One Coast Evidence Base:

An Environmental and Economic Review of the Cornish Coastal Corridor

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Executive Summary

For the purpose of this review, the Cornish coastal corridor is defined as the continuous strip of land stretching 1km inland from mean high water. Although Cornwall has a relatively sparse overall population density the coastal corridor is interspersed with multiple dense coastal settlements (e.g. St Austell, Truro, Falmouth, Bude, Newquay, Saltash and Penzance). The concentration of urban settlements in the coastal corridor make it a focal point for much of Cornwall's economic activity and settlements. Cornwall's coastal corridor is composed of an extensive range of natural features, including granite cliffs, small rocky coves and headlands, mudflats, sand dunes, sandy beaches and estuaries alongside wooded valleys, grazing pastures and arable lands. The coastline itself ranges from an extensive network of indented coves, long river estuaries and creeks, to exposed headlands, sheer cliffs and large sandy beaches. Moving inland from the coastline, the coastal corridor contains a range of habitats, from sheltered broadleaved wooded estuaries, to exposed coastal heathlands and semi-natural grassland, often with abrupt transitions into agricultural improved grasslands, horticultural and arable areas, urban and suburban settlements.

- **A high population density**: Between 32%-37% of the population of Cornwall live in the coastal corridor. Although this population is relatively dispersed along the coastal corridor, with 42% of the population in urban areas and 58% in rural areas, the population density in the coastal corridor is more than twice that of the rest of Cornwall (3.04 usual residents per ha) and by 2030 this could rise to 3.4 usual residents per ha.
- **An older population**: Usual residents of the coastal corridor, and its immediate surrounding area, have a higher mean age and median age compared to the rest of Cornwall. Consequently, the coastal corridor contains a slightly lower percentage of economically active residents (-3%) than the rest of Cornwall (2011), and a higher percentage of economically inactive residents who are retired (+2%). The age differential across Cornwall is predicted to grow, with 31% of the population predicted to be 65 or over by 2030. The ageing population in Cornwall is likely to grow in the future and place higher demand on services such as health and care provision in the corridor.
- **A generally wealthier population with pockets of deprivation**: Living in the coastal corridor is expensive. Average residential property price within the coastal corridor was estimated to be around £336 thousand pounds, 27% higher than the average for the whole of Cornwall. There is a notably higher percentage of usual residents of the coastal corridor who are employed as managers, directors and senior officers and in professional occupations (39%) compared to the rest of Cornwall (33%). Six neighbourhoods which intersect the coastal corridor rank within the 10% most deprived Lower Super Output Areas (LSOAs) in England, out of a total of seventeen neighbourhoods which rank amongst the 10% most deprived in England across the whole of Cornwall (35%). Eight neighbourhoods which intersect the coastal corridor are within the 20% most deprived LSOAs in England, out of a total of twenty-seven neighbourhoods in Cornwall classed as amongst the 20% most deprived in England (30%).
- **A hotspot for enterprise and self-employment.** 24% of economically active residents in employment in the coastal corridor are self-employed, 2% higher than for the rest of Cornwall and 10% higher than the national average (ONS 2011). 44% [9225] of all enterprises in Cornwall registered with Companies House fall within the coastal corridor, this excludes enterprises not registered for VAT or PAYE. Within the coastal corridor the density of enterprises is 0.14 per ha while it drops to 0.039 per ha for the rest of Cornwall. The coastal corridor is of particular importance for the following sectors: tourism, recreation and leisure, education, retail, professional scientific and technical services, finance and insurance, food and beverage sectors, construction and real estate, and marine based business**.**
- **A centre for economic productivity***:* The coastal corridor could contribute an estimated 38-44% of Cornwall's total Gross Value Added (GVA*).* It is important to note that these estimates are subject to the effects of commuting and variations in the age structure of populations. The largest contributions to the coastal corridor's GVA are derived from public administration, education and health (23%); real estate (19%); distribution and transport, accommodation and food (18%); and construction (12%). The coastal corridor is particularly important for financial and insurance activities (72% of total GVA from this sector), information and communication (69%), construction (68%) and other services and household activities (51%).

