

The Yorkshire Moors and Fells

+ Physical Influences

The primary influences in the shaping of the upland landscapes of today are the varied geology of the National Park, from the raw, exposed and fascinating karst landscape of the limestone to the more subdued, darker landscapes of the sandstones, shales and gritstones and the impact of man (through historic woodland clearance and management of today's vegetation cover).

Limestone Moors and Pavements

The geology of the limestone moors and pavements is dominated by the Great Scar Limestone, which comprises a number of layers of limestone beds of varying thickness and hardness and up to 200m in overall depth. The oldest layer of the Great Scar Limestone is the dark grey Kilnsey Limestone, seen outcropping most extensively within Wharfedale and Ribblesdale.

Overlying the Kilnsey Limestone is the Horton Limestone, a light grey limestone with poorly developed bedding, which forms scree-covered slopes with sporadic scars in Wharfedale and Ribblesdale. Of a similar age is the Cove Limestone, which forms the spectacular cliff at Malham Cove, the lower half of Gordale Scar and the brow of Kilnsey Crag.

Overlying these limestones is the Kingsdale Limestone, light grey in colour and about 120 metres thick. Typically, it has weathered to form a series of steps in Wharfedale, Littondale and Kingsdale, overlooking scree slopes. In the Malham area, Gordale Limestone takes the place of Kingsdale Limestone, forming the stepped upper cliffs at Gordale Scar.

Within the limestone moorland, the primary outcrops of limestone occur in a chain west-east across the south of the National Park, following the line of the Craven Faults at Tow Scar and Scales Moor (near Kingsdale and Chapel-le-Dale); in an arc around the base of Ingleborough; at Giggleswick Scar, Langcliffe Scar, Malham Moor and Kilnsey Moor; and on the edge of Conistone Moor north of Grassington.

The Middle Craven Fault marks the southern limit of the Great Scar Limestone in the National Park. Easy erosion of soft shales to the south of the fault has left a sharp southern edge to the limestone plateau, identified by a band of impressive scarp slopes and limestone cliffs including Giggleswick Scar, Attermire Scar, Malham Cove and Gordale Scar.

The North Craven Fault has created a small band of gritstones, sandstones and slates within the wider mass of the Great Scar Limestone. This is most evident in a bed of impervious slate sealing the base of Malham Tarn.

Meltwater, from the retreating glaciers of the last Ice Age, carved out the dramatic landmarks of Gordale Scar and Malham Cove. Glacial ice scraped away the soil cover from higher ground exposing the limestone bedrock. Weathering and the dissolution of limestone in water caused exposed joints (grikes) to widen, creating intervening blocks (clints), forming the distinctive, internationally important limestone pavements of today. Smaller-scale Ice Age features include erratic boulders as seen at Scales Moor and the impressive erratics of Norber (north of Austwick).

The Great Scar Limestone has developed its own distinctive scenery – the karst landscape, a mixture of towering cliffs, bare rock, scree slopes, deep gorges, limestone pavements, potholes, sinkholes and cave systems. Weathering of the Great Scar Limestone allows a surface patina to develop on the exposed cliffs and crags, giving them their characteristic white colour. The variety of this landscape stems from a combination of weaker shale bedding planes, dense systems of vertical joints and the ability of limestone to dissolve in water yet retain mechanical strength. The porosity of the fissured rock prevents the development of surface streams, with water draining to underground cave systems via shakeholes (depressions formed as overlying soils, often 2-3m thick, are washed down into fissures in the underlying bedrock) or sinkholes (larger vertical shafts which form direct natural entrances to cave systems, also known as swallowholes), which are spread across the limestone moors. The karst can be summed up as a highly detailed, dramatic landscape where the exposed geology becomes the overriding landscape characteristic, indeed, the outstanding scenic quality of

the limestone landscape was one of the prime reasons for designation of the Yorkshire Dales as a National Park.

Three Peaks and Central Moors and Fells

The Three Peaks and central moors and fells are underlain by rocks of the Yoredale Series, a cyclic sequence of limestones, shales and sandstones lying over 300m deep above the Great Scar Limestone. Alternating bands of soft shale with harder sandstones and limestones have created a distinctive 'stepped' landscape along valley sides, with harder wearing beds standing out as scars within scree slopes or creating waterfalls such as at Force Gill on Whernside.

The differential erosion of hard and soft rocks has produced a dramatic landscape of peaks and valleys. Remaining outcrops of erosion-resistant Millstone Grit cap peaks within the area, forming the high fells including, most famously, the Three Peaks of Whernside (736m AOD), Ingleborough (723m AOD) and Pen-y-ghent (694m AOD). Within the Three Peaks area the rocks lie almost level, creating a simple, distinctive stepped character. To the east, a larger outcrop of Millstone Grit forms Buckden Pike (702m AOD) between Wharfedale and Bishoptdale.

Where the Yoredale Series rocks have been eroded away the Great Scar Limestone becomes exposed, eroding further to form the dales valleys, which penetrate deeply into the area from Wharfedale in the east, Ribblesdale, Kingsdale and Dentdale in the south and west and Wensleydale in the north.

Near Gearstones, at the head of Ribblesdale, glacial action has created a notable drumlin field, with many egg-shaped, rounded green hills.

Post Ice Age landslips created impressive crags, as seen at Black Scar and Penhill Crags at Penhill in Wensleydale, where rocky ramparts dominate a mass of tumbled blocks. Exposed shales contain bands of flaggy sandstones, once worked by quarrying and tunnelling for roofing flags. The stepped landscape of the Yoredale rocks is clearly seen at Penhill with banded outcrops of dark and light grey limestone, capped by a darker mass of sandstone and shales.

The shale of the Yoredale Series occasionally contains thin, brittle seams of coal, as found on the summit of Fountains Fell, which had a colliery for many years.

Eastern Moors and Fells & Southern Gritstone Moors and Fells

The eastern and southern moors and fells are underlain by Millstone Grit series geology, a thick sequence of alternating shales and coarse, hardwearing sandstones (Gritstones). The Millstone Grit forms a bleak, gently rolling, often featureless landscape, in contrast to the angular grandeur and detail of the limestone country.

The Millstone Grit of the eastern moors and fells extends east of Wharfedale and Coverdale, from Caldbergh Moor in the north to Beamsley Moor at the south eastern tip of the National Park, comprising the western edge of a much larger area of Millstone Grit which forms the Nidderdale plateau and stretches southwards through the Pennines into Derbyshire.

The southern gritstone moors and fells are formed from Millstone Grit outliers, which became detached from the main plateau through erosion. These occur from west to east across the southern edge of the National Park, south of the outcropping Great Scar Limestone, at Scostrop Moor, Winterburn Moor, Flasby Fell and Barden Moor.

Where deep valleys provide steeper edges, the strong grits stand out from the weaker shales, creating stacked, dark, blocky crags and outcrops such as those fringing Barden Moor at Thorpe Fell and Embsay Moor or at Simon's Seat east of Wharfedale. Large glacially transported boulders are seen strewn on the moor tops.

The Grassington Grit is heavily mineralised, containing veins of argentiferous (silver bearing) lead ore, which were exploited by the Grassington mines, extending from Appletreewick to Conistone Moor. Thin coal seams were also mined at Threshfield and Grimwith Moors.

Northern Moors and Fells

The northern moors and fells are underlain by the Yoredale Series rocks, however, the limestones are set far apart with thick intervening shales and sandstones. An extensive capping of Millstone Grit has created upland plateau characteristics which are more similar to that of the southern and eastern gritstone moors and fells than the widely varying peaks and valleys of the central dales area.

The Yoredale limestones form small pockets of limestone scenery within the surrounding mass of sandstones and shales, with occasional scars and scree slopes. Between Hawes and Keld, for example, the Buttertubs area forms an independent karst landform.

Following the Ice Age, over-steepened hillsides charged with meltwater became unstable leading to many landslips and exposure of rocky sandstone and gritstone outcrops. Good examples of these are seen at Fremington Edge in Arkengarthdale and at Winterings, above Gunnerside Gill in Swaledale.

Extensive mineralisation of the sedimentary rocks occurred in Swaledale and central Wensleydale, creating vertical ore veins near the surface and leading to development of the lead mining industry in these areas. Coal seams are found within the Millstone Grits and Yoredales at many locations but were worked most notably at Tan Hill and on Grinton Moor.

Soils

The soils of the moors and fells have developed primarily in response to the drainage characteristics of underlying geology. Loamy, often shallow, free draining soils are found over limestone whilst peaty, poorly drained acidic soils occur primarily (with the exception of deep drift deposits over limestone) over sandstones and gritstones.

The limestone moors and fells are dominated by very shallow, loamy or humose-loamy, free draining upland soils, interrupted by extensive bare rock crags, scree and limestone pavement. These soils provide the best moorland sheep grazing in the Dales and support a diverse limestone grassland. Deeper pockets of glacial drift also occur, creating deeper free-draining loamy soils and deep, well-drained silty soils which may become seasonally waterlogged in winter. An island of deeper, slowly permeable loamy soil, with peat, over clay drift is found at Mastiles Moor above Malham.

The central, northern and eastern fells and southern gritstone moors are overlain by a range of poorly drained and permanently waterlogged very acid soil types from loamy, loamy-peat to blanket peat. These soils are generally of poor agricultural value, supporting thin sheep grazing, grouse moors and important heath and blanket bog habitats. Within the central and northern fells pockets of thinner, well drained loamy soils occur where limestone geology meets the surface, showing similar characteristics to the main limestone soils in the south of the National Park.

+ Historical and Cultural Influences

Following the last Ice Age, some 12,000 years ago, the uplands would have initially been covered by mosses, lichens and grasses, giving way to heath and, finally, woodland. Species such as alder, birch and pine migrated from warmer areas in the south, moving through the Dales and merging into grasslands on the hills. Woodland cover reached its peak during a warm period around 8500 years ago, with pine, elm, oak and lime forming the main species. Locally, hazel grew to dominate the limestone plateaux, or occurred in clearings. The thin limestone soils across the south of the National Park would also have favoured pine and birch.

