

6.3 SHORELINE PROTECTION AND BEACH CONTROL STRUCTURES

Shoreline protection (or coastal defence) and beach control structures built of and/or armoured with stones have a number of benefits when compared with other materials and forms of construction. Table 6.4 below summarises both the advantages and disadvantages of using rock in such structures. The designer should appreciate the limitations of the form of structure that they are considering. This section aims to relate these limitations and considerations to the designer in the form of practical guidance.

Table 6.4 *Advantages and disadvantages of rock structures for shoreline protection*

Advantages	
Durability	Rock from most sources withstands wear and attrition sufficiently and is ideally suited to the coastal environment.
Wave absorption	Porous and generally have gently sloping faces, so readily absorb wave energy and minimise adverse scour consequences caused by vertical reflective surfaces of seawalls and other structures.
Flexibility	Readily modified to take account of changing environmental conditions.
Cost effectiveness	Can be cost effective, eg using locally available materials.
Visual impact	Often considered visually attractive compared with other forms of sea defence, for example large seawalls or concrete stepped revetments.
Ease of construction	Even with limited equipment, resources and professional skills, structures can be built that function successfully.
Settlement	These are flexible structures that can adjust to settlements and are only damaged in a modest way if the design conditions are exceeded.
Maintenance	Repair works are relatively easy and generally do not require mobilisation of very specialised equipment. If properly designed, damage may be small and repairs may only involve resetting of displaced stones.
Disadvantages	
Safety	Concern over access to structures and risk to members of the public from falling into and being trapped in voids.
Navigation	Long rock groynes may cause problems for navigation of small leisure craft and fishing vessels. Groynes and breakwaters may need to be marked with appropriate lights or marker beacons. Submerged rock structures can be considered a navigation hazard if located near busy shipping lanes or areas of high amenity usage.
Footprint on foreshore	Rock revetments and rock groynes take up more foreshore than vertical seawalls and timber groynes respectively. This may be a consideration if the foreshore has environmental designations. Access limitations due to beach levels for maintenance may also mean that rock structures are not suitable at certain locations.

This section concentrates on the features and design considerations for seawalls, shoreline protection structures and beach control structures that differ from those of breakwaters. Cross-reference is made to Section 6.1 on breakwaters where appropriate. The section covers a range of structures, from revetments and anti-scour mats to structures designed to retain sand or gravel beaches, including conventional and fishtail groynes as well as offshore (or detached) breakwaters and sills.

Guidance on the selection of protection concept and layout, armouring systems and structural details is given. Cost, construction and maintenance issues that influence the design are also discussed, with cross-reference to the relevant sections of Chapters 9 and 10 where necessary.

The concept generation, selection and detailing of shoreline protection and beach control structures can be summarised by the flow chart in Figure 6.41. The numbers refer to the relevant parts of this section.