- **Vital to the Cornish tourism industry:** Tourism is a main driver of the Cornish economy, it is also a sector which is "inextricably linked to Cornwall's unique environment, including its coastline and cultural heritage" (Cornwall Council 2012[1]). 53% of tourist sites lie within or intersect the coastal corridor. An estimated 5.34 million day/staying visits per year are made to coastal areas in Cornwall (28% of total) (SWRC 2016[2], 2018[3]). Conservative estimates suggest that the coastal corridor, excluding beaches and coastal resorts, receive an estimated 2.26 million visitors per year (SWRC 2016[4]), however, this number could be as high as 14.88 million visitors per year (SWRC 2016). Coastal areas are estimated to be linked to a tourist spend of around £666 million per year, and the coastal corridor an estimated £178 million per year, equating to on average 10% of the total visitor spend in Cornwall and 26% of coastal spend (SWRC 2016, 2018[5]).
- **A focal point for real estate development**: New housing and employment uses are planned for the coastal corridor, and some 36.4% of all 'allocation sites' (by area) lie within or intersect the coastal corridor. Based on estimated dwelling numbers for housing-based allocations, 49.5% of allocated dwellings will be in sites which intersect or lie within the coastal corridor.
- **One-third of Cornwall's best and most versatile agricultural land:** Cornwall's economy is still more reliant on agricultural production and food processing than much of the rest of UK (6% of GVA and 30% of employment). Despite having 10% less agricultural land than the rest of Cornwall, one-third of Cornwall's best and most versatile agricultural land lies within the coastal corridor and the corridor is of particular importance for arable and horticultural farm types. Approximately 372 farms have land intersecting the coastal corridor, 8.2% of the total estimated farms in Cornwall. These farms currently benefit from an average Common Agricultural Policy Basic Payment of £241/ha. 33% of agricultural land in the coastal corridor has received payments for environmental improvements, through Agri-Environment Scheme Agreements with a total annual value to agreement holders of £1.597 million and an average payment of £115/per ha.
- **A landing site for fisheries and aquaculture:** Total landed value of the fisheries sector in Cornwall is approximately £23.5 million. The aquaculture industry has a total landed value of £4.2 million. At some locations the development of the aquaculture industry has been directly influenced/constrained by the coastal corridor due to the dependency of aquaculture on pristine water quality. At present only 26% of estuaries and 44% of coastal areas are assessed as being of good ecological quality which limits the capacity of aquaculture to develop close to the coastal corridor.
- **Quarrying and Mining**: There are 50 active mines and quarries, 26% [13] of these are sited within or very close to the coastal corridor (GeoIndex Onshore 2019).
- **Natural Capital Assets**:
    - A wide range of semi-natural habitats, natural capital assets, are present across the coastal corridor. Natural capital assets are estimated to cover 87% of the coastal corridor.
    - The vast majority of the corridor consists of enclosed grasslands (73%), woodlands (13%) and coastal margins (9%).
    - Comparing the coastal corridor to the rest of Cornwall shows a lower proportion of semi-natural grasslands (-4%), and a notably higher percentage are of woodlands (+3%), and, as to be expected, coastal margin habitats (+6%).
        - Woodlands cover some 11% of the coastal corridor, by percentage area, compared to just 9.2% of the rest of Cornwall. This includes an estimated 1,472 ha of ancient and semi-natural woodlands, 21% of the total amount in Cornwall.
        - The coastal corridor is a significant reserve for neutral and calcareous semi-natural grassland, containing 81% of all calcareous grasslands and 53% of all neutral grasslands in Cornwall, but a much lower percentage area of acid grasslands compared to the rest of Cornwall.
        - Freshwater habitats cover only 0.12% of the coastal corridor by area, accounting for 5.2% of the total extent of freshwater habitats across Cornwall. Twelve BAP priority rivers run through the coastal corridor, around 16.6km, 48% of the total length of priority rivers across Cornwall.
    - Woodlands have the potential to deliver the largest range of ecosystem services, however coastal margins may provide the most valuable services through leisure and hazard and climate regulation, while by virtue of their extent, enclosed grasslands have significant potential for improvement in ecosystem service delivery. Coastal margin habitats provide

[1] *Cornwall Council (2012) Economy and Culture Strategy Evidence Base - https://www.cornwall.gov.uk/media/3624007/Economy-and-Culture-Strategy-Evidence-Base.pdf*
[2] *Please note that these data exclude regular non-tourism related residential use such as dog walking.*
[3] *SWRC (2018) Cornwall Visitor Survey 2018/19 Quarterly update, Produced on behalf of Visit Cornwall.*
[4] *SWRC (2016) SW Coast Path Monitoring and Evaluation Framework, Year 5 (2015) Key Findings, Produced on behalf of the SW Coast Path Team.*
[5] *Observatory of the Cornwall Marine Leisure Industry Draft in preparation 2010. Nautisme Espace Atlantique Project, Cornwall Development Company.*

ecosystem services to both adjacent terrestrial and marine habitats, for Cornwall the ecosystem services of greatest financial value are thought to be recreation (tourism) and coastal defence.