Woodland clearance began in the hunter-gatherer Mesolithic period, using burning or bark ringing techniques. The removal of tree cover may have led to wetter ground conditions and the formation of hard pans in the lower soil layers, resulting in the creation of bogs. Although clearance by man continued during the Mesolithic period, between 6000-4000BC a warming of the climate and increased rainfall are believed to be the main factors which led to further woodland decline and an increase in blanket bog over poorly drained upland soils. The limestone uplands, however, with their thinner free-draining soils, would have retained a cover of hazel, birch, oak and elm.

Woodland clearance would have continued and increased during the Neolithic period and through the Bronze Age. Bronze Age settlement was more extensive across the dry limestone country of the Craven area than in the northern dales. A period of warmer climate, combined with a steady population increase is believed to have prompted a spread onto the grit moors, leading to major loss of the upland forest. Around 1000BC the climate deteriorated, with cool, wet conditions leading to further expansion of the blanket bog.

By the Iron Age, around 600BC, bog and heath was firmly established on the higher fells and peaks, with these landscapes being much as they are today. Settlement in the limestone uplands continued throughout this period with large areas of woodland clearance and enclosure of fields for pasture. This pattern continued with little change through the Roman occupation. By the time the Angles arrived in the Park, around AD 620, the limestone hills were mostly converted to good pasture or thin scrub. Outbreaks of pestilence led to declines in population levels, allowing a gradual increase of tree cover until AD 745-865, followed by increasing clearance of secondary woodland as population levels recovered.

Norman hunting forests, comprising a mixture of woodland and open country were established within the Dales. Place names such as Langstrothdale Chase, Stags Fell and Forest of Barden indicate that these forests probably extended into the uplands.

The establishment of the monasteries saw much of the Yorkshire Dales sub-divided into vast sheep ranches for wool production, managed under the 'grange' system and inter-connected by droving routes such as Mastiles Lane across Kilnsey Moor. This influence can be seen near Malham where Fountains Abbey operated moorland sheep farms including, for example Green Field in upper Langstrothdale, and lent its name to Fountains Fell north of Malham. The influence of Jervaulx Abbey is seen north of Askrigg, in Wensleydale, where the abbey owned large areas of fell now called Abbotside Common. The intensification of sheep farming under the monastic influence led to further decline in woodland cover, with regeneration being prevented by sheep browsing off seedling trees.

Following the dissolution of the monasteries, around 1538, the monastic estates were sold off, firstly to the landed gentry and wealthy merchants with some areas then being resold to the sitting tenants, creating a new population of freeholders. In the moorland, established sheep grazing practices continued, preventing the re-emergence of woodland cover.

The lead mining industry, and the less extensive medieval iron industry, used significant quantities of wood and charcoal for smelting, leading to further loss of woodland, although some wood and charcoal would have been produced from coppiced woodlands. The high cost of wood led to peat becoming the main smelting fuel, in addition to continued use of coke, produced from locally won coal.

Commons were established in the uplands to control shared grazing land, reflected in place names such as Angram and Askrigg Commons on the moors between Swaledale and Wensleydale. Communal sheepfolds were established, often on the high moor or on the edges of common land.

Within the Yorkshire Dales the effect of the Parliamentary Enclosures (1750-1850) is most evident in the enclosure and sub-division of common grazing grounds and moorland with drystone walls. Whilst some drystone walls, or remains of walls, pre-date this period, the majority of the arrow-straight walls seen today in the upland areas stem from the enclosures. Walls constructed in this period were built to a detailed specification laid out in the Enclosure Award and are characterised by a rectilinear 'grid iron' layout which often takes no account of intervening topography or obstacles. Walling stone was often cut from shallow quarries beside the walls.

The hay meadow-field barn system of stock management relied on cattle using the extensive areas of rough fell grazing on the edges of the moors during the early summer months, whilst the grass in the lower meadows was allowed to grow and be cut for winter hay. On the edges of the fells in Upper Swaledale and Arkengarthdale, almost 10 per cent of field barns were used for overwintering sheep rather than cattle. 'In bye' areas, part of the hay meadow-field barn system, were formed by enclosing moorland on the upper slopes of the dales.

Current land use within the moorland is mainly summer sheep grazing on the lighter, free draining limestone soils of the south, with limited grazing giving way to heather moorland, managed for grouse shooting, on the poorer soils of the central, northern and eastern moors. A reduction in the numbers

of cattle being reared and an increase in sheep numbers has led to changes in the vegetation composition of the upland fringes and, in some cases, overgrazing of upland habitats.

Mining and Quarrying

The rocks of the Yorkshire Dales, and their associated mineral deposits, have been a major influence in the development of the upland areas, with a long history of quarrying for building materials, metal mining, coal mining and peat cutting. In particular, lead mining has had a major effect on the landscape with some 400sq km of the National Park being identified as 'Mining Affected Area' in a 1993 mapping exercise commissioned by English Heritage.

Since at least Roman times lead ore has been won from the two main lead fields in the National Park, in the north at Swaledale and Wensleydale and in the south, around Grassington. Both of these orefields lie within moorland areas and their remains influence the present character of the moorland landscape. Early mining took the form of surface working of outcropping veins, followed by progressively more organised methods as deeper deposits were exploited. Evidence of mining includes surface disturbance, remaining structures, roads, spoil tips, hushes, leats and dams, shaft mounds, adit entrances and deep shafts.

The Arkengarthdale orefield, part of the larger Swaledale mining fields, was worked extensively using 'hushes'. This technique involved damming streams high on the fells and releasing a temporary torrent of water down the veins, first to expose the mineral and then to wash loosened ore deposits down the hillside to collection areas. The scars of hushes remain today, visible as deep rocky cuts on the hill sides. Good examples of hushes can be seen at Grinton Moor, Gunnerside Gill in Swaledale and most notably Turf Moor Hush and the Hungry Hushes at Whaw Moor west of Arkengarthdale. An important group of underground mines was established at Gunnerside Gill in the 19th century. The remains of the Old Gang Smelt Mill, which operated until 1900, are still visible in the valley of Old Gang Beck near Reeth High Moor. The remains of the lead mining industry in Swaledale are chiefly found in the moors and gills on the northern side of the dale, between Keld and Hurst, across Melbecks Moor, Reeth Moor and Marrick Moor.

Mining within the Grassington orefield was undertaken using shafts rather than the hushes and adits of the Swaledale orefield. The Grassington lead mines operated from about 1600 and ceased production in 1886, leaving extensive spoil remains, with the appearance of a 'lunar' landscape, across Grassington Moor. Remaining above-ground structures include the Cupola Mill flue and restored chimney. Further mining took place on Conistone Moor to the north and Appletreewick Moor to the south.

Lead mining also took place on a smaller scale between the two main orefields; in Wharfedale and Bishopdale and on the moors between Swaledale and Wensleydale.

Many remains of the lead mining industry are now designated as SSSI's or SAM's for their natural history and archaeological value. Reworking of some of the larger lead mining waste tips (at Grassington Moor for example) has been undertaken to recover secondary minerals such as fluorspar and barytes.

Outcropping coal deposits have been worked within the Yoredales and Millstone Grits of the northern, eastern and central moorlands, for local domestic use, firing limekilns and, as coke, for smelting in the lead industry. Large workings are found at Tan Hill, dating from the 14th to 20th centuries, and at the extensive coalfield near Grinton Moor, which extends beyond the Park boundary to Redmire and Preston Moors, where approximately 500 coal pits cover an area of about 5sq km. Other, smaller workings are found at Threshfield and Linton Moors, at Fountains Fell north of Malham and between Mossdale Moor and Fossdale Moor at the head of Wensleydale. Working was carried out by bell pit or adit methods, with remaining evidence of the industry comprising round bell pit earth forms and numerous small overgrown spoil tips.

Peat has long been an important domestic fuel but was also used in the 18th and 19th centuries as a fuel for limekilns and in the lead industry. Large areas of peat cutting are recorded at Flincher Bottom Moss, and Penhill.

Many small quarries were established to provide building materials for the wave of vernacular construction which took place from the 17th century onwards. In the moorland areas gritstone was

worked from hilltop quarries, for use as gateposts, cornerstones, lintels or stone troughs and, from some outcrops, for millstones. Wensleydale was noted for its roofing slate (a strong, thinly bedded sandstone which split easily) with mines in the hillside at Stags Fell, Burtsett and Penhill. Most of these small workings are now weathered and revegetated, with the terraced form of tips usually providing the only clue as to their former use.

Modern quarries bite into the edges of the uplands, mainly exploiting the Carboniferous Limestone for construction aggregates. Examples can be seen at Beecroft Quarry in Ribblesdale and at Swinden, Threshfield and Kilnsey quarries in Wharfedale. The scale of modern quarries is such that they may adversely affect distant views over the dales from the surrounding uplands.

Trackways, Roads and Railways

The moorlands are criss-crossed by a network of ancient trackways which provided through routes across the dales, links between the dales or were used for specific local purposes. The network has evolved gradually from the erratic lines of prehistoric footpaths.

Roman roads were constructed from Ingleton and Kettlewell to Bainbridge in Wensleydale, passing over the fells north of Langstrothdale Chase. Enclosure with drystone walls is a later addition to these routes.

Medieval roads evolved in response to village growth and the influence of the distant monastic estates. Mastiles Lane, which passes over Malham and Kilnsey Moors, linked Fountains Abbey in the east to granges around Malham and more distant lands that extended into the Lake District. A further monastic road now forms the route of the moorland road between Wharfedale and Coverdale.

Market roads were established between market towns and the dales, often taking the most direct route across the fells. Routes radiate out from Settle over Fountains Fell north of Malham Tarn, to Littondale, Wharfedale and beyond and provide a direct route between Muker and Askrigg over Askrigg Common.

