Nidderdale
Area of Outstanding Natural Beauty

Nidderdale AONB Summary Report

Ecosystem Services Produced by Land Management in Upper Nidderdale

November 2013

Contents

1 Summary

Ecosystem services are the services provided by the natural environment that benefit people. Food, fuel, water and cultural services such as recreation and tourism are well known and other are less obvious but vital for human well-being such as soil formation, biodiversity, flood regulation, nutrient cycling and pollination. It is important that ecosystems are maintained in a healthy condition for society.

Upper Nidderdale is an area of special qualities and provides many ecosystem service benefits for people as it contains valued landscapes and natural habitats. It has important carbon stores in soils and woodland, water and food resources and potential for renewable energy. It's landscape and natural beauty attract visitors seeking recreation and spiritual refreshment. However the ecosystem services and the benefits they provide are vulnerable to economic, environmental and social change.

Population increase, food demand, farm economics and agricultural support mechanisms can put pressure to intensify or abandon land which will result in habitat and biodiversity loss leading to the decline of capacity to deliver ecosystem services. In the future payments for ecosystem services may become more main stream in recognition of the role that farming can have in meeting wider environmental objectives and to maintain HNV farms.

Upper Nidderdale is within Nidderdale AONB, a Catchment Sensitive Farming Catchment Partnership; it is classified as a Severely Disadvantaged Area and the majority but not all moorlands are designated SSSI, SPA and SAC. There are several geological SSSI on the limestone areas at Stean, Lofthouse and Greehow. Agri-environment uptake is high with a large proportion of HLS and classic agreements. The upper reservoirs of Scar and Angram are in drinking water protected areas.

There are links and complexities within and between each Ecosystem Services habitat, each supports and interacts with each and is sometime difficult to consider in isolation.

