking after your copies of Greenkeeper International before now...

**...But not any longer!**

**Keep your copies safe, and the vital information always immediately to hand, with our new, exclusive Greenkeeper International binders.**

Stylish, hardwearing and convenient, the binders are supplied in a smart green colour with the magazine's name style and the BIGGA logo on the spine. Each binder will hold a year's issues of Greenkeeper International and comes with a useful index card in its own plastic pocket, for you to personalise as a quick reference guide.

And to get you started, we're offering the chance to save £1 if you buy two binders – just what you need to hold all the 1991 editions and the eight months (so far) of 1992's magazines.

**Say goodbye to dog-eared magazines – order your binders today!**

## ORDER FORM – BINDERS

Please send me .....Greenkeeper International binder(s) at £5.95 each including postage/packing (UK price; £7.95 Europe), or;

I want to take advantage of the Special Introductory Offer and buy two binders for just £10.90, including P+P (UK price; £14.90 Europe).

GL 8.92

Name: .....

Address: .....

Please make cheques payable to BIGGA. Clip this coupon and post to:  
Binders Offer, BIGGA, Aldwark Manor, Aldwark, Alne, York YO6 2NF.

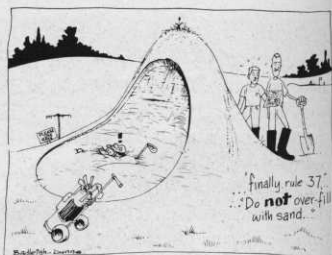
Allow 28 days for delivery. Copy this information on a plain sheet of paper if you don't want to cut up your magazine.

# More than

**A** good bunker is not a simple hole in the ground. If a bunker is to perform well in play, careful pre-planning and construction is essential: covering location; orientation; size; style; angle of face, cross sectional profile and provision for free drainage. However, before getting into any technical detail in planning, everyone has to ask a simple question – is any new bunker necessary or valid? Bunkers are expensive to build (a contract price in 1992 is likely to be £750 to £1000 each, plus sand), are time-consuming to maintain and are not vital to every golf course or every hole on a golf course. There are still a few good courses with no bunkers at all!

If though, after deep and careful thought, the decision is made to proceed to the next step, then consideration has to be made of exact location, orientation, size and style. Of the first three items much will depend upon how it is intended to control the strategy of play, and which group of players the bunker is intended to penalise.

There are management considerations to be accounted for too, especially how the new bunker will affect



flow of play through the green. Many a new bunker has been spoiled by a track of bare ground around, due to funnelling of play. Orientation will also have an influence on whether or not grass can be grown on the face of the bunker. This is often difficult if the face is steep and exposed to a southerly aspect.

Turning to style, there are lots of different ways in which to build a bunker, but methods tend to tie in with the special management problems of different types of golf course. At the seaside, bunkers tend to be deep and fairly narrow to help keep the sand in, though hopefully not so deep that the water table is exposed for long periods each winter.

## REMOVING THE SCAR

ping' – which is the action of cutting drainage channels diagonally across contours – followed by the application of a 250mm layer of ground dolomitic limestone. The ripping process relieves compaction and aids the incorporation of the neutralising limestone. Deep incorporation also increases the permeability of the soil. On top of the limestone was spread a sealing layer of clay subsoil stripped from surrounding areas of low grade agricultural land and finally the topsoil layer was spread. The phosphate and nitrogen deficiency was treated at this stage by applying a fertilizer treatment and this was followed by a final application of powdered lime to counter the possible build up of acidity in the topsoil layer. By these methods the burning is gradually extinguished, the acidity is reduced enough for plant growth to begin and the site is ready for its 'fallow year' during which the vegetation and the new landforms will have the chance to establish themselves and take on a new permanence. That year begins about now as the contractor finishes off the painstaking job of stone picking.

Local people seem happy with their new pathways and the new surroundings. They are perhaps less happy with the fact that the steep sides of the lake prevent their dogs

from climbing out once they have gleefully leapt in after a stick! They have put up with a great deal but even at this early stage you can see it has been worth it. The City Council certainly thinks so now that the preparations for the golf course are getting underway. They have been very happy with the contractor and especially pleased to see that Golightly was prepared to undertake featuring and mounding work that would normally be part of the golf course construction. His willingness to do this extra shaping has saved Sunderland City Council a considerable amount of time and effort as an important part of the formation work for greens and tees has already been done. The Leisure Services Department will take over the remaining work of drainage and irrigation installation and final shaping in April 1993. They will be working under the supervision of Jonathan Gaunt, the golf course architect who has designed the course, a challenging 6,250 yard 18 hole pay-as-you-play.