Corpse Roads provided specific links between church and graveyard, crossing Firth Fell between Littondale and Wharfedale and extending onto the northern flanks of Harkerside Moor above Swaledale.

Packhorse traffic created later routes such as the Craven Way, which ran from Ingleton across Scales Moor before skirting the eastern and northern slopes of Whernside down to Dentdale and Sedbergh beyond. Packhorse roads also crossed Walden Moor, between Waldendale and Wharfedale and radiated out from Tan Hill across the moors north of Swaledale.

Drove roads were established for Scottish cattle being driven south, before the advent of the railways. They were routed to avoid villages (to protect crops) and generally ran in a north-south line across the National Park, linking markets at Askrigg, Hawes, Appletreewick and Skipton. The largest market of all, which often held 5000 head of Scottish cattle, was held at Great Close on Malham Moor. The main route into the dales was from the Eden valley, which forked south to Clapham, across Dent Moor, Gayle Moor and Ingleborough Common, and to Wharfedale and Skipton across Langstrothdale Chase, Malham Moor, Kilnsey Moor and Winterburn Moor.

The first major change to the route system developed in the medieval period was the introduction of turnpikes in the 18th century. The first turnpike road was established between Richmond and Lancaster, following the route of the Roman Cam High Road between Ingleton and Bainbridge. A later diversion of this road, in 1795, took an easier route up Widdale, between Hawes and Gearstones, and now forms part of the modern B6255.

Several mineral roads were established during the 18th century, to link mines in the Swaledale and Grassington orefields to the wider packhorse and road network.

Some ancient routes now form part of the modern road system whilst others have been incorporated into the modern public right of way network as footpaths, bridleways and byways, allowing access into the moorland areas. Parts of these trackways have been incorporated into modern tourist routes, for example part of the Cam High Road, and the packhorse road between Tan Hill and Keld, have been

incorporated into the Pennine Way, whilst monastic or medieval roads at Mastiles Lane and along the modern road through Coverdale now form part of the Yorkshire Dales Cycleway and Dales Way.

Modern roads within moorland areas primarily comprise improvement and tarmac surfacing of older routes, which, whilst changing the immediate character of these routes, has had little effect on wider moorland character. Thin bands of tarmac are often enclosed by verges and widely spaced drystone walls, reflecting earlier use where walls were set far enough apart for a flock of sheep to be driven between them. The moorlands are virtually unaffected by railways, with the exception of the Settle-Carlisle railway as it skirts Whernside and Dent Fell, and its spectacular Ribbleshead Viaduct which is seen in views from Whernside and Ingleborough.

Farming

Most of the fells and moors continue to be used for sheep grazing. Sheep on the fells are mainly of the hardy Swaledale breed, with their black faces and pale grey noses or are Dalesbred, also dark-faced but with white marks on either side of the nostril. Both varieties have the ability to withstand the harsh upland conditions in winter. Intricacies, relating to sheep management, are seen built into the drystone wall network including sheepfolds, sheep-creeps (small, easily-blocked rectangular openings designed to manage stock movement) and gateposts or 'stoups' made from gritstone or sandstone. Occasional stone-lined dew ponds may be found.

The enclosures of the late 18th and early 19th centuries, saw the main drystone wall building period in the dales, with common land and open moors being enclosed by a network of walls which often extended in straight lines out of the dales and over the fells. Drove roads and packhorse routes were preserved, forming the broad green lanes and wide-verged roads present today. Moorland areas can be broadly sub-divided into the following categories:

- Moorland fringe, comprising enclosed marginal pastures 'in bye' land;
- Large moor-edge enclosed grazing allotments;
- Unenclosed moorland, primarily on the fell tops.

On the lighter soils, within limestone areas and pockets of the Three Peaks central area, upland pastures are present. Occasional flower-rich upland hay meadows are seen at the heads of the dales. Some of these remain traditionally managed such as Swineley Meadow, at the head of Widdale, recognised as a Site of Special Scientific Interest for its botanical value.

At the heads of the dales occasional farmhouses are found, together with barns for overwintering cattle (or sheep in the northern dales), albeit at much lower densities than within the dales proper.

Changes in farming practice are affecting the moorlands, with a reduction in cattle numbers and an increase in sheep leading to overgrazing impacts on open moorland and moorland edge habitats. Increased commercialisation has led to other changes in farming practice, such as amalgamation of fields or 'ranching', leading to potential loss of redundant intervening drystone walls, or replacement with post and wire fencing.

In recent times drainage of the moors has been attempted, to improve rough grazing value. This has resulted in unsightly lines of 'grips', drainage ditches cut across the landscape, erosion and damage to some distinctive moorland habitats. Overgrazing by sheep in many areas has led to a decline in heath cover in favour of acid grassland.

Grouse Shooting

Grouse shooting has been carried on in Swaledale for over 150 years and now forms a substantial business for the large estates. Management of the moors for grouse has produced some of the broadest stretches of heather moor in the dales. Grouse are dependent on short, young heather plants for food whilst old, bushy heather provides shelter and nest cover. Heather is systematically burned in patches on a 12-15 year cycle to encourage new young shoots, the main food of the red grouse, creating a mosaic of young and old heather cover. Lines of shooting butts are evident in even the remotest places, together with the more obvious new roads built across the fells to allow shooting parties to reach the butts and shooting huts by vehicle.

Well-managed heather moors demonstrate a wide variety of upland heath species, protected from over-grazing by sheep. Intensive burning, however, may reduce species variety, leading to over-dominance by heather at the expense of other dwarf shrubs. In the past, grouse moor management has included moorland drainage (gripping) although this practice is now being reversed by blocking grips.

Reservoirs

The watershed of the gritstone areas on the southern fringe of the dales was identified by the Victorians as a source of water for the growing industrial conurbation of Bradford, leading to the construction of a series of reservoirs in the mid 19th century including Grimwith Reservoir on Appletreewick Moor, Winterburn Reservoir at Winterburn Moor and Lower Barden and Upper Barden Reservoirs on Barden Moor. The soft water running off the Millstone Grit was of particular value in the city's woollen industry. Grimwith Reservoir was later expanded in the 1980's to cover some 150 hectares, forming the largest inland water in Yorkshire.

Recreation and Leisure

Since the first 'curious travellers' of the Romantic Age (1760-1820) visited the area, the karst landscape of the Great Scar Limestone has attracted tourist attention. The coming of the railways in Victorian times and cheap excursions from the large towns and cities formed the beginnings of the mass-tourism industry of today. With their expansive scenery, solitude and extensive rights of way network, the moors and fells play a significant role within this industry.

Tourist activity in the moors and fells is centred on the Great Scar Limestone, in the area around Malham, and on the Three Peaks of Ingleborough, Pen-y-ghent and Wharfedale, the latter forming the basis for the famous Three Peaks Walk. Important long distance footpath routes cross the moors and fells including the Pennine Way, the Dales Way and the Ribblesdale Way.

The underground karst landscape of the Great Scar Limestone is exploited with show caves (eg White Scar Cave and Ingleborough Cave) drawing further visitors to the fringes of the moors. Potholing and cave exploration has become established as a mainstream recreational activity.

The crags and open spaces of moorland areas act as a draw for other 'adventure sports' including climbing, abseiling, mountain biking, paragliding, orienteering and hang gliding.

Historic routes and 'greenways', until recently open to all traffic including motor vehicles, have attracted unwelcome use by off-road vehicles and trials bikes, leading to rutting and damage of routes which are shared with other users.

As identified above, grouse shooting is now a well-established sporting industry in the uplands, closely allied to the upkeep and well-being of extensive tracts of moorland habitat.

Since enlargement Grimwith Reservoir now possesses a visitor centre and caters for watersports including sailing and windsurfing.

+ Buildings and Settlement

Today, settlement of the uplands is sparse, being mainly confined to outlying farmsteads at the extreme heads of the dales, or occasional former coaching inns, such as the famous Tan Hill Inn on the northern edge of the National Park.

Evidence of earlier settlement in the uplands is limited. Hillfort remains from the first millennium BC are found on the summit of Ingleborough and, less certainly, at Maiden Castle on the south side of Swaledale. Although marginal in terms of arable cultivation it is possible that communities may have developed around more specialist activities such as transhumance (the summer movement of domestic stock from the lowlands to the uplands), working the mineral resources (lead, copper and iron) or quern production from outcrops of Millstone Grit. Remains of a small Viking settlement have been found at Ribblesdale, on the northern tip of Ingleborough, whilst earthworks at Hill Castles Scar, above Conistone are believed to be the remains of a 'Celtic' settlement and associated field systems.

Evidence of Roman activity in the uplands is seen in the earthwork remains of a legionary size marching camp at Malham Moor (bisected by Mastiles Lane). Tor Dyke, an earthwork across the watershed between Wharfedale and Coverdale is believed to form the north eastern boundary of the kingdom of Craven, established following the withdrawal of the Romans.

Civil war and Napoleonic beacon sites are recorded at Great Shunner Fell and Pen Hill. Norton Tower, on the western edge of Barden Moor, was constructed as an observation tower to overlook the family estate and now forms a semi-derelict landmark.

The remains of temporary workforce settlements may be found near the Ribbleshead Viaduct and near reservoirs on the Gritstone moors in the south east corner of the National Park, although these are now grown over and of little influence in the present landscape.

+ Land Cover

Upland vegetation has evolved into a distinctive range of habitats in response to the loamy, free draining characteristics of the limestone soils and pavements and the peaty, acidic soils of the moors and bogs. Further diversity is found in cliffs, screes, tarns and the transition between wet and dry habitats in both limestone and peat areas. Many of these habitats are of national or international importance being designated as Sites of Special Scientific Interest, Special Areas of Conservation, Special Protection Areas or Ramsar Sites. Limestone pavements are protected by Limestone Pavement Orders to deter illegal removal for use as decorative stone.

The acidic moorlands are characterised by three broad habitat types: dry heath, bog and acidic grassland. Of these, acidic grassland is the most extensive, resulting from a long history of grazing, which has gradually eliminated dwarf shrub cover from areas which would typically be heath. Extensive areas of heath in the National Park are managed as heather moor.