2 Upper Nidderdale Landscape Character

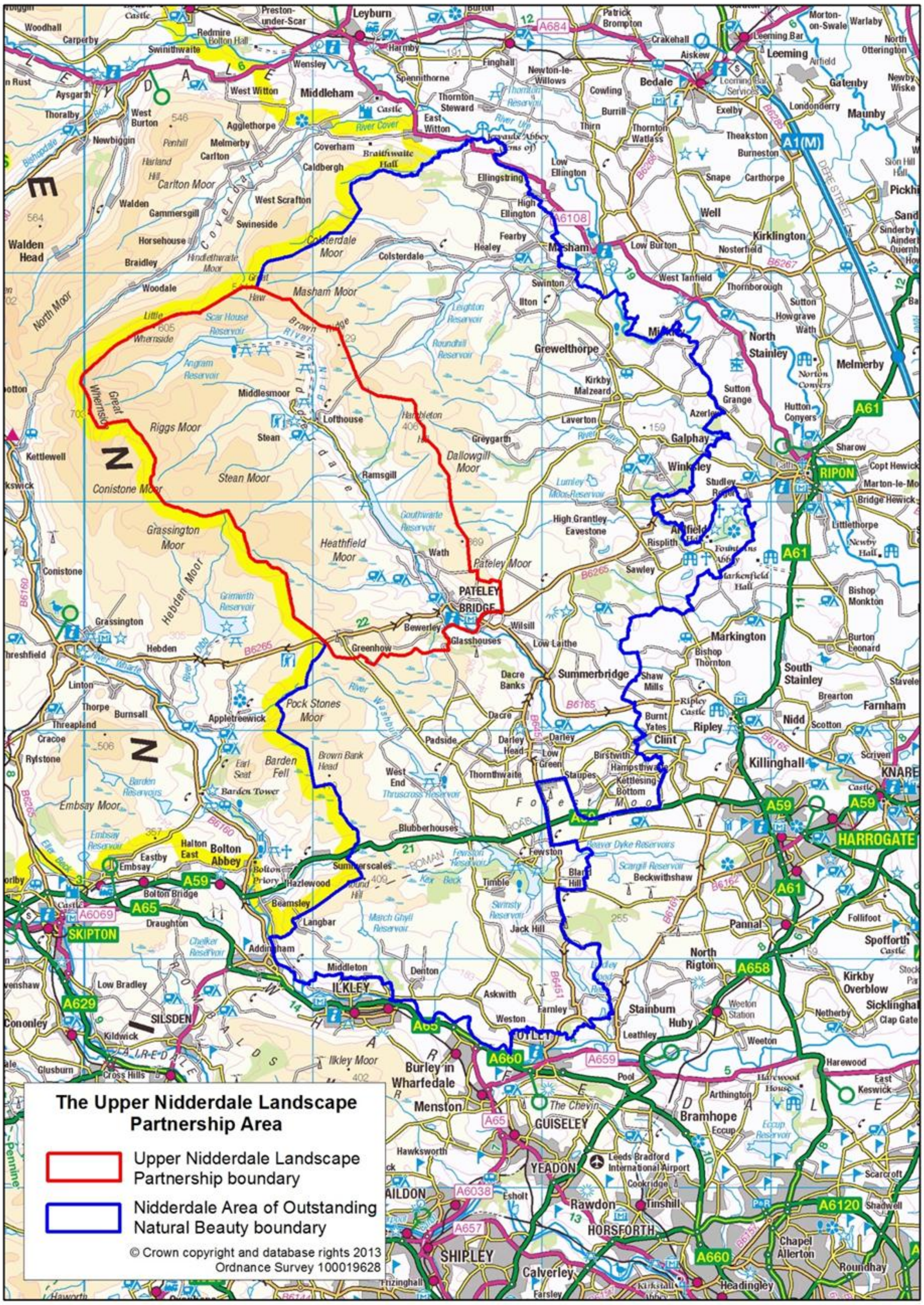
The stunning landscape of upper Nidderdale is designated AONB and comprises of the upper valley of the River Nidd. The upland plateau is a vast, open and remote area of unenclosed moorland dominated by heather and cotton grass managed for grouse shooting. Adjacent to this are large enclosed in-bye allotments of unimproved rough grazing, supporting good populations of breeding upland bird communities. Grassland becomes increasingly improved down slope. The upper valley has been dammed and flooded to create 3 reservoirs which provide a vast expanse of water with both architectural and historical interest in their construction as well as aesthetic qualities.

Valley sides have both earlier piecemeal enclosure and later regular rectangular fields of parliamentary enclosure the majority of which are bounded by drystone walls. Village settlements and dispersed farmsteads occur along the valley with evidence of origins being prehistory with a strong evidential archaeological timeline of a long tradition of farming. There is especially a strong monastic influence in the dale. Dominant farmland land use is pastoral sheep farming with beef. Vernacular buildings are features but many are redundant and in poor repair.

Woodland cover is dispersed and boundary trees and woodland give the valley a well wooded appearance. The majority of semi- natural tree cover tree cover is restricted to river corridors in the upper dale with regimented conifer plantations prominent along the steep valley sides, semi-natural and ancient woodland increases further down the valley.

Lead mining, quarrying and lime industries are dominant landscape features, especially in the southern part of the area and impact upon land use.

There is one main access road up the dale and only one way out of the Dale to Masham from Lofthouse. Many of the other routes have not been designated and are assigned as public rights of way which diverge on the linear access up the dale. Many of these are old monastic routes. The area is a valuable recreational resource especially for walkers with increasing use by cyclists and horse riders.


