

INFORM

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# DRY STONE WALLS



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*Fig. 1: Two regional variations showing how local geology influences walling style.*

## DRY STONE WALLS

This INFORM guide aims to broaden the awareness of the importance and complexity of dry stone walling in Scotland, and it outlines common causes of deterioration and the maintenance required to prolong the life of such walls.

Dry stone walls, or drystone dykes as known in Scotland, are an integral part of the built heritage and landscape of Scotland. They perform several functions, such as to delineate boundaries, to corral livestock and to provide shelter for wildlife. Despite the many thousands of miles of dry stone walling which can be seen forming field boundaries and related structures, it is a much neglected and misunderstood part of the built heritage. Both their construction and repair are complex tasks that should not be undertaken lightly; It is recommended that any large-scale repair is performed by a competent or accredited dyker. However, there are some maintenance tasks which can be undertaken by the owner/manager to reduce the need for larger repairs.

### Composition of dry stone walls

Dry stone construction is an ancient building technique, where the walls are constructed from carefully positioned interlocking stones placed on top of each other without the use of mortar. Pressure from the stones at the top and the way the stones are interlocked ensures the self-supporting stability of the wall. However, there is more to the construction of a dry-stone wall than randomly setting stone upon stone; the skill required to properly construct a wall without mortar that will last for several hundred years is considerable.

The construction of the wall depends on the quantity and types of stone available. Although today it is possible to source quarried stone, walls would have originally been constructed with stones found on local ground. There are regional variations in the type of stone used for dry stone walls, as the local geology varies from one place to another, dictating the shape and size of available stone, as well as the workability of the material (Fig 1). Dry stone walls can be built as a 'single' wall, of one stone in thickness, or two stone walls (double dyke) built parallel to each other.



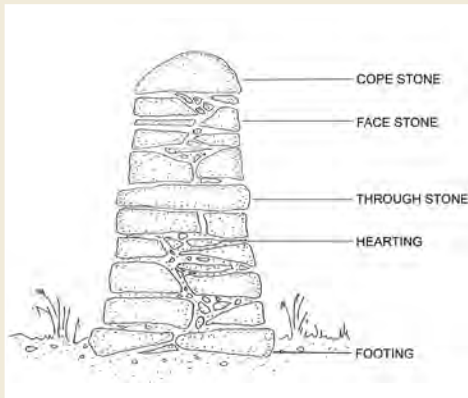


Fig. 2: Illustration of a typical double dyke.

The stones used on most dry stone walls diminish in size as the wall is erected (Fig. 2), using the largest stones as the foundation layers, also known as the footing or foundation stones. At the top of the wall are the cope stones which hold down the stones beneath and shed rainwater.

### Styles of dry stone walls

There are a several styles of dry stone walls in Scotland:

- A **double dyke** is the most common style encountered in Scotland. It consists of two stone walls (called face stones) built parallel to each other, with the core or voids infilled with smaller stones, called the hearting or packing (Fig.2). Through stones and cover (top) stones span the full width of the dyke and are used to hold the two facing walls together. This style of building produces a thick and substantial wall.
- A **single wall** or **boulder dyke** is one which is only a single stone thick (Fig. 3). Such walls are often built of stones cleared from fields (building stones). They are most commonly associated with areas where granite is the predominant stone type such as the south west and north east of



Fig.3: Single wall or boulder dyke.

Scotland.

- A **galloway dyke**, also known as a half-single dyke, combines a lower half of double dyke construction and an upper half of single wall (Fig. 4). Galloway dykes feature a cover band half way up the build, where the section of double dyke ends, and the single dyke begins.
- A **caithness flag fence** is a regional variation of dry stone walling (Fig. 5). It consists of large slabs of local sandstone set into the ground and overlapped to form a continuous fence.



Fig. 4: A galloway dyke (Copyright Nick Aitken).

## Construction of dry stone walls

To properly maintain dry stone walls, it is vital to understand the basic rules of their construction. It is not possible within this guidance to describe all the complexities of building a dry stone wall, but the following points should be borne in mind when considering the upkeep of such walls:

- Prior to starting to build the wall, the top 150mm of soil must be cleared and footing stones then laid with the flattest side up.
- Subsequent layers should then be laid across the joints formed by the course below. Stones should be placed with their long edges into the dyke, rather than along it; this helps to give strength to the wall.
- Sedimentary stones should be laid with the bedding or grain oriented horizontally to prevent water ingress.
- Building stones should be carefully pinned from behind, using small wedge-shaped stones to fill gaps and take the weight of unusually-shaped stones.
- Cope stones should be laid along the top of the wall. They should be well-shaped stones which fit tightly together set on edge, usually vertically, and are typically slightly wider than the wall. They are sometimes bedded onto turf.

When building a double dyke:

- The hearting should be carefully packed and not simply thrown in loose.
- Through stones should be incorporated. Sometimes a cover band just beneath the cope stone should also be put into place.
- For galloway dykes, these should have a through stone where the double dyke section ends. On this type of wall, no stone should project



*Fig. 5: Caithness flag fence.*

above the course below, except for through stones. This helps to maintain an A-shape in the cross section, called 'the batter' (Fig. 6).