Dry heath (commonly heather-dominated) is most extensive on the flat tops and acidic soils of the northern and eastern fells, persisting where there are relatively few sheep and management is mainly for red grouse. Pockets of heath are also found in the central Three Peaks area on the eastern flank of Pen-y-ghent, at Old Cote Moor (between Littondale and Wharfedale) and Mossdale Moor (at the head of Wensleydale) where glacial drift overlies the limestone. In heathland areas, the August landscape is transformed with purple during the heather flowering season. Heath species vary depending on soil conditions with cross-leaved heath preferring wetter areas and bell heather and bilberry preferring drier soils. Bracken is associated with areas of drier ground, and is often found in moorland fringe habitats.

Blanket bogs are found throughout the Park at higher altitudes, where peat occurs on flat or gently sloping ground on the fell tops, and where rainfall exceeds run-off or evaporation. The wet, acidic, low nutrient conditions support heather, (which becomes dominant where burning is carried out to promote its growth), cloudberry, cranberry, bog mosses and cotton grass, with deer grass and the insectivorous sundew.

On the steeper, drier slopes of and in gills on the moorland fringes scattered trees and shrubs, often subject to heavy grazing pressure, can be found, including rowan, downy birch, aspen, and occasionally, juniper or hawthorn scrub.

Acidic grassland is ubiquitous throughout the moorland areas, forming open featureless tracts between more varied moorland habitats.

The acidic moorlands support internationally important breeding bird populations, recognised by the designation of Special Protection Areas at Mallerstang/Swaledale Head in the north of the National Park and the East Nidderdale Moors and West Nidderdale Moors, Barden and Blubberhouses Moors (also a Candidate Special Area of Conservation) complex of sites on the eastern and southern fringes of the Park. Tall heath is favoured by merlin and short-eared owl, heather moors support golden plover and curlew (in addition to red grouse), snipe and redshank breed in the grassy and rushy edges whilst peregrine, hen harrier and buzzard forage over moorland areas generally.

The close-cropped, springy turf of the limestone fells is almost entirely the product of sheep grazing, together with some rabbit browsing. The limestone swards are dominated by sheep's fescue, blue

moor-grass, sweet vernal grass and crested dog's tail grass. On herb-rich, unimproved pastures and meadows harebell, thyme, eyebright, fairy flax and cowslip can be found. Calcareous grassland types are often intermixed with neutral or acidic grassland types, resulting from glacial deposits overlying limestone, further increasing species diversity.

Limestone pavement supports occasional windswept tree and shrub species including ash, hawthorn and rowan, but is primarily home to ferns such as the hart's tongue fern and old woodland flora including dog's mercury, wood sorrel, wood anemone and herb robert growing in the shelter of the grikes.

Steep slopes and cliffs support more extensive tree and shrub cover, including yew. Occasional woodlands support ash, downy birch, hawthorn and hazel. Sycamore is notable in plantations and also occurs as scattered trees.

The Malham-Arncliffe area is designated as a Special Area of Conservation for its outstanding geological and biological interest, including classic examples of limestone geology and a range of fen, carr, raised mire and mire that is unique in Britain. Part of the site is also designated as a Ramsar site, in recognition of the international importance of its wetland habitats. Scales Moor, between Ingleborough and Wharfedale, is designated as a further Special Area of Conservation for its botanical interest, extensive, unbroken, horizontal limestone pavement and the markedly stepped form of the Twisleton Scars, (illustrating the resistance of individual limestone layers to glacial erosion).

Forestry

During the mid 20th century large-scale conifer plantations were established within the central western area of the National Park, in a broad triangle between Langstrothdale Chase, Baugh Fell and Abbotside Common (at the head of Wensleydale). The plantations are mainly even-aged Sitka Spruce and form a substantial alien element within the otherwise open, largely treeless landscape of the central moors.

As these plantations are cropped, it is anticipated that restocking will be carried out to accord with modern forest design principles, including mixed species related to topography, and broadleaved edges, reducing future impact on the landscape.

+ Yorkshire Moors and Fells Landscape Character Areas

Landscape Character Types (Draft National Types in brackets)	Landscape Character Areas	Location
Moors and Fells (HDO)	Northern Gritstone Moors and Fells	Wensleydale to northern National Park boundary
Moors and Fells (HDO)	Three Peaks & Central Moors and Fell	Area between the central western dales, Wensleydale (to the north), Coverdale to Wharfedale (to the east) and Ingleborough Common/Malham Moor (to the south)
Moors and Fells (HDO)	Eastern Gritstone Moors and Fells	Coverdale and Wharfedale to the eastern National Park boundary
Limestone Upland (HLO)	Limestone Moors	Areas on the Great Scar Limestone across the southern edge of the National Park in a band between Ingleton and Grassington
Moors and Fells (HDO)	Southern Gritstone Moors and Fells	Areas of high ground south of a line between Settle, Malham Cove and Threshfield and west of Wharfedale (Craven Fault Area)/Mid Wharfedale

36. Northern Gritstone Moors and Fells

+ Key Characteristics

- Elevated, gently rounded hills, often with stepped sides facing valleys, forming east-west trending broad plateaux to the north and south of Swaledale interconnected at the head of the dale.
- Plateau edges are often defined by dark, blocky gritstone outcrops, with scree below, sometimes sitting above exposed, banded Yoredales Series limestone and sandstone outcrops.
- Occasional gritstone outcrops and scattered boulder fields are found on the moor tops.
- Steep-sided, sometimes rocky side valleys cut into the main plateau areas, which are further subdivided by steep, incised, winding gulleys.
- Watercourses are rocky, with grass, heather or rush banks and occasional trees on rock and cliffs in sheltered gills, widening out and accompanied by increasing tree cover and marginal herbs at lower elevations.
- Landcover comprises extensive tracts of acid grassland, blanket bog and upland heath, mainly over peat on the poorly drained gritstone plateaux. Heather moorland is mainly managed for grouse shooting, producing a distinctive mosaic pattern of different-aged plants.
- Settlement is absent from the open moor tops. Scattered traditional farmsteads with modern outbuildings are found on the dale fringes and in dale heads, accompanied by walled upland meadows, improved pastures and field barns.
- Gritstone drystone walls are concentrated around the dale fringes with occasional isolated meadows and sheep pens set within the open moor. Some moorland tops are broadly enclosed whilst others remain open.
- Evidence of coal mining and, to a much greater extent, lead mining workings and tips remains, mainly across the eastern half of the character area.
- Roads and footpaths are isolated in character with panoramic views of the northern dales and Cumbrian fells.

+ Landscape Character

Comprising a broad mass of gently rounded, occasionally stepped hills up to 672m AOD the Northern Gritstone Moors and Fells occupy the northernmost quadrant of the National Park, from Wensleydale to the northern Park boundary. They are characterised by the fairly continuous underlying Millstone Grit series geology, which creates a more resistant, less varied landform than the Yoredales of the Central Moors and Fells to the south, and contributes strongly to landcover characteristics through its poor drainage qualities.

The area contains two broad east-west trending gritstone plateaux, running north and south of Swaledale and connecting at the head of the dale. Gently rolling open moor tops are cut by steep-sided, partly eroded or rocky valleys. Underlying sandstone and limestone geology is sometimes exposed within valleys as a series of stepped cliffs, which are further cut by cross gulleys (eg at the valley of Cliff Side, between Stags Fell and Thwaite Common at the head of Swaledale).

Hints of the stepped Yoredales geology influence remain, showing mainly on the lower hill sides as banded outcrops or as gentle steps up to the broader main plateaux but are generally less pronounced than in the Central Moors and Fells area to the south, with its dramatic upstanding and flat-topped peaks.

The underlying Gritstone rock is rarely evident on the moor tops, occurring as small outcrops or boulder fields. At the plateau edges, however, overlooking the dales, it becomes dramatically evident, forming dark, blocky, vertical crags (such as Fremington Edge above Arkengarthdale or Whitfield and Ellerkin Scars above Wensleydale).

Plateau areas are sub-divided by winding, incised gulleys, often cutting deep through the peat surface and underlying drift to form becks with rocky beds and bare, steep, eroded, slipping banks. As gradients level out watercourses widen but remain rocky with a mixture of gravels, angular and worn boulders. Banks become grassed or heather-covered and rushy hollows form. Areas of blanket peat form dark layers where they have been partially eroded, for example at Tan Hill.

Further downstream, at the dale heads, river forms become defined, with a mixture of wide rocky beds or exposed layered rock combined with grass, herb cover and dense willow scrub with occasional trees (eg where Birkdale Beck and Great Sleddale Beck join the River Swale).

Vast tracts of the area are covered by acid grassland, blanket bog and upland heath mosaic. Heathland areas are predominant at Birkdale Common, Arkengarthdale Moor, Melbecks Moor, Reeth Moor north of Swaledale and occupy the greater part of the moors between Swaledale and Wensleydale east of Stags Fell. The heather moors are managed for grouse shooting with a patchwork quilt of greys, purples, browns and olive greens identifying the cyclical burning pattern used to renew and vary heather growth. Grouse butts and bright stone tracks on the open moors are further evidence of grouse shooting use.

Moorland fringes are often enclosed, providing rough grazing and occasional meadows on the dale fringes. Occasional isolated pockets of walled pasture and meadow are also found within the main moorland areas, standing out as bright green islands within the darker colours of the moors.

Tree and shrub cover is absent from the moor tops with the exception of occasional plantings of alien coniferous species such as at Cotterdale Common (head of Wensleydale) and Turf Moor west of Arkengarthdale. Scattered ash, sycamore and hawthorn are found within gills or beside streams in more sheltered areas. Within steep-sided, eroding gulleys and side valleys occasional ash and mountain ash trees cling to cliffs or exposed rock, where the ground is firm. Tree and shrub cover increases within gills as they descend to the dale fringes, and continues down into the dale proper. Groups of ash and sycamore often accompany farm buildings at lower elevations. Bracken is sometimes found in dense patches, replacing heather and acid grassland on the drier gill sides.