The Upper Nidderdale Landscape Partnership Area
Upper Nidderdale Landscape Partnership boundary
Nidderdale Area of Outstanding Natural Beauty boundary
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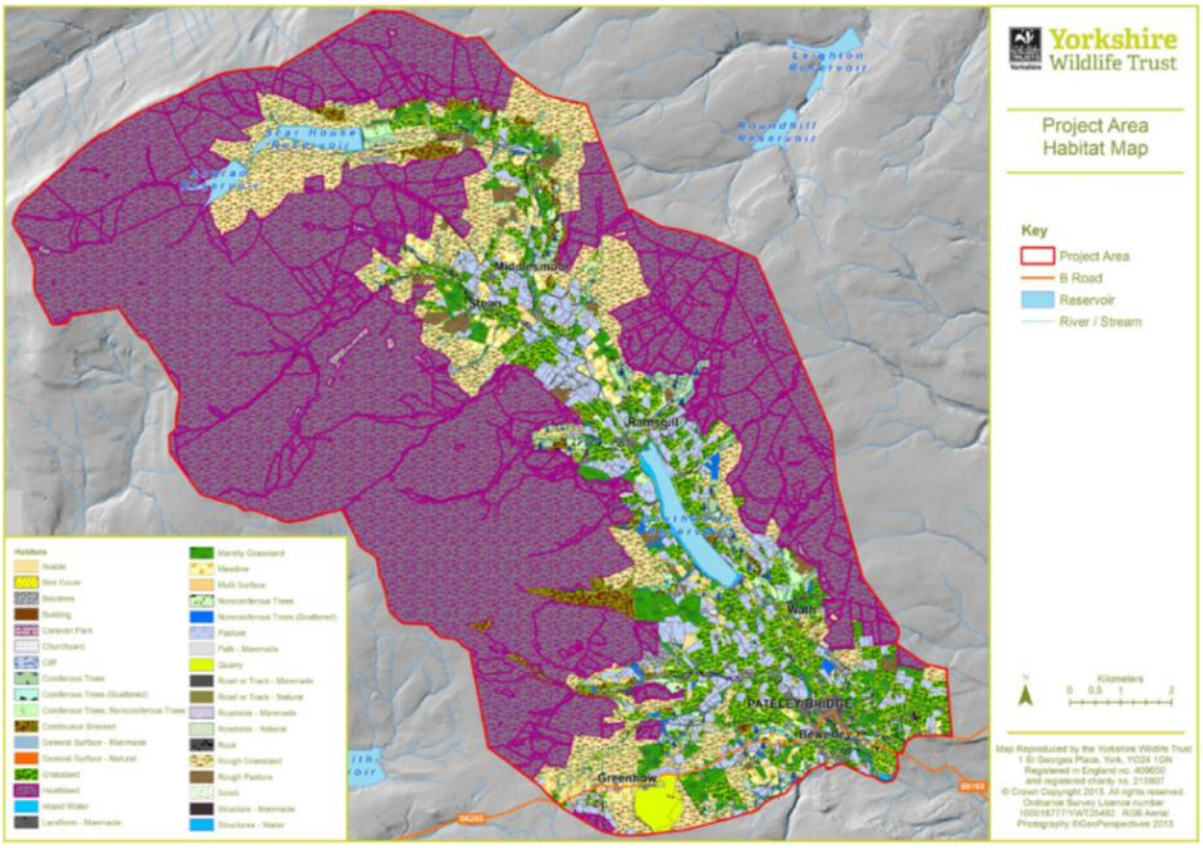
3 Ecosystem Services in Upper Nidderdale

	MOORLAND	FARMLAND	WOODLAND	RIVERS & RESERVOIRS
Provisioning	• Livestock meat & breeding stock • Grouse & rabbits • Honey • Hunting experience • Heather seed & mulch • Water supply	• Food meat & dairy, game • Livestock breeding • Renewable energy •	• Timber • Game	• Drinking water • Hydro electrical power • Food
Regulating	• Flood management • Water quality • Carbon storage • Control of soil erosion • Pollination	• Pollination • Soil & water quality • Water regulation & quality •	• Flood water • Soil quality and erosion • Water quality • Carbon sequestration	• Flood management • Waste disposal & dilution • Fire breaks
Cultural	• Aesthetics • Biodiversity • Recreation & Tourism • Spiritual refreshment • Heritage • Social cohesion	• Farming landscapes • Heritage • Species conservation • Social cohesion	• Recreation • Tranquillity • Heritage	• Landscape qualities & sense of place • Tranquillity • Heritage • Recreation & tourism