There is still some way to go before work finally finishes and play begins in summer 1994 but the local community can already be well satisfied with the results of this reclamation scheme which would seem to amply justify others taking place or planned for the future.

● The author, Maja Mihajlovic, is a freelance journalist with a special interest in golf course architecture.

# a hole in the ground

## Revetting

Cutting deep into dune sand, or sometimes gravel, means that the side walls of a bunker will be unstable if unsupported. Hence the tradition of building turf walls brick fashion (revetting), packing behind mainly with sand, but using topsoil near the surface to give grass something to grow in around the bunker.

The turf used for revetting will generally come from the course, and comprise fine textured, very drought-tolerant species. So, when such fine, slow-growing turf is placed in an environment with minimal growing medium, it will knit up and survive but will not leave thick lush swards for frequent cutting on the faces.

Inland, the use of revetting can transfer well to very sandy or gravelly heaths, but is generally not a technique for parkland. The moister, richer environment, combined with the difficulty of obtaining turf of the right quality, means the faces become lush and clumpy, and the facing turf quickly breaks down under heavy management. It is worthwhile noting too that revetted bunkers which have been built inland tend to be over-steep on the sides and too flat on the bottom, giving impossible lies in the corners. Not very popular with members! Any steep-sided bunker must have a distinctly rounded floor and tight packing of the flooring sand, so that balls running into the bunker roll away from the margins.

The angle of face around the margins is created by stepping back each layer of the turf wall from a firm flat foundation, well below the proposed sand floor. The amount of stepping back will depend upon height and the desired angle, but no bunker wall should be less than 15° from the vertical. The entrance and margins of the bunker must roll down towards the sand, at an angle which will collect balls with a shape such that uniform mowing will be readily achievable. A sharp step from entrance turf to sand floor must be avoided.

## Drainage

Whether or not pipe drainage has to be provided in a sand or gravel subsoil is debatable, and the need will vary from site to site. On other soil types, pipe drainage is essential, leading to a positive outflow. The pipe drainage must be set into the base of the bunker some 200-250mm below floor level as a drain trench or soakaway point, depending upon the overall size of the bunker itself. The drain excavation must be backfilled with suitable aggregate and then blinded, blinding generally with a geotextile mem-

brane of adequate pore size, well overlapped to each side and securely pegged into slits.

To help water run to the drain, the floor of the bunker must be shaped and solid, to facilitate rapid water movement through the base of the sand (minimum gradient, say, 1:50).

The overall design of a bunker on parkland should also be such as to minimise the amount of water running into the hazard from surrounding land, which could well mean shaping shallow rises of turf around (swales), but not so marked as to direct a running ball away from the bunker itself.