Roads rise up from the dales through side valleys and are often enclosed by drystone walls. Across the moors roads are open, marked by the occasional traffic sign or snow markers, which comprise tall wooden poles or short vertical slabs of stone. The precipitous road at Cliff Side is contained by a prominent steel-strand crash barrier. Bridges are not prominent, with watercourses being culverted under roads. A notable exception to this is the pointed, stone Beck Crooks Bridge which stands out in the otherwise open moorland north and west of Arkengarthdale. An extensive right of way network crosses the open moors and peaks, often following historic routes. Panoramic views are available over the northern dales and the Cumbrian fells to the north and west and across the overlapping plateaux of the northern fells and moors.

With the exception of Tan Hill Inn, a survivor from the days of the packhorse trade routes and now a tourist attraction as England's highest pub, the moor tops are devoid of settlement. Upland farms are found near the dale heads at Arkengarthdale and Swaledale (eg Ravenseat) and comprise gritstone traditional buildings with some modern outbuildings.

The effects of modern influences are seen in the herringbone patterns of drainage grips stretching across otherwise open moors (eg at Birk Dale) and very occasional overhead wires on poles. The use of former railway wagons as animal shelters near remote moorland roads (eg the road from Swaledale to Tanhill) creates an unusual local scene in the open moors.

Earlier mineral extraction has left a significant effect on the present-day landscape. Coal mining near Tan Hill has left spoil tip remains and small areas of disturbed ground but it is the remains of the lead mining industry, however, which are most prevalent, mainly across the eastern half of the character area. Lead mining remains include 'hushes' (which form large rocky ravines eg Hungry Hushes and Turf Moor Hush in Arkengarthdale, Friarfold Hush and North Hush in Gunnerside Gill), countless spoil tips and areas of disturbed ground, shafts, adits and building remains (eg Surrender Mill on Reeth

Moor). Many tips have vegetated over and no longer stand out whilst others remain as slopes of raw, crushed stone, often visible due to their lighter colour than the surrounding moors.

Drystone walls, mainly constructed from gritstone and sometimes accompanied by field barns, enclose in-by land and meadow on the dale fringes and heads. Examples of this are seen at Crackpot Side, Birk Dale and Whitsun Dale in Swaledale and Dale Head and High Faggergill in Arkengarthdale. Isolated pockets of walled improved pasture and meadow, accompanied by field barns, provide a strong contrast to the wilder moorland at Birk Dale and Sleddale Pasture near the western end of Swaledale and Shaw Farm and Stang House north of Arkengarthdale. The moors in the south eastern quadrant of the area, between Swaledale and Wensleydale are loosely sub-divided by drystone walls whilst those in other parts of the area remain entirely open. Drystone wall or fenced sheepfolds are dotted throughout the area.

37. Three Peaks & Central Moors and Fells

+ Key Characteristics

- Elevated stepped hills formed by differential erosion of layered Yoredale Series limestones and sandstones, often with pronounced flat plateau tops, sub-divided by and overlooking the central dales.
- Exposed peak sides are marked by sandstone and limestone crags and screes, sometimes forming dramatic, steep-sided, upstanding plateau peaks (eg Pen-y-ghent and Ingleborough Hill).
- Deep drift deposits often mask underlying geology but are cut through by gulleys on steeper hillsides to reveal stepped rock bands which often form waterfalls.
- Isolated pockets of limestone karst scenery are exposed within the surrounding drift and along valley sides, creating areas of brighter grassland and typical limestone features including pavements, cliffs and screes.
- Broadleaved tree cover is confined to scattered trees clinging to cliffs and rock outcrops in gulleys or on hillsides, or occasional small woodlands. At lower elevations tree cover increases in gills and along dale heads.
- Extensive coniferous plantations form dark, alien intrusions across the centre of the area.
- Moor tops are uninhabited. Occasional upland farms of traditional construction with some modern buildings are found on the dale fringes and at dale heads, usually close to rivers and roads and often associated with isolated pockets of limestone grassland.
- Drystone walls extend from the dale fringes to enclose rough pasture and sometimes sub-divide wider areas of moorland. Stone types are mixed, often changing in accordance with outcropping geology. Occasional isolated walled meadows associated with upland farms and field barns are found in limestone pockets.
- Roads and footpaths are isolated in character with panoramic views of the central dales and Three Peaks, the Howgill Fells, Cumbrian Fells, west across the Bowland Fringe, Bowland Fells and north west to the Lake District.

+ Landscape Character

An area of broad, often flat-topped and stepped peaks rising up to 736m AOD which separate the central dales between the western edge of the Park, Wensleydale in the north, Coverdale to Wharfedale in the east and to Ingleborough Common and Malham Moor in the south. Ingleborough Hill forms an outlier of the area contained within the Limestone Moors.

Yoredale Series geology, with its alternating bands of limestone, sandstones and gritstone is exposed in cliffs and scars throughout the area, although these are less frequent than in the Limestone Moors to the south where drift deposits are either shallower or absent. Underlying geology is often pronounced as a series of broad, slightly rounded, terraced flanks to hillsides, as seen at the head of Bishopdale at its junction with Wharfedale but also forms spectacular upstanding, stepped, rocky plateaux at Ingleborough Hill and Pen-y-ghent. Exposed rocky steps are softened and connected by concave slopes of softer drift geology, which often reinforces the stepped nature of Yoredale Series landforms. Glacial retreat has formed a drumlin field between Pen-y-ghent and Whernside, across the head of the Ribblesdale.

Rocky outcrops and screes vary between sandstones, gritstones with their darker colours and blocky texture, to limestones with lighter grey or white colours and smoother texture. Localised, isolated pockets of limestone scenery occur (eg New Pasture and Dawsons Close, east of Pen-y-ghent), with limestone pavements, screes, shakeholes and caves demonstrating typical karst characteristics.

Limestone scenery is sometimes juxtaposed with the dark layers of partially eroded beds of blanket peat on the gentle lower slopes of hills.

Deep gills are often found on the lower slopes of hills, cutting back and uphill through the softer drift geology, sometimes to harder bands of rock, exposing gritstone and limestone steps at gill heads and intermediate positions downslope. Rock steps are normally accompanied by waterfalls, pools and limited tree cover, which establishes more easily on the firm rock than the often eroding, unstable drift geology of intervening gill sides. The frequency and form of gills varies considerably through the area from numerous v-shaped shallow cuts (eg on the slopes of Whernside and Ingleborough Hill) to infrequent deep v-cuts with steps and waterfalls (at the head of Coverdale) and shallow gills with deep cuts through rock bands and stepped beds where drift geology forms a thinner cover and rock platforms are nearer the surface (at the junction of Bishopdale and Wharfedale).

At the base of hills and in elevated valleys shallow rocky streams occur, with steeply-eroded or shallow grassy and rushy banks and occasional rush-filled hollows on flatter areas. Approaching the more sheltered dale heads, streams remain shallow and rocky but widen out and are accompanied by increasing tree cover, close-grazed grass and broad bands of marginal or damp-loving herbs such as meadowsweet.

Landcover is primarily acid grassland mosaic, giving way to increasing rush and cotton grass cover in wetter peat covered places (for example on hill top plateaux or on the shallow areas at the foot of hills). Areas of walled in-bye rough pasture, used for sheep and cattle grazing, are found near the dale edges with sheep grazing on the open moor tops beyond. Pockets of walled limestone meadow and pasture have been established on the shallow, loamy, better-drained soils associated with occasional areas of limestone scenery.

Within the main body of the central moors upland heath is relatively scarce, being limited to pockets on the eastern slopes of Pen-y-ghent and Potts Moor and Old Cote Moor further east, above Littondale. At the eastern edge of the area, however, between Bishopdale and the Eastern Moors, extensive upland heath is found on the peat-covered shallow tops of Naughtberry Hill, Carlton Moor, Melmerby Moor and Penhill, lending this area a similar character to the adjacent Eastern Moors.

Tree cover is absent from the open moors. At lower elevations occasional ash and sycamore are found in sheltered gills, scattered along streams at lower elevations or in groups around farms. Small broadleaved woodlands, primarily of ash or sycamore with occasional hawthorn scrub, are sometimes found on steep, better-drained land or outcropping areas of limestone at the dale fringes, for example at the head of Bishopdale. Many of these woods are undergrazed by sheep and are suffering from a lack of regeneration.

Extensive areas of conifer planting have been established across the centre of the area, between Langstrothdale Chase and Baugh Fell. The dark, enclosing, rectilinear forms of these plantings (mostly single aged Sitka Spruce stands) are at odds with the open, mosaic-like character of the surrounding moors and form a significant visual detractor. Smaller conifer stands are seen on the northern tip of Naughtberry Hill and at the head of Coverdale, with equally alien and detracting effect.

Roads through the area are those which interconnect the dales and are generally of historic origin (for example Galloway Gate, a former cattle drove route, between Dentdale and Garsdale, or the B6255 between Ribbeldale and Widdale, a former turnpike road). Whether crossing the open moortops or within elevated valleys these roads are isolated and little used, with no road markings and little signage present on the smaller roads. Enclosure by drystone walls with wide grassy, wildflower verges at lower elevations often gives way to open roads with cattle grids on the moor tops. Some moorland stretches have been enclosed by post and wire fencing. Occasional stream crossings are denoted by short drystone wall or timber fence parapets rather than obvious bridges. An extensive right of way network crosses the open moors and peaks, often following historic routes. Panoramic views into and over the dales, between the Three Peaks and over the wider landscape beyond the Park boundary to the west and north west are a key feature.