3.1 Moorland

Moorland is by far the largest and iconic habitat in the project area it covers 10,656 ha which is 67 % of the land area of Upper Nidderdale. 4,450ha of moorland is both a Special Area of Conservation (SAC) and a Special Protection Area (SPA) as part of the vast North Pennine Moors Natura 2000 site. The SPA designation signifies the international importance of the area for birdlife, with strategically important populations of birds including merlin and golden plover as well as significant populations of waders such as curlew, lapwing, snipe and red shank. The SAC designation demonstrates the same level of importance for habitats, with the area's upland heath and blanket bog both important examples of this upland habitat in northern England. Species composition is largely ling heather but with other species such as bilberry and crowberry, cowberry on drier sites and cotton grass, cross leaved heath, mosses, cloudberry, sundew, cranberry and lichens.

The majority of the moors have been affected by drainage, wildfire and erosion, grazing pollution deposition (lead mining) and burning management. Many of the moors have altered hydrology and attract massive investment through agri-environment and peat restoration works to help restore the integrity and sustainable management of these moors. Yorkshire Water has committed over £1million capital investment to restore the benefits moors provide for clean water provision.

3.1.1 Provisioning

The moorland in upper includes blanket bog, wet and dry heath and associated habitats. It has low agricultural productivity due to soils, waterlogging and topography. Land improvements of the moorland edge e.g. drainage, lime, and fertilisers have been used to develop peat soils into rough grazing on which can also be derived from over the grazing of the dwarf shrub species which has occurred on some of the moors at the top of the dale.

- Livestock - For breeding stock and meat. Upper Nidderdale Sheep grazing supports native sheep flocks of Swaledale, & Dalesbred sheep in hefted flocks. They are generally used as breeding stock and the castrated males for meat provision which is often looked upon as a by –product of the breeding stock.
- Sheep wool - it is now an unproductive by product of sheep farming but was once the major industry in Nidderdale in monastic times.
- Grouse and rabbits - all of the moorlands in upper Nidderdale are used for grouse shooting. The game is generally

sold to game dealers and is sent all over the world. Rabbits are generally controlled as vermin but sold as meat locally and exported similarly to the grouse.

- Hunting experience - the biggest impact on the moors is the shooting experience and the whole management of the moor is focused around this activity which impacts upon aesthetics, increases local employment and tourism.
- Honey - bees are sent to the moors in the summer months to produce heather honey which is a sought after luxury commodity.
- Mulch & seed for restoration of sites - seed and mulch have been harvested for restoration sites in other parts of the dales.
- Water supply quality - limited human impacts of agricultural pesticides and fertilisers produce uncontaminated water supply. Negatives aspects include peat drainage; wildfire and controlled burning have all been indicated in reducing the quality of water. £1m investment has been spent to date in reducing peat loss from the moors of upper Nidderdale.

3.1.2 Regulating

- Carbon storage – peat soils are a huge carbon store and potential carbon sink
- Flood management – peat soils are capable of storage of large quantities of water. Flood management by restoration of degraded systems and re-vegetating areas will have the largest impact.
- Water - peat soils release water slowly over a period of time enabling continuity of supply.
- Control of soil erosion - many of the moorland in Upper Nidderdale have experienced accelerated erosion due to anthropogenic impacts which include wild fires, overgrazing, acid deposition and heavy metal contamination from lead mining which has had negative impacts leading to the degradation of perceived landscape quality, reduction of water quality due to release of heavy metals, Persistant Organic pollutants and loss of water storage capacity in the reservoirs due to sedimentation and is also a significant carbon loss. Gouthwaite Reservoir has a reduced capacity of at around third due to sedimentation. Extensive re-profiling and grip blocking works have been carried out on Stean, High & Low West and Lodge Moors. With plans for further works on Scar, Angram Pasture and Heathfield in the near future.