## Corners and wall heads

Wall or cheek heads (sometimes called cheek-ends) are constructed where a wall is to start or end. They provide strength and stability for the wall and they are built where gates or other openings are taken through a wall, where a new wall abuts an existing one and cannot be tied in, and where extra strength is required (e.g. where a wall is built on a steep slope).

The wall head is the section that is most vulnerable to damage and should, therefore, be built from the largest, most regular stones. When rebuilding a damaged wall head, it is good practice to take the wall down a few courses from the top to ensure a thorough rebuild that is integral with the rest of the wall.

Where a wall has a corner, it is important that through stones are used to ensure the wall's strength is maintained. Likewise, where two walls meet in a T-junction, these should be tied in together rather than simply



Fig. 6: Rebuilding a section of a dry stone wall - note the use of a batter frame.

butting one wall against the other.

### Special features

There are many special features that can form part of a dry stone wall.

**Stiles** allow people access to cross the wall without damaging it; they can take various forms such as steps built into the wall, sometimes with an opening left in the cope (Fig. 7).

**Squeeze stiles** are gaps in the wall which are narrower at the base to allow people to pass through, but not livestock. **Lunky holes** and **badger gates** are openings in the base of the dyke which are large enough to allow sheep to pass through, but not cattle.

**Smoots** are smaller openings in the wall which allow the passage of water or, in some cases, rabbits. **Bee boles** are small alcoves built into a wall to house beehives. **Shooting butts** are small round enclosures which provide shelter for game shooting or bird watching. **Pens** are sometimes built against dry-stone walls to provide a corral or shelter for livestock, particularly in exposed areas.

Such features should be maintained; they are important historical evidence of former traditional practices and

they often still serve a practical use.

### Causes of deterioration of dry stone walling

Deterioration of dry stone walls can be caused by a number of factors (Fig. 8). Small trees and other vegetation growing through, or close-by, may seriously destabilise the structure of the wall. Unchecked tree growth will eventually lead to stones becoming dislodged, or the wall being slowly pushed out of line and eventually collapsing.

Large animals such as horses, cows and deer may rub against a dry stone wall and dislodge top stones. Burrowing animals can cause problems by destabilising the ground beneath the wall. The provision of a badger gate or lunky hole can help prevent this.

One of the biggest threats to dry



Fig. 7: Stiles built into dry stone wall.



*Fig. 8: Even where a lack of maintenance has led to collapse, repair is always possible and can utilise much of the fallen material.*

stone walls is deliberate destruction. This can be due to the enlargement of fields, the cost of upkeep, and changes of use from pasture to arable land.

People are by far the most likely cause of damage to a dry stone wall. Walkers trying to cross a wall can dislodge stones, particularly cope stones. Walls are sometimes pillaged to obtain stones for rockeries, landfill and other building purposes.

If there is inadequate drainage, water may undermine the foundations of a wall, leading to collapse. Flooding is a threat where there is a stream close to or passing under a wall, where an appropriately sized gap has not been built into the structure.

If mortar has been inappropriately introduced, water ingress and frost damage can occur to the stones themselves. It is, therefore, inadvisable to apply mortar to a dry stone wall.

## **Maintenance of dry stone walling**

Walls should be regularly inspected,



*Fig. 9: Rebuilding a section of a dry stone wall - note the construction of the wall-head.*

at least once a year, and the following maintenance tasks carried out:

- Remove potentially damaging vegetation which has begun to establish itself, as early as possible. A strip on either side of the wall should be kept free of encroachment by trees and shrubs.
- Replace cope stones which have been dislodged or removed.
- Where damage has occurred to the structure of the wall, repair as soon as possible to prevent deterioration spreading (Fig. 9).

## **Conclusion**

Dry stone walls in Scotland were built in a wide range of styles specific to particular regions and are an impressive part of our built heritage. With correct care and appropriate repair using traditional skills and materials, dry stone walls can continue to perform their important function long into the future.



## Further reading

*Dry Stone Walling, Techniques and Traditions*, Dry Stone Walling Association (DSWA) (2004).

A series of free leaflets are available from the DWSA at <https://www.dswa.org.uk/leaflets/>

*Dry Stone Walling, a Practical Handbook*, British Trust for Conservation Volunteers (1999).

## Further information

### HES Technical advice

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### Dry Stone Walling Association

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W: [www.dswa.org.uk](http://www.dswa.org.uk)



## THE ENGINE SHED

The Engine Shed is Scotland's buildings conservation centre. Run by Historic Environment Scotland, it is a hub for everyone to engage with their built heritage. We offer training and education in traditional buildings, materials and skills. For more information, please see our website at [www.historicenvironment.scot](http://www.historicenvironment.scot) or email [technicaleducation@hes.scot](mailto:technicaleducation@hes.scot).



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