Settlement does not occur on the open moor tops and is very sparse in remaining areas, comprising upland farms, linked to roads and mostly found near the heads of dales. The more remote farms are usually located within pockets of limestone scenery, taking advantage of the grazing qualities of limestone grassland. Occasionally cottages or farmhouses have been abandoned. Farmhouses are mostly of traditional stone rubble construction (using both limestone and sandstone depending on

local outcropping geology) or are rendered, with slate or stone roofs. Outbuildings are a mixture of traditional stone buildings and modern buildings constructed from timber, corrugated plastic and asbestos sheeting or metal silos, clustered around the farmhouse. Most farms retain a traditional character despite the presence of modern outbuildings.

Other evidence of modern day use includes wooden pole overhead telephone and power cables, usually routed along roads, or vehicles parked on the roadside. Jets flying overhead, or moving vehicles occasionally break the tranquillity.

Evidence of previous use of the landscape is seen in occasional roadside limekilns or small quarries and mineral workings (eg shallow shaft coal pits near Galloway Gate, or lead working on the moor tops). The latter are generally sparse and the tips are now so well vegetated or remote that they are hard to distinguish from the surrounding moorland.

Drystone walls extend along roads and up from the dale edges, enclosing 'in bye' rough pasture and improved pasture and meadow or are found in isolated pockets where patches of limestone grassland have been enclosed. Walled meadows are mostly accompanied by traditional field barns. Wall construction is from locally gathered or quarried rock, often directly reflecting outcropping limestone, sandstone or gritstone geology and creating a distinct change in wall colour as geological boundaries are crossed. Walls are often constructed directly over outcropping features such as limestone pavements or rocky ledges and serve to accentuate the stepped or concave topography of the area. Isolated circular or square drystone sheepfolds also occur.

38. Eastern Gritstone Moors and Fells

+ Key Characteristics

- Narrow band of elevated gritstone moorland, falling north and south from a central highpoint and forming the western edge of the much larger Nidderdale Millstone Grit plateau.
- The main plateau comprises gently rounded hills with occasional stepping, giving way to more pronounced, lumpy knolls in the south of the area. Appletreewick Moor drains internally, feeding Grimwith reservoir.
- Gritstone crags and screes punctuate the rounded landforms, and are most prominent on the western edge of the plateau.
- An exposed pocket of limestone geology forms a miniature karst landscape at Trollers Gill, with cliffs, screes, limestone grassland and ash/sycamore tree cover.
- Steep-sided or rocky gills are cut through the gritstone, exposing underlying limestones and forming small waterfalls where rock ledges are crossed. In areas of deep drift deposits frequent erosion gulleys give hillsides a ribbed appearance.
- Streams are shallow and rocky with steep, eroded sides of grass/heather covered banks, broadening to small rocky rivers at lower elevations.
- Landcover is primarily acid grassland with extensive areas of upland heath, which are managed for grouse shooting and of international nature conservation value.
- Tree cover is often absent from the open moors, with scattered oak, mountain ash and birch on lower slopes or contained within sheltered gills. Linear stands of alder line watercourses at lower elevations. Conifer plantations create an alien effect at the northern and southern edges of the area.
- Settlement is sparse primarily comprising farmsteads along road corridors, and also around Grimwith Reservoir and on the dales fringes. Buildings are a mixture of traditional and modern with associated tree cover, walled pasture and meadow and infrequent field barns.
- Grimwith Reservoir forms a large-scale man-made feature in the centre of Appletreewick Moor but is broadly in sympathy with the open character of the moors.
- The remains of lead mining, in the form of waste tips and disturbed ground, are strongly evident on Grassington and Conistone Moors and to a lesser degree in other areas at Trollers Gill and along the B6265 corridor.
- With the exception of the busy A59 and, to a lesser extent the B6265, roads and footpaths are isolated in character with panoramic views of the eastern dales, southern dales fringe and east across the Nidderdale AONB.
- Drystone walls enclose the dale fringes giving way to larger areas of moorland enclosure or open moor, which is contiguous with the Nidderdale Moors. Walls are constructed from gritstone except where exposed limestone geology is crossed where limestone is used.

+ Landscape Character

The eastern gritstone moors and fells form the western edge of the much larger Nidderdale Millstone Grit plateau, which lies adjacent to the south eastern corner of the National Park. The area forms a narrow band along the Park boundary from Braithwaite Moor (near Coverdale) in the north to Beamsley Moor, above Wharfedale in the south. In its central section the area is divided from the

central moors and fells along the valley between Coverdale and Wharfedale and lies above the limestone moors of Conistone on the eastern flank of Wharfedale.

From a central peak of 704m AOD at Great Whernside the area falls to around 413m AOD at Braithwaite Moor in the north and 393m AOD at Beamsley Moor in the south. Within the area the National Park boundary broadly follows the natural watershed, with areas to the east draining to Nidderdale. Most parts of the area drain west, directly to Coverdale or Wharfedale. At Appletreewick Moor, however, the land drains inwardly to a central bowl, which is now occupied by Grimwith Reservoir, before draining to Wharfedale along the River Dibb.

Landform comprises gently rounded domes on the main plateau, with occasional stepping and a transition to smaller-scale pronounced lumpy knolls at Barden Fell and Hazlewood Moor.

Steep-sided or rocky gills (eg Gate Up Gill, Blea Gill, Trunla Gill, Trollers Gill) cut through the gritstone capping exposing gritstone crags and underlying limestones, most prominently at Trollers Gill, where a self-contained miniature karst landscape has developed. In areas of deep drift cover (eg Cow Side in Coverdale) numerous steep, incised erosion gulleys run perpendicular to contours, giving the hillside a ribbed appearance.

On the open moor tops gritstone is exposed as low, dark, blocky crags and scattered boulder fields. More extensive crags and screes are found on the western edges of the area, where the gritstone has been cut through by Wharfedale and Coverdale, including landmark crags such as Simons Seat on the northern edge of Barden Fell.

Moorland streams are shallow and winding with rocky beds and steep eroding or grassy/heather covered banks, with occasional tree cover clinging to the sides of more sheltered gills. In deeper gulleys exposed rock ledges form small waterfalls. Downstream watercourses widen but maintain a rocky bed, with grassy banks, increasing tree cover, marginal habitats and rush filled hollows in flatter areas.

Landcover is primarily acid grassland with large tracts of upland heath at Caldbergh Moor on the northern tip of the area and Conistone Moor, Appletreewick Moor, Barden Fell and Beamsley Moor in the southern half of the area. With the exception of heathland at Conistone Moor these areas are contained within the East Nidderdale Moors and West Nidderdale Moors, Barden and Blubberhouses Moors SPAs and candidate SACs. The dark colours and mosaic pattern of heathland contrasts with the bright green colours of bracken (found in large patches throughout the area on drier slopes) and the duller, lighter greens and browns of acid grassland. In acidic areas scattered stunted oak, mountain ash and birch may be found on lower hill slopes or in gills.

In limestone pockets (eg Trollers Gill) characteristic close-cropped, bright-green grassland flows around rock outcrops, with scattered ash, hawthorn and sycamore in lower areas. Ash cling to cliffs and rocky ledges. Large patches of bracken have established on upper slopes, where drift deposits provide deeper soils.

Occasional plantation copses of beech and sycamore are found above Grassington, whilst linear stands of alder are found alongside larger watercourses at lower elevations (eg River Dibb). Groups of ash and sycamore are found in association with farmsteads.

Conifer plantations are mostly absent from the area with the exception of a large block at Witton Fell (at the extreme northern tip of the area) and fringing blocks around Barden Fell in Wharfedale.

Settlement is limited to widely spaced traditional farmsteads, accompanied by modern outbuildings, alongside main roads (A59 and B6265) or occasional upland farms on the dales fringes and around Grimwith Reservoir. Farmsteads are often associated with walled meadows, enclosed rough grazing and infrequent field barns.

The A59 and, to a lesser extent, the B6365 are busy main roads, which pass through the area at Beamsley Moor and Appletreewick Moor respectively. Smaller roads, with wide grass verges and enclosed by drystone walls are found at Appletreewick Pasture and above Grassington, leading to the disused lead mines. An extensive right of way network crosses the area, linking to a recreational circuit around Grimwith Reservoir and open access land at Barden Fell and Hazlewood Moor. Other than within the main road corridors roads and footpaths offer solitude and tranquillity.

Other than main roads the primary modern influence in the area is Grimwith Reservoir, occupying the centre of Appletreewick Moor. The modern dam is low and grass covered and is broadly in sympathy with the broad, open sweep of the gritstone moors. Wire fences and overhead lines are present in the area, primarily along road corridors and leading to farmsteads, but do not have a significant effect on character.

Historic influence in the area is most evident in the extensive tips and workings left by the lead mining industry of the 18th and 19th centuries across Grassington and Conistone Moors and, to a less noticeable extent, within Trollers Gill. Large areas of 'doughnut' shaped shallow shaft working remains follows the B6265 corridor from south of Grimwith Reservoir to Greenhow in the east, just beyond the Park boundary. The restored cupola flue chimney on Grassington moor forms a distinctive local landmark on the open moors.

Drystone walls enclose in-by land around the dale fringes, giving way to large moorland enclosures across Appletreewick Moor. The open tops of Barden fell, Hazlewood Moor, Beamsley Moor and Cow Side to West Scafton Moor are enclosed to a lesser degree. Caldbergh Moor, Conistone Moor and Grassington Moor remain unenclosed, running directly into the contiguous and open Nidderdale Moors in the east. Walls are primarily constructed from gritstone but change to limestone over pockets of outcropping limestone geology, for example at Trollers Gill.