- Pollination – pollinators support moorland biodiversity by mediating seed and fruit set of many plants which feed invertebrates and birds. Pollination is provided by a managed honey bees and a wide range of wild insect species, including bumble bees, solitary bees, hoverflies, butterflies, and moths.

3.1.3 Cultural

These socially valued landscapes are demonstrated by both landscape and biodiversity designations.

- Aesthetics - people who visit Upper Nidderdale value remoteness, bleakness, tranquillity, open space, dark skies, special plant and animal life, the sense of wilderness and freedom which often inspire works of art and sculpture.

- Biodiversity - conservation for moral, ethical and aesthetic reasons ensuring diversity for future generations and encouraging interest in specific iconic species such as raptors, wading birds and black grouse.

- Recreation and tourism - most visitors are attracted by the scenery and tranquillity. The area is very popular for walkers, mountain bikers, bird watchers and horse riding. Health benefits are gained through physical activities undertaken and passive benefits for mental and emotional health.

- Spiritual refreshment - moorland can provide a setting for religious and spiritual reflection. Travelling through semi-wild beautiful terrain with uninterrupted views can involve a sense of meaning and therefore spirituality.

- Heritage - the Nidderdale Moors have important archaeological features which span hundreds of thousands of years. There are prehistoric, Bronze Age and iron age sites through to more modern medieval features and artefacts found throughout the dale giving a rich legacy of land use and occupation. Peat soils are also of considerable importance as they preserve records of species, environment, climate and land use.

- Social cohesion and community development - the majority of the moorlands in Upper Nidderdale are commons and shared grazing requiring co-operation and involvement in their management. Grouse shooting days as well as providing high private investment brings local communities together and employment.

3.2 Farmland

Enclosed farmland in upper Nidderdale is typical of upland dales farms with the exception that the reservoirs have flooded many of the more fertile and flatter land in the valley bottom. Typically farms have an amount of semi-natural grassland either derived from the enclosure of moorland on peaty soils or in the form of traditional hay meadows. These grasslands characteristically have very low inputs, extensive grazing and hardier breeds of livestock involved in their management and form an integral part of an archetypal upland farming system in Nidderdale. Further improvements of this land would lead to biodiversity and ecosystem service losses in the valley. There are little arable or rotational grass leys, the majority of the land is permanent pasture with meadows and silage fields on the most improved land. Soil pH is generally low due to lack of liming with high Magnesium indices. The primary systems are sheep and beef with only 2 small dairy units surviving to date.

3.2.1 Provisioning

The farms in upper Nidderdale do not usually provide any excess produce other than meat and a small amount of dairy. Quality of production of the livestock is perceived to be produced naturally due to extensive stocking rates and the use of semi- natural habitats on the majority of farms.

- Food - the main food provision is meat for direct human consumption from sheep and cattle. With only 2 dairy farms remaining in the dale (one of whom milks 10 cows to produce ice cream, the other now dispersing cows with a view to ceasing his dairying enterprise in 2014) it is of little consequence in the upper dale. Traditional breeds and cross breeds of sheep are produced which are often seen as a by- product of breeding stock production.

- Livestock breeding - pedigree hill sheep for upland stocking and cross breeds for lowland breeding stock to produce lambs for food. The upland system is an important source of breeding for stocking lowland farms.

- Renewable energy – there are several small scale wind and hydro schemes

3.2.2 Regulating

- Pollination - traditional hay meadows, stream sides and moorland edge habitats, trees and hedgerows are important sources of pollination.

- Climate Change – soils in Upper Nidderdale are retained under low in-put, permanent pasture which maintain organic carbon and which can be a carbon sink with organic inputs. The majority of grassland in Upper Nidderdale has low inorganic inputs due to affordability, topographic restrictions and high rainfall.
- Flood regulation & water quality - soil structure is generally better under permanent pasture; allowing better infiltration as compaction is less of a problem with lower stocking carrying capacity thus reducing flood risk Lower use of inorganic fertilisers and pesticides has reduced diffuse pollution from agriculture and producing a cleaner water supply and greater river biodiversity.