## Parkland

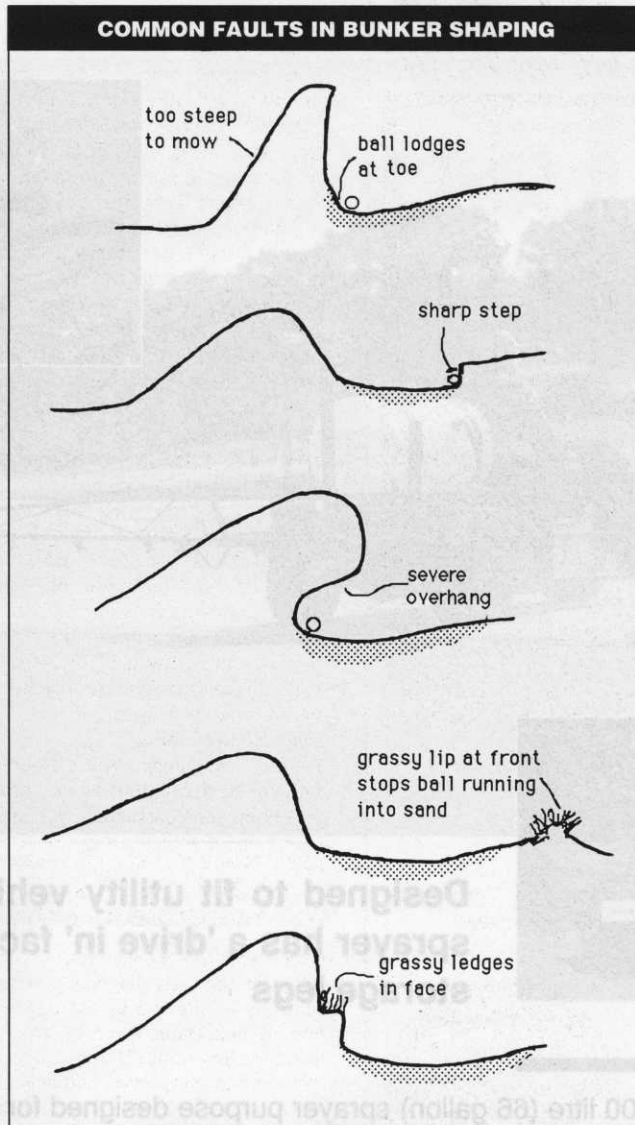
On parkland courses, a heavier sand is used in bunkers, and there is usually less problem with wind blow, so bunkers need not be so deep as at the seaside. This avoids the need to cut deep into poor-draining loams, clays or silts – necessary even if pipe drainage is provided. At the seaside, bunkers

will be 0.5m below ground level or deeper. Inland, the sand floor level need be no more than 100-150mm below general surround level and need not be so rounded as a consequence.

So a minimum of excavation needs to be sought on parkland courses, and careful shaping is required to provide for a minimum depth of sand (say 100mm firmed), and to avoid accumulation of loose sand at the entrance and at the toe of the face. Up the face of sand-faced bunkers, only a skim of sand is required.

The constraints of these requirements means careful shaping of the subsoil after excavation, and again after placement, to form the face and leading bank (if appropriate), so the right depth of sand can be placed and maintained, avoiding future management problems, in particular plugging.

When shaping out bunker floors and leading banks, look for flowing contours which marry in with the general topography of the site.



Nothing looks more obtrusive than a sharp high hump sticking out of flat-tish land. Make the bunker look as if it is part of the landscape, and has always been part of the landscape.

The angle of face in a parkland bunker will vary from 1:1 to 3:1 dependent upon distance from the putting surface (the further away the more shallow the angle) and how far sand is wanted up the face. For a sand-faced bunker a gradient of 2:1 would allow for sand, say one third of the way up, and if higher sanding is required, so also is a more shallow gradient.

## Geotextile Membranes

Should a geotextile membrane be used to cover the whole bunker floor, rather than just the drain trench? On unstable subsoils and very stony soils, this procedure is valuable, ensuring the right porosity of material, and that this is securely pegged beneath the surrounding turf and into the base of the bunker face. Never run the membrane up the face of bunkers though – it will just pull away. In such circumstances, particularly on stony sites, use turf to pin stones beneath the face and margins.

Elsewhere, in my view, the use of geotextile membranes should be avoided. They do tend to make the bunker sand fluffier than it would otherwise be.

Having shaped out a new bunker, fill it with good sand of approved grade – one which is known to work well. Inland, bunker sands are specified as a material with at least 75% of particles in the size range 0.25 to 1mm, free of grit, silt and clay. However, this specification is a basis for selection, not an absolute truth. Not all sands falling in with the above will be good bunker sands.

On parkland, allow for a minimum depth of sand of 100mm firmed, spreading in two 50mm layers, each trampled in wet to pack tight. Then just loosen the immediate surface and carry out raking to achieve a marry-through with surrounding turf. Up sand faces, a skimming of maximum 50mm depth should be aimed for. Post-maintenance must be geared to maintaining this uniformity.

At the seaside, new sands must also be placed and packed tight, shaped to give a distinctly rounded floor. Use dune sand for preference, giving a step down in grading from that detailed above, so the sand will be predominantly within the range 0.125 to 0.5mm. A lime content is permissible at the seaside – but not inland.

● The author, David Stansfield, is a senior agronomist with the Sports Turf Research Institute.