39. Limestone Moors

+ Key Characteristics

- A series of areas following the exposed Great Scar Limestone across the southern part of the National Park, separated by the southern dales, and containing many areas of international and national biological or geological value.
- Exposed limestone features including cliffs, screes, gorges, pavements and scattered boulders dominate the landscape, creating a rugged, worn character. These combine with shallow soil cover, shakeholes, potholes and caves to form classic karst landscape.
- Panoramic views are available across the southern dales and southern dales fringes. In the western part of the area views are dominated by the Three Peaks landforms of Ingleborough, Wharfedale and Pen-y-ghent.
- Closely grazed, springy, flower-rich grasslands form a neat, continuous, bright green carpet between exposed rock features. Many areas are recognised as being of high nature conservation value.
- Several large, semi-natural, undergrazed woodlands occur on the dale sides with a few, small, isolated plantations at higher elevations. A more continuous pattern of plantations has been established within the estate around Malham Tarn. Scattered trees or open, grazed woodland occur on scree slopes and cliffs, with occasional windblown trees or shrubs in cliffs and pavements at higher levels.
- A general absence of streams and surface water features, with the exception of occasional small tarns and limited numbers of springs at the base of the limestone moors, mainly around Ingleborough. Malham Tarn is atypical, forming a large waterbody in the central bowl of the Malham/Arncliffe area.
- Settlement is very limited, comprising mainly upland farmsteads in the Malham/Arncliffe area. Urban influences such as overhead wires and fences are scarce, tending to be concentrated around Malham Tarn.
- Quarries eat into the sides of the limestone moors but are often well hidden except in local views or views from opposing dale sides.
- An extensive network of historic routes and modern footpaths/tourist routes crosses the area. Former drove roads form wide, walled green lanes. Roads are mostly limited to minor lanes within the Malham/Arncliffe area, some are open whilst others are contained within high drystone walls, with verges of varying width and small roadside quarries.
- Drystone walls are frequent, forming medium size enclosures on the dales fringes giving way to larger enclosures or limited open areas. Wall pattern is strongly rectilinear, passing straight over and taking little or no account of natural features.

+ Landscape Character

The limestone moors are located in a band across the southern part of the National Park between Ingleton in the west and Grassington in the east, where the underlying Great Scar Limestone has been exposed. They occur as a series of seven areas separated by mainly north south trending dales and are contained between the Central Moors and Three Peaks, the southern dales fringes, the Southern Gritstone Moors and Fells and the Eastern Gritstone Moors and Fells character areas as follows, in west to east order:

- Keld Head and adjoining scars west of Kingsdale;

- Scars and pavements at Twisleton Scars and Scales Moor between Kingsdale and Chapel le Dale;
- Extensive scars and pavements around the base of Ingleborough between Chapel le Dale and Crummackdale/Ribblesdale including White Scars, Moughton Scars and Thwaite Scars;
- Giggleswick Scar and pavements between Crummackdale and Ribblesdale;
- The Malham/Arncliffe area, extending in a broadly triangular shape between Ribblesdale, Littondale and Wharfedale including Attermire Scar, Malham Cove, Gordale Scar, Malham Moor, Kilnsey Moor, Hawswick Clowder, Yew Cogar Scar, Kilnsey Crag and Malham Tarn. The character area encompasses an island of deeper drift cover and acidic soils over limestone at Mastiles Moor;
- A v-shaped area on the southern edges of Hawswick Moor at the junction of Wharfedale and Littondale, including Gate Cote Scar and Knipe Scar;
- The western edge of Conistone Moor/Grassington Moor above Wharfedale between Grassington in the south and Kettlewell in the north.

The limestone moors range primarily through elevations between 240-450m AOD, corresponding with the exposure of the Great Scar Limestone. In the largest single limestone area, at Malham/Arncliffe, elevations reach 531m AOD. Landform closely follows the underlying geology, with stepped or sheer outcrops, steeply angled scree slopes and gently rounded tops or limestone plateaux and pavements on hill tops.

Exposed rock is the principle characteristic of the limestone moors, with extensive limestone cliffs ('scars'), screes, pavements and scattered boulders present throughout all seven parts of the character area. The extent of exposed rock lends the area a rugged, worn character. Outcrops are often banded, exhibiting the differential strengths of the various layers of limestone from which the Great Scar Limestone is composed. This is clearly seen in the Keld Head, Twisleton Scars and Conistone areas and at Yew Cogar Scar near Arncliffe. Further variation is seen in the shape and form of limestone cliffs, for example steep, sheer sided cliffs are found at Great Close Scar east of Malham Tarn; tumbling, knobbly cliffs occur at Twisleton Scars and Attermire Scar; classic 'buttresses' and extensive screes are seen at Great Hill Scar on the eastern edge of Fountains Fell. Rock colour varies but mainly takes on a light grey or white appearance and contributes strongly to the 'light' appearance of limestone moor scenery compared to other, darker, upland areas. Deeper, atypical drift deposits create an open landscape, with little exposed rock, in the centre of the Malham/Arncliffe area around Malham Tarn and Mastiles Moor. Major limestone features including Kilnsey Crag and Malham Cove sit on the boundary of the limestone moors whilst Gordale Scar with its spectacular cliffs is contained within the Malham/Arncliffe area.

Limestone pavements occur throughout but are most extensive in the western parts of the character area at Keld Head, Twisleton and around the base of Ingleborough, where they occupy the majority of the area. At Giggleswick, Malham/Arncliffe and Conistone large pockets of pavements are broken by limestone grassland or, in the vicinity of Mastiles Moor/Malham Tarn the atypical incursion of acidic or neutral grassland associated with underlying deeper drift geology. Pavements typically form level, often stepped, plateaux above the dale sides and extending back from cliff tops. At Norber, sandstone erratics, carried by glaciers during the last Ice Age, have been deposited on the limestone pavements, producing dramatic sculptural effects.

Caves are sometimes visible as dark spots in the side of limestone cliffs and are well spread across the seven limestone moors areas. At Ingleborough, White Scar Cave and Ingleborough Cave have been exploited for tourist purposes, giving rise to associated buildings and car parks. Within the Malham/Arncliffe area, at Attermire Scar, a sequence of caves is present including Attermire, Horseshoe, Victoria, Albert and Jubilee Caves, the latter three being known or suspected to be of archaeological value for the prehistoric remains they contain.

The limestone moors are characterised by a general absence of watercourses, resulting from the porosity of shallow soil layers over the fissured limestone bedrock. The route of surface water into the bedrock is marked by numerous shake holes and potholes which are dotted across the limestone

moors. Shakeholes produce a 'dimpled' landform when sufficiently close together whilst potholes form larger, open shafts leading directly down into the bedrock (eg Gaping Gill, Alum Pot). Often these features are only evident at close range or when viewed from nearby elevated positions (for example shakeholes are visible when looking south west on the Arncliffe Road near Nab End) . Occasional springs and small tarns are found within some of the elevated limestone areas around Ingleborough, Malham and Conistone. More extensive springs are present around the base of the Ingleborough limestone moors and at higher elevations on the eastern side of Ingleborough at Selside. Malham Tarn forms an exception to the above, comprising a large water body in the landform bowl in the centre of the Malham/Arncliffe area. Pockets of deeper, impermeable drift geology to the west and east (at Mastiles Moor) of Malham Tarn are an anomaly within the limestone moors character area, creating small moorland streams which are more typical of the Yoredales geology found within the main body of the National Park to the north. Becks running off Mastiles Moor feed Gordale Beck, a shallow, fast flowing rocky watercourse which runs through Gordale Scar.

Landcover is primarily herb-rich calcareous grassland, supported by thin, well drained soils and maintained by livestock farming with sheep and cattle with additional grazing by rabbits. Within the centre of the Malham/Arncliffe area deeper drift soils support an atypical pocket of neutral and acidic grassland at Mastiles Moor. The closely grazed character and brighter colours of the calcareous grasslands contrast with the darker, often brownish colours of the acidic and grasslands. Although atypical of the limestone moors character area, a concentration of flower rich hay meadows occurs at lower elevations on calcareous soils around Bordley, on the southern edge of the Malham/Arncliffe area. Flower rich verges are found within walled sections of road in the Malham area.

In most areas woodlands are limited to occasional large blocks adjacent to the dale fringes and often used as wood pasture (eg Wharfe Wood, Oxenber Wood, and Feizor Wood at Giggleswick and Bastow Wood at Conistone) or linear strips which follow the shelter of gills (eg along Clapdale Drive near Ingleborough Cave). A few mixed plantations are found at higher elevations, such as Rayside Plantation at Ingleborough. In the central bowl of the Malham/Arncliffe area woodland cover is more extensive where a chain of mixed woodlands has been established around Malham Tarn. In the semi-natural woodlands species primarily include ash and hazel, with some hawthorn, rowan, and planted sycamore. Oak, bird cherry and rock whitebeam are also found in the woodlands below Giggleswick and Common Scars. Plantations mostly comprise sycamore and ash.

Ash, hawthorn, rowan and sycamore occur throughout the area as scattered individuals on grassland and limestone pavements and are more commonly found together on steep slopes and cliffs, sometimes with yew (as seen at Yew Cogar Scar near Arncliffe). On the pavements and more exposed cliffsides trees and shrubs are often windblown, producing dramatic leaning shapes.

The high biological and geological value of the limestone moors is recognised by numerous designations including SSSIs (eg Bastow Wood, Oxenber Wood, Langcliffe Scars and Jubilee, Albert and Victoria Caves), inclusion of parts of the Ingleborough area within a National Nature Reserve, Special Areas of Conservation at Keld Head, Twisleton, Malham/Arncliffe and Conistone and a Ramsar Site at Malham Tarn.

Evidence of earlier human activity in the area is seen in the form of enclosure, settlement and field system remains at higher elevations, for example on Conistone Moor. Bellpits, shafts, adits and tips remaining from the lead mining industry are mainly scattered across the eastern parts of the character area at Malham/Arncliffe and Conistone. These remains of earlier activity are often grown over and form only localised influences. Modern settlement within the limestone moors is limited to the Malham/Arncliffe area where scattered upland farms occur around Malham Tarn, along the road to Arncliffe and south of Mastiles Moor, at the hamlet of Bordley. Malham Tarn House has been converted to a field studies centre. Traditional farm buildings of limestone rubble and sandstone slate roof construction are sometimes accompanied by modern outbuildings, where the light grey/bleached colour of faded timber cladding is sympathetic to limestone character. Influences of the tourist industry and modern needs are seen at White Scar Cave, which is surrounded by visitor buildings, and an adjacent service reservoir, both located at the western foot of Ingleborough.