3.2.3 Cultural

- Farmed landscapes- Aesthetics of pastoral field patterns with dry stone walls, field barns, flower rich meadows and animals are all highly valued by tourists and residents.

- Heritage - the low intensity farmed land of the moorland fringe and pastoral farming has preserved many important historic features which are generally in better condition than in more improved areas lower in the dale. There are important prehistoric settlements such as at Gouthwaite and Raygill Farms, historic routeways and a legacy of industrial archaeology.

- Species conservation –Upper Nidderdale farmland contains many BAP priority species and habitats including; lapwing, curlew, snipe, red shank, black grouse, grey partridge, and BAP habitats such upland hay meadows, purple moor grass and rush pastures and ghyll woodland . Greenhow Pasture SSSI is noted for its neutral and calminarian grassland flowers, cowslip, ox-eye daisy and lady's mantle, frog orchid and moonwort.

- Social cohesion - the farmed landscape can bring together heritage groups, wildlife enthusiasts, conservation groups and groups of farmers such as those farming similar habitats or breeds of stock. Eg nidderdale Iron Age Group, Farmer Network, Nidderdale Walling Group, Nidderdale Conservation Volunteers.

3.3 Woodland

The woodland in Upper Nidderdale is comprised of semi-natural blocks, mainly occurring in gills and along the river edges and larger blocks of conifer woodlands mainly planted prominently on hill sides. Access route through woodland itself is limited in the dale but woodland is highly visible and has a strong visual impact with adjacent rights of way.

3.3.1 Provisioning

- Timber production – the woodlands are capable of supplying timber, fuel and fibre. However many of the woodlands in upper Nidderdale have been planted without thought of extraction and therefore are unlikely to be harvested.

- Food – provision of reared pheasants and wild deer.
- Hunting experience - a good deal of the woodlands are used for pheasant shooting and are part of estates, not incorporated as part of the farmed landscape but kept purely for sporting interest. They provide income and local employment.
- Shelter – there is provision of shelter afforded by the woodland in Upper Nidderdale. A commodity not to be undervalued to stock and communities in the upland climate.
- Oxygen production

3.3.2 Regulating

- Climate change – carbon sequestration for woodland is calculated at a rate of up to 42t of CO_2/ha/yr for soft woods and 15t of CO_2 /ha/yr for hardwoods.
- Soil Erosion – woodland protects soils from erosion and slope failure.
- Water quality – woodland provides buffers from agricultural activities, grazing and intercepts pollution; this is increased where the woodlands is fenced.
- Flood mitigation -reduced overland flow and increased infiltration, especially on slopes which helps to militate against flooding by reducing peak flow by attenuation of water.

- Provides cool dappled shade along water habitats regulating temperature for fish.

3.3.3 Cultural

- Aesthetics –woodland can enhance landscape character and provides aesthetic appeal.

- Tranquillity - woodland gives the sense of tranquillity. Many linear stretches of woodland and public access coincide in Upper Nidderdale.

- Historic assets – many of the woodlands are linked with historic land use through their management i.e coppice, pollarding, ancient woodland and veteran trees or with the historic environment such as pleasure parks associated with estates e.g Skrikes and Fishponds Wood.

3.4 Water

3.4.1 Provisioning

- Drinking Water - Upper Nidderdale is an important drinking water source to the conurbations of Bradford. The Scar & Angram Reservoirs can supply 100 million litres of water a day; that is 1/12th of the water Yorkshire Water supplies every day.