- **Physical Flow Accounts**

  - **Regulating Services - Climate regulation potential (Carbon storage and sequestration):** Soils and vegetation in the coastal corridor are estimated to store approximately 9 million tonnes of carbon, equating to around 14.3% of Cornwall's total stored carbon. Soils store an estimated 15 times the amount of carbon as above ground vegetation. The coastal corridor stores 20% of Cornwall's total above ground carbon storage. The coastal corridor is estimated to have the potential capacity to sequester an additional 55 thousand tonnes of CO_{2e} per year, around 17% of the total amount potentially sequestered each year in Cornwall.

  - **Regulating Services - Erosion Mitigation Potential:** Soils perform a variety of key ecosystem services such as nutrient cycling, regulating water and carbon storage. The erosion of soils has major implications not only for farm productivity, but also by reduced water quality and avoided cost as eroded soils often need to be removed from roads, reservoirs etc. At present the coastal corridor experiences an average estimated loss of around 180,182 tonnes of soil per year through water erosion, and 27,870 tonnes of soil per year through wind erosion. The predicted mean tonnes of soil eroded by wind in the coastal corridor is almost four times higher than for the rest of Cornwall. Sea level rise could result in the loss of some 74ha of the coastal corridor in the next 20 years. There is considerable potential to enhance natural capital assets and change land management practice to reduce wind and water erosion.

  - **Regulating Services - Air Quality Amelioration Potential:** Cornwall has one of the highest amounts of air pollutant (66kg/ha/yr) removal by vegetation in England (ONS 2019[6]). In 2015 the coastal corridor and its immediate surrounding area potentially removed an estimated 6,279,357 kg of air pollutants (including ammonia, nitrogen dioxide, ozone, PM10, PM2.5, sulphur dioxide). The coastal corridor, and its immediate surrounding areas, is responsible for the removal of an estimated 25% of all air pollutants removed by vegetation in Cornwall.

  - **Regulating Services - Freshwater Quality Improvement Potential:** Cornwall faces a number of significant water quality issues as a result of historic mining activities, industry, development and agricultural practices. The potential of natural capital assets in the coastal corridor to regulate water quality is relatively low in terms of area, just 2332 ha are scored as having any capacity to deliver water quality benefits, equating to just 3.5% of the coastal corridor (Mosedale et al. 2019 in prep). Although the majority (49%) of this area only has a low capacity to deliver benefits, some 288ha do have a medium-high or high potential to deliver benefits (Mosedale et al. 2019 in prep). In particular, wetland areas in the coastal corridor are also likely to play a significant role in water quality regulation through denitrification, nitrification and mineralisation of pollutants.

  - **Regulating Services - Bathing Water Quality Improvement**: Bathing water quality influences the potential for recreational use. Much like freshwater quality, natural capital assets can help to improve bathing water quality by reducing pollution from surface and ground waters. There is also an increasing body of evidence that sand dunes and shingle can also help to reduce diffuse pollution in the marine environment with positive outcomes on bathing water quality. 19% of the coastal corridor was found to have some capacity to deliver benefits for bathing water quality through land use or management changes, equating to around 12,662 ha. The majority of this area (50%) only had a low potential to deliver benefits with just 11% having the potential to deliver medium high to high benefits, some 1382 ha.

  - **Regulating Services - Flood Mitigation Potential**: The UK NEA (2011) identifies coastal margins as playing an important role in storing and slowing the flow of surface water runoff. However, the overall capacity of the coastal corridor to mitigate flood risk is much less than in the rest of Cornwall, and the majority of natural capital assets with high flood mitigation potential are around NW and central Cornwall (Mosedale et al. 2019 in press). Some 29,808 ha of the coastal corridor still has some potential capacity to deliver flood mitigation benefits, almost 45% of the coastal corridor. The vast majority of this area (93%) only has a low potential to deliver flood mitigation benefits (Mosedale et al. 2019 in press). Only 132 ha of the coastal corridor have 'high' potential to deliver flood mitigation benefits.

  - **Provisioning Services - Water Supply Potential:** The coastal corridor has some significance for ground water source protection, around 328ha of the coastal corridor is classed as a ground water source protection zone which equates to 16% of Cornwall's total ground water source protection zone.