Roads are absent from all of the limestone moor areas with the exception of Malham/Arncliffe where a network of minor lanes provides access between Malham, Malham Tarn and Arncliffe, in Littondale. Roads near Malham are enclosed by tall drystone walls but often have wide verges (a remainder from earlier droving days) and small roadside quarries (excavated for walling stone). Roads across Malham Moor are generally open, with some stretches enclosed by post and wire fencing.

Occasional overhead lines on poles follow roads or cross fields near Malham Tarn but are absent from other limestone areas. Large scale quarries represent the main modern influence within the character area. They are located on the edges of the Ingleborough (Arcow, Foredale and Beecroft Quarries), Giggleswick (Giggleswick Quarry), and Malham/Arncliffe (Threshfield and Kilnsey Quarries) areas. Some quarries are well hidden but others (eg Beecroft) are visible over a wide area, particularly from opposing dale sides.

Panoramic views are available over the southern dales and dales fringes. The internal bowl of the Malham/Arncliffe area, centred on Malham Tarn is visually self contained, with an almost sheltered quality compared to other, more exposed upland areas. In the western part of the character area the limestone moors are closely juxtaposed with Ingleborough and Whernside, which dominate local views. Pen-y-ghent is also a dramatic landmark in views from these areas. In close range views the fractured patterns of limestone pavements and the delicacy of calcareous wildflowers provide a level of detail and interest largely absent from other upland character areas.

Limestone drystone walls enclose the majority of the limestone moors, with rectilinear enclosure patterns taking little or no account of natural features, often passing directly over pavements and outcrops. Field pattern varies considerably but typically comprises medium size enclosures on the edges of dales giving way to larger enclosures and some open areas on the pavements above. Walls are sometimes raised with a top band of wire mesh supported on leaning wooden poles. Gate posts are made of gritstone. Sheep creeps and folds occur throughout the area.

40. Southern Gritstone Moors and Fells

+ Key Characteristics

- Four outlying islands of elevated gritstone moorland set within and overlooking the Craven and southern dales, falling gradually south and south east from high points on the northern and western sides.
- Landform comprises gently rounded hills with occasional stepping. Flasby Fell comprises a distinctive series of small conical peaks.
- Winterburn Moor and Barden Moor drain internally, feeding three man-made reservoirs with grass covered dams.
- Dark, blocky, gritstone crags and screes punctuate Barden Moor, most noticeably on the edges, but are less prominent or are absent from the other moors.
- Streams are shallow and rocky with steep, eroded sides of grass/heather covered banks, broadening to small rocky rivers at lower elevations.
- Landcover varies between the four areas with acid grassland and rough pasture dominating Scosthrop Moor, Winterburn Moor and Flasby Fell and upland heath (of international conservation value) dominating Barden Moor. Occasional walled upland hay meadows are found in isolated positions within the open moors.
- Tree cover is generally absent from the open moors, with copses and larger mixed ancient semi-natural woodland and conifers on the lower slopes of Winterburn Moor, Flasby fell and Barden Moor.
- Dark, alien blocks of conifer plantations encroach on to the edges of Scosthrop Moor, Flasby Fell and Barden Moor with smaller plantations at higher levels on the sides of Scosthrop Moor and Winterburn Moor.
- Settlement is sparse primarily comprising farmsteads around reservoirs and within the sheltered valley between Winterburn Moor and Threshfield Moor. Buildings are a mixture of traditional and modern with associated tree cover, walled pasture and meadow and infrequent field barns.
- Minor roads cross parts of the moors impinging locally on solitude but with little effect on wider character. White, limestone surfaced tracks are prominent against the darker heather on Barden Moor.
- Drystone walls enclose the dale fringes giving way to larger areas of moorland enclosure across Scosthrop Moor, Winterburn Moor and Flasby Fell. Walls are constructed from gritstone except where exposed limestone geology is crossed. The main body of Barden Moor remains unenclosed.
- Lower areas of Winterburn Moor contain smaller fields, meadows, pasture, trees and occasional barns forming a transition between the open moor and sheltered dales.
- An extensive rights of way network crosses the moors. The main body of Barden Moor is open access land, which is heavily used during the summer months.

+ Landscape Character

The southern gritstone moors and fells are outliers of the main Nidderdale Millstone Grit plateau, which lies to the east of the National Park. They form four distinct islands of high ground within and overlooking the Craven and southern dales fringes at Scosthrop High Moor/Kirkby Fell, Winterburn

Moor/Threshfield Moor, Flasby Fell and Barden Moor/Embsay Moor/Burnsall and Thorpe Fell/Rylstone Fell.

Overall landform is generally defined by high points on the northern and western edges of the areas (Rye Loaf Hill rising to 547m AOD on Scosthrop Moor, Weets Top rising to 400m AOD on Winterburn Moor, Rough Haw rising to 339m on Flasby Fell and Cracoe Fell rising to 500m AOD on Barden Moor). Steep northern and north western flanks contrast with gently rounded, undulating slopes falling gradually to the south and south east. Flasby Fell is dominated by the distinct pointed conical hills of Sharp Haw and Rough Haw.

The crowns of Scosthrop Moor and Flasby Fell shed water directly to surrounding areas. Winterburn Moor generally drains to a central north-south valley formed by Hetton Common Beck and now dammed to create Winterburn Reservoir. In a similar manner, Barden Moor primarily drains into itself, feeding Upper Barden and Lower Barden Reservoirs before joining the Wharfe via Barden Beck.

Dark, blocky gritstone crags and screes crown the steep western flank of Barden Moor and form a prominent landmark at Embsay Crag on the southern edge of the moor. Further, occasional low crags are set within the main body of the moor, accompanied by fields of scattered gritstone boulders. Outcropping gritstone is generally absent from the other moors but small areas of scattered gritstone boulders are found on the moor tops and steep northern flank at Kirkby Fell on Scosthrop Moor.

Shallow, rocky moorland streams or peaty channels are often obscured by surrounding grass or heather cover and do not form a significant component of wider landscape character. Occasional steep-sided eroding gulleys are found at the edges of the moors, sometimes exposing softer shales (eg Black Gill Beck on the western edge of Scosthrop Moor). At lower elevations watercourses widen, accompanied by grassy, boulder banks, increasing tree and shrub cover and patches of marginal/rushy vegetation.

Landcover varies between the different moors. Scosthrop Moor is almost entirely covered in acid grassland and rough pasture, lending the area a particularly bleak character. Contrasted with this are several high-level, isolated walled meadows (with field barns) which stand out as bright green patches in the duller browns and yellows of moorland grasses. Winterburn and Threshfield Moors comprise rushy acid grassland on the exposed moor tops with occasional high-level hay meadows and barns. In-by pasture and meadows mainly occur in the shelter of the central valley or at lower elevations on the edges of the moor, around Bordley Hall in the north and Winterburn village in the south. Typically these areas are associated with small field sizes, occasional field barns and increasing tree cover, creating a transition from the moors to a dales character. Flasby Fell is primarily covered with rushy pasture and acid grassland, with several small pockets of upland heath on Sharp Haw. Barden Moor is comprised mainly of upland heath (used for grouse shooting) and larger pockets of acid grassland and rough pasture on the northern and southern tips of the area. Barden Moor forms part of the West Nidderdale Moors, Barden and Blubberhouses Moors SPAs and candidate SACs. The dark colours and mosaic pattern of heathland contrasts with the bright green colours of bracken (found in large patches throughout the area on drier gill sides) and the duller, lighter greens and browns of acid grassland. Scattered stunted oak, mountain ash and birch may be found on lower hill slopes or in gills.

At Scosthrop Moor broadleaved woodland cover is confined to a small wood on the top of the moor and several copses around the area perimeter. Pockets of broadleaved plantations are found on the lower slopes of Winterburn and Threshfield Moors, with a collection of ancient semi-natural woodlands (including some conifer replanting) occurring in the shelter of Winterburn Beck valley, south of the reservoir. Large areas of ancient semi-natural woodland with conifer interplanting also occur on the western slopes of Flasby Fell and the lower western slopes of Sun Moor at Barden Moor. Broadleaved woodland is absent from the exposed moor tops in these areas.

Conifer plantations form dark, alien, rectilinear blocks encroaching on the edges of Scosthrop Moor, Flasby Fell and Barden Fell, forming part of larger plantings, which extend down into the dales. On the moor tops conifer planting is limited, comprising a small block on Scosthrop Moor and a larger series of linear plantings extending up the slopes of Winterburn Moor west of the reservoir.

Settlement on the moors is confined to several Victorian stone lodges and farms around the reservoirs on Barden Moor and a chain of traditional farms, lodges and Bordley Hall in the central valley between Winterburn and Threshfield Moors. The reservoir dams themselves are broad low grass

covered banks, which stand out from the surrounding darker heather vegetation on Barden Moor due to their lighter colour. Access tracks to the reservoirs and grouse moors are constructed from limestone and stand out as gleaming white ribbons against the heather. Grouse shooting butts are found across Barden Moor in small linear groups. Occasional overhead lines run along roads or to farms but do not have a significant effect on the character of the four areas.

A number of minor roads cross the moors. They are usually enclosed by drystone walls at lower elevations and open with cattle grids on the moor tops. The low-key nature of these roads and limited traffic has little effect on wider character. Public rights of way are found across the four areas with the most extensive networks being found at Winterburn and Threshfield Moors and Barden Moor, which is open access land north of the road between Barden and Embsay. Barden Moor is often busy and well-used by walkers. The other moors are less frequently used, providing a higher degree of solitude and tranquillity.

Gritstone walls enclose the fringes and tops of Scostrop Moor, Winterburn and Threshfield Moors and Flasby Fell, snaking across the moors as dark lines. Enclosure at Barden Moor is limited to pockets of hay meadow and pasture near the reservoir and moorland south of the Barden-Embsay road, with the main body of the moor remaining unenclosed.