- Hydro-electric power - there is one hydro-electric scheme in construction from mine waters which will have no negative impacts upon biodiversity of the river and potential for many other small scale schemes to provide alternative energy supply.
- Food - fishing on Scar & Gouthwaite Reservoirs, and the River Nidd also provides hunting experience

3.4.2 Regulating

- The reservoirs when under capacity regulate flooding of the lower stretches of the Nidd.
- Waste disposal and dilution – rivers provide routes for waste disposal e.g from septic tanks and sewage works and dilute other pollutants
- Provide fire breaks

3.4.3 Cultural

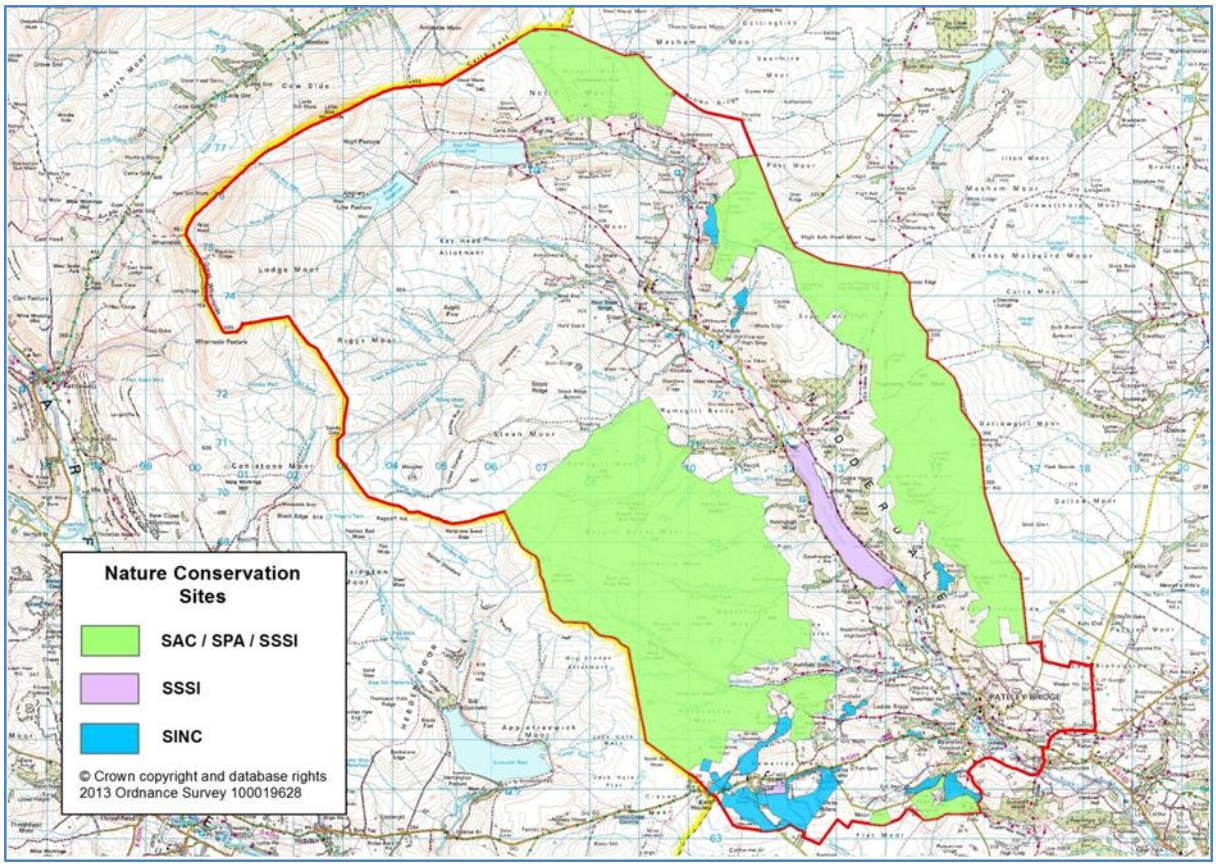
- Landscape qualities - rivers and reservoirs are iconic of upper Nidderdale and give a sense of place, are physical barriers; inspire art and provide a sense of remoteness and tranquillity.

- Recreation & Tourism – water attracts visitors and often focus points for walking, wildlife groups, angling clubs and other activities. The Nidderdale Way follows large stretches of the River Nidd.

- Heritage- the reservoirs in upper Nidderdale have left a strong heritage legacy in their construction with navy camps, quarries, architecture, flooded villages.