[6] https://www.ons.gov.uk/economy/environmentalaccounts/articles/ukairpollutionremovalhowmuchpollutiondoesvegetationremoveinyourarea/2018-07-30

- **Supporting Services - Pollination Services Potential:** The CEH Nectar plant diversity map for bees (Maskell et al. 2016[7]) suggests that the coastal corridor has a slightly higher mean value of nectar plant diversity for bees than the average for the whole of Cornwall. Casalegno et al. (2014[8]) also show that the coastal corridor has a slightly higher average habitat availability for pollinators than the rest of Cornwall, with a 5% lower amount habitat with 'low potential' to provide pollinator habitats and a 5% greater coverage of habitats with 'medium potential' to provide pollinator habitats. The distribution of habitat availability for pollinators shows high concentration around the NW coast of Cornwall particularly around West Penwith, Godrevy and Holywell (Casalegno et al. 2014). The coastal corridor notably contains 81.4% of the highest nectar productivity habitat, calcareous grassland, which is concentrated in one site in the coastal corridor, Holywell.
- **Supporting Services - Species Diversity:** The coastal corridor is a significant reserve of some of our most protected sites for biodiversity, containing some 74 Sites of Special Scientific Interest (SSSI), which cover some 8.2% of the area of the coastal corridor [5927 ha] and represent 29.4% of total area designated as SSSIs across Cornwall. Some 13,566 ha of the coastal corridor are covered by UK Biodiversity Action Plan priority habitats, 21% of the total area of the corridor and 27% of the total BAP habitat area in Cornwall. In comparison, BAP habitats cover only 14% of the total area of Cornwall. The coastal corridor is particularly important for: saltmarsh (82% of total area in Cornwall): sand dunes (85%), maritime cliffs and slopes (98%), reedbeds (91%), saline lagoons (90%), good quality semi-improved grassland habitats (69%), lowland calcareous grassland habitat (78%), lowland dry acid grassland (59%), lowland meadows habitat (45%), and traditional orchard habitat (37%).
- **Cultural Services – Opportunities for Recreation:** Greenspaces, paths and beaches (see footnotes for full list[9]) within the coastal corridor are predicted to receive approximately 18.64 million recreational day visits by English adult residents per year, with an associated annual welfare benefit to residents of £74 million (Day and Smith 2018[10]). The coastal corridor alone accounts for 49% of the total predicted recreational visits by adults to greenspace in Cornwall, and 51% of the total welfare benefit to residents in Cornwall (Day and Smith 2018).
- **Cultural Services – Aesthetics**: All 39 hotspots of high aesthetic value mapped by Casalegno et al. (2013[11]) are located in the coastal corridor. 65% of the coastal corridor is designated for its landscape value as an Area of Outstanding Natural Beauty (AONB) (41,901 ha), and this equates to 40% of the total area designated as an AONB across Cornwall.
- **Cultural Services - Heritage**: Despite representing just 17% of the land area of Cornwall, the coastal corridor was found to contain the majority (54%) of Cornwall's conservation areas. More than a third of the 145 conservation areas are coastal towns and villages, and 40% of Cornwall's registered parks and gardens occur directly along the south coast. The corridor also contains an estimated 15% of all scheduled monuments and 49% of listed buildings, and 16% of the Cornish world heritage site. Heritage coast designations cover 31%, some 20,577 ha, of the coastal corridor.
- **Cultural Services – Health and wellbeing -** Populations living near the coast in England are healthier than those inland (Wheeler et al., 2012) and longitudinal data suggest that individuals are healthier during periods when they live closer to the coast (White et al., 2013). The link between living near the coast and good health was also found to be strongest in the most economically deprived communities, suggesting that access to coastal environment can have a role in reducing health inequalities between the wealthiest and poorest members of society (Wheller et al. 2012, White et al. 2013).

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[7] Maskell et al. (2016) Bee nectar plant diversity of Great Britain. NERC Environmental Information Data Centre. http://doi.org/10.5285/623a38dd66e8-42e2-b49f-65a15d63beb5

[8] Casalegno et al. (2014) Regional scale prioritisation for key ecosystem services, renewable energy production and urban development. PLoS ONE 9(9): e107822. https://doi.org/10.1371/journal.pone.0107822

[9] ORVal Includes country parks, amenity parks, recreation grounds, village greens, golf courses, gardens, woods, amenity woods, allotments, cemeteries, grave yards.

