3.4.4. Shingle restoration

WHAT IS IT?

The movement of existing or new sediments placed on the foreshore to create a more desirable morphological profile that is better able to dissipate wave energy and attenuate storm surge.

Shingle beaches are mobile structures developed in high-energy environments that are very efficient at absorbing and dissipating wave energy. The height of shingle beaches and ridges is also often above astronomical tidal levels, providing an effective barrier against storm surge.

The term shingle is an imprecise term that can be used to describe a beach with significant proportions of gravel or cobbles (sediment with a grain size of between 2mm and 200mm). Most shingle beaches contain a significant proportion of sand or smaller sediment particles below the surface that influence the permeability of the shingle and mobility of the larger gravels or cobbles[102]. This, along with wave action will influence the beach profile and whether vegetated shingle can form. Restoration of shingle involves re-profiling to create a more desirable profile or planting of vegetation to stabilise shingle habitats.

3.4.4.1 Technical considerations

Restoring a shingle ridge

Re-profiling (Figures 3.18 and 3.19) is appropriate where previous management practices have created a very high, narrow shingle ridge for flood protection or where a recharge scheme is being undertaken and it has not been deemed appropriate to allow the shingle ridge to form naturally. In some cases, it may also be undertaken to repair a breach following a storm. However, care should be taken that re-profiling does not reduce the availability of sediment downdrift, potentially increasing flood or erosion risk there. In more stable beaches it can be more damaging to try to repair a shingle breach due to the impacts on vegetation and invertebrates associated with these structures.

When realigning or restoring a shingle ridge, a naturally wide profile should be aimed for in order to maximise the absorption of energy, although storm surges may still overtop the ridge. Historically managed shingle profiles have often been much steeper as a result of moving sediment upwards to create a higher crest levels or seawards to maintain the existing defence alignment. This puts the shingle ridge into contact with greater wave energy rather than allowing natural shoreline migration (with rising sea levels). Although this decreases the risk of overtopping, it increases the risk of a catastrophic breach and is unlikely to be sustainable[86].

Table 3.7. Types of shingle beach and vegetation found (adapted from Doody and Randell[101])

Type of shingle beach	Common vegetation
Unstable beaches (common in high energy situations)	None
Beaches stable between spring and autumn	Summer annuals (e.g. *Galium aparine* and *Atriplex* spp.)
Beaches stable over 3-4 year periods	Short-lived perennials (e.g. *Sedum acre, Desmazeria marina*)
Beaches stable over 5-10 year periods	Long-lived perennials (e.g. *Cramble maritime, Suade vera, Silene vulgaris*)
Beaches stable over very long periods	Heath or heath grass vegetation (e.g. *Arrhenatherum elatius, Festuca rubra*)

Figure 3.18. Replenishment and reprofiling on the shingle at Chesil beach, Dorset: This work was undertaken in order to increase protection to the community of Chiswell following significant storms (© Environment Agency).

Figure 3.19. Shingle restoration at Spey Bay, Moray – Scotland's largest shingle beach (© Sally Gemmell).

Restoring vegetated shingle

The vegetation found on shingle beaches is largely determined by the stability of the beach[101] (see Table 3.7). However, sediment composition is also important, for example whether sand, silt, clay or organic matter dominate the finer sediment particles present. Restoration of vegetation is appropriate where a more stable shingle beach profile is desirable. For flood protection purposes, it is only appropriate as an additional measure where recharge and or re-profiling have been undertaken.

Vegetated shingle habitats are rare in part due to a lack of nutrient rich beds. Some fine material in shingle substrates improves plant germination and survival but excessive quantities can encourage weeds or invasive species. Possible approaches to the restoration of vegetated shingle include:

- allowing natural regeneration;
- using the natural seed bank;
- sowing seeds; and
- planting container-grown plants.

It is unclear which methods are most effective. However, it is important to wait until beaches have been reshaped by winter storms before attempting to plant vegetation.

3.4.4.2. Cost

The costs will be largely dependent on whether recharge is also required. Re-profiling costs will be determined by the size of the scheme. The costs of planting are likely to be minimal, although storms can undo this work. It may be appropriate to let nature take its course rather than try to restore vegetation (providing there is a natural supply of seeds). Baseline and ongoing monitoring is key to track success.

Further reading and guidance

DOODY and RANDALL (2003). A guide to the management and restoration of coastal vegetated shingle. English Nature.

LIVERPOOL HOPE UNIVERSITY (*no date*). The Sand Dune and Shingle Network [Online]. www.coast.hope.ac.uk. [Accessed: April 2015].