- Biodiversity- Gouthwaite Reservoir SSSI (148 ha) is an important site for breeding birds, as well as providing a stopping point for wintering birds, including significant populations of teal and mallard. Its northern end is a large shallow area of mudflats well suited to ducks and waders. The open water attracts large numbers of wildfowl and wading birds with over 200 bird species recorded adding to the aesthetics and value of the habitat. It is the only lake in UK with a wild population of greyling.

4 Appendices



4.1 Statistics

HNV Farming Statistical Evidence Base			
Subject Area	**Information**	**Value**	**Source**
General			
	Area of NidderdaleAONB HNVF Study	15837 ha	ArcGIS measurement
Biodiversity			
	Number of SSSI	6	Natural England
	Area of traditional hay meadow	143 ha	Natural England
	Breeding wader population on none SSSI sites	784 pairs	Nidderdale AONB breeding bird survey
	Breeding wader population SSSI sites		NE
	SSSI area (biological)	4607 ha	Natural England
	SAC/SPA area	4450 ha	JNCC
	SINC area	267 ha	NYCC
	Total woodland cover	509 ha	NFI
	% woodland cover below moorland line	10	
	Ancient woodland	145 ha	
	% ancient woodland out of all woodland	28	
	Area above moorland line	10656 ha	
	Area below moorland line	5181	
	%above moorland line	67	
Geology			
	Number of geological SSSI	3	Natural England
Farming & Land Use			
	Number of farms	66	Defra
	Number of people employed in agriculture	154	Defra
	Number of grouse moor estates	6	
	Area of moorland	10656 ha	
	Reservoir area	228 ha	ArcGIS measurement

4.2 Tourism Statistics

Analysis by Sector of Expenditure			
(£'s millions)	**2012**	**2011**	**% change**
Nidderdale	43.73	45.40	-4
TOTAL	**43.73**	**45.40**	**-4**

Analysis by Sector of Expenditure			
(£'s millions)	**2012**	**2011**	**% change**
Accommodation	5.45	5.42	1
Food & Drink	6.30	6.60	-4
Recreation	2.42	2.55	-5
Shopping	7.21	7.61	-5
Transport	3.44	3.61	-5
Total Direct Revenue	**24.82**	**25.79**	**-4**
Indirect Expenditure	13.94	14.46	-4
VAT	4.96	5.16	-4
TOTAL	**43.73**	**45.40**	**-4**

Economic Impact Generated by:			
(£'s millions)	**2012**	**2011**	**% change**
Serviced Accommodation	11.20	10.77	4
Non-Serviced Accommodation	14.46	15.43	-6
SFR	5.52	5.57	-1
Day Visitors	12.55	13.63	-8
TOTAL	**43.73**	**45.40**	**-4**

Tourist Days Generated by:			
(Thousands)	**2012**	**2011**	**% change**
Serviced Accommodation	88.27	85.13	4
Non-Serviced Accommodation	282.89	302.02	-6
SFR	116.92	117.98	-1
Day Visitors	347.32	377.01	-8
TOTAL	**835.41**	**882.15**	**-5**

Tourist Numbers Generated by:			
(Thousands)	**2012**	**2011**	**% change**
Serviced Accommodation	51.11	50.75	1
Non-Serviced Accommodation	44.13	46.94	-6
SFR	25.63	25.83	-1
Day Visitors	347.32	377.01	-8
TOTAL	**468.18**	**500.53**	**-6**

Sectors in which Employment is supported by Tourism Activity			
(FTE's)	**2012**	**2011**	**% change**
Direct Employment			
Accommodation	245	245	0
Food & Drink	111	114	-2
Recreation	54	56	-3
Shopping	117	121	-3
Transport	28	28	-3
Total Direct Employment	556	565	-2
Indirect Employment	162	164	-1
TOTAL	**718**	**730**	**-2**

Bibliography

UK National Ecosystem assessment: Technical Report