[10] Day and Smith (2018) Outdoor Recreation Valuation (ORVal) User Guide: Version 2.0, Land, Environment, Economics and Policy (LEEP) Institute, Business School, University of Exeter.

[11] Casalegno et al. (2013) Spatial covariance between aesthetic value & other ecosystem services. PLoS ONE 8(6): e68437. https://doi.org/10.1371/journal.pone.0068437.

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ABBREVIATIONS

AES:	Agri-Environment Schemes
AONB:	Area of Outstanding Natural Beauty
BPS:	Basic Payment Scheme
CEH:	Centre for Ecology and Hydrology
CUA:	Cornwall Unitary Authority
DEFRA:	Department for Environment, Food and Rural Affairs
FBI:	Farm Business Income
MHW:	Mean High Water
NE:	Natural England
NT:	National Trust
ONS:	Office of National Statistics
OS:	Ordnance Survey
RSPB:	Royal Society for the Protection of Birds
SAC:	Special Area for Conservation
SPA:	Special Protection Area
SSSI:	Site of Special Scientific Interest
SWEEP:	South West Economic and Environmental Partnership

1. INTRODUCTION

The One Coast initiative aims to establish a nature-rich accessible corridor around the South West Coast for people and wildlife. The coastal corridor is defined as the continuous strip of land stretching from mean high water to 1km inland along the coastline. To assist the National Trust and RSPB (hereafter referred to as the project partners) to realise the ambitions of the One Coast project, the SWEEP One Coast project has collated an evidence base outlining some of the key economic, social and environmental characteristics of the section of the coastal corridor within Cornwall Unitary Authority (CUA). The Cornish section of the SW coastal corridor equates to 36% of the SW coastal corridor, by far the largest section when compared with other Local Authorities (LA), e.g. North Devon (6%) and South Hampshire District (12%). In order to explore the economic, social and environmental characteristics and significance of the coastal corridor the evidence base uses existing national and local data sets and official national statistics.

For the purposes of this report, the evidence base has been organised into three main sections: (1) socio-economic and demographic characteristics, (2) economic characteristics, and (3) environmental characteristics and composition [including a natural capital asset review]. Much of the evidence base for the One Coast project has been produced from spatial derived national environmental and economic datasets, for example, the Centre for Ecology and Hydrology's Land Cover Map 2015 and the 2011 Census Data, clipped or adjusted via best-fit methods to the coastal corridor. A brief methodology for each indicator/data set is outlined at the start of each section, or within each subsection.

It is envisaged that this information will be used by the project partners for a range of purposes.

- To communicate the significance of the coastal corridor from a variety of different perspectives.
- To highlight the capacity of the coastal corridor to provide multiple potential ecosystem service flows and benefits for society and the economy.
- To identify priority locations or focal points for investment based on the delivery of multiple or specific ecosystem services.
- To identify ecosystem goods and services that could be improved or are at risk, which could be used as a trigger for the development of Payments for Ecosystem Services type schemes. Where information on the natural capital assets can be combined with information on business locations this could be a powerful tool to trigger investment or the motivation for the development of Payments for Ecosystem Services type schemes.
- To help justify land management changes/decisions based on trade-offs between different ecosystem service flows.
- To help identify opportunities to operate alternative and innovative finance mechanisms for the One Coast project.

1.1 Cornwall's Coastal Corridor

Cornwall has the longest coastline of any county in England and its peninsula geography means that no inland area is more than 32 km from the sea. Although notoriously difficult to estimate, the Cornish coastline is most often estimated to be around 697km (422 miles) long but could be up to 1086km in length (OS 2017[12]). For the purpose of this review, the Cornish coastal corridor is defined as the continuous strip of land stretching 1km inland from mean high water. In general, Cornwall has an overwhelmingly rural character with two-thirds of the population living in rural areas. However, its polycentric urban form means that although Cornwall has a relatively sparse overall population density the coastal corridor is interspersed with multiple dense coastal settlements (e.g. St Austell, Truro, Falmouth, Bude, Newquay, Saltash and Penzance). The concentration of urban settlements in the coastal corridor makes it a focal point for much of Cornwall's economic activity and population.

Cornwall's coastal corridor is composed of an extensive range of natural features, including granite cliffs, small rocky coves and headlands, mudflats, sand dunes, sandy beaches and estuaries alongside wooded valleys, grazing pastures and arable lands. The South and North sections of the coast have distinctly different landscape and biodiversity characteristics. The South coast, on the English channel, consists of sheltered beaches, sandy coves and bays, deep water harbours, hills rolling down to the shoreline, tree-lined sheltered river estuaries and harbour towns. Lowland stretches are also to be found, sometimes backed by large expanses of dunes (or towans), such as near Par. The north coast is much more exposed to the prevailing winds associated with low-pressure weather conditions which move in from the Atlantic Ocean, with sheer cliffs, steep valleys and dunes, interspersed with large wide bays. There are a variety of habitats along the coastal corridor, including farmland, woodland, heathland, moorland and former

[12] *OS (2017) https://www.ordnancesurvey.co.uk/blog/2017/01/english-county-longest-coastline/*

mining sites, supporting a wealth of wildlife species. Cornwall's marine and coastal habitats provide a range of ecosystem services of significant economic and cultural value to Cornish residents and visitors, including food production, climate regulation, pollution control, coastal protection, energy production and improving mental and physical health and well-being.

The vast majority of the coastline is designated through a variety of different designation types, including SSSI, AONB and SAC, and many of these designations spill into the coastal corridor. Of the twelve separate areas that make up the Cornwall Area of Outstanding Natural Beauty (AONB), eleven cover sections of the Cornish coastline, including the Fal, Helford, Fowey and Camel estuaries. Cornwall also has six Voluntary Marine Conservation Areas (VMCAs) [e.g. Polzeath, St Agnes, Isles of Scilly, Helford, Fowey and Looe] which provide an additional focus for coastal and marine habitat protection, public awareness and engagement. The coastal corridor is also a centre for recreation with some 163 amenity beaches and contains almost 47% of the whole length of the SW coast path.

1.2 Natural Capital

Natural Capital can be broadly understood as the elements or assets of the natural environment which provide valuable ecosystem goods and services to people, or as defined by the Natural Capital Committee (2013:11[13]) *"those elements of nature which either directly provide benefits or underpin human wellbeing"*. The UK Natural Capital Committee defines natural capital as the "*stock of waters, land, air, species, minerals, and oceans. This stock underpins the economy by producing value for people, both directly and indirectly. Goods provided by natural capital include clean air and water, food, energy, wildlife, recreation, and protection from hazards*" (Natural Capital Committee 2019[14]). Natural capital assets can include species (including genetic variation), ecological communities, soils, freshwaters, land, minerals, the atmosphere, subsoil assets, and coasts and oceans (National Capital Committee 2013; Mace et al. 2015[15]). Under a natural capital framework, assets provide ongoing benefits critical to people's health and wellbeing, and to a sustainable economy (National Capital Committee 2013). Natural capital is by no means a simple concept but refers to the complex configuration of natural resources and ecological processes which together can contribute to human welfare. One example of a natural capital asset is woodland from which flows a variety of potential benefits, including fibre, flood risk reduction and carbon capture. Flows of benefits from natural capital assets are more commonly referred to as ecosystem goods and services.

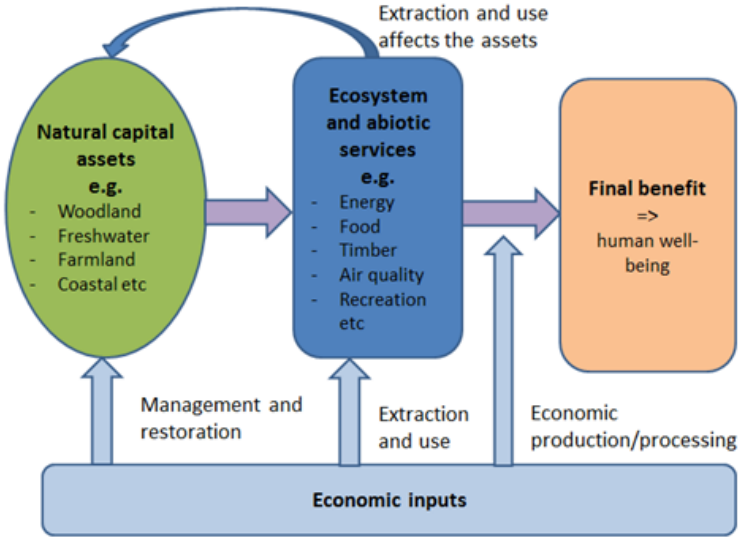

Figure 1. The link between assets, services and final benefits, (Source: Department for Environment, Food and Rural Affairs (Defra), Office for National Statistics)

[13] *Natural Capital Committee (2013) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/516707/ncc-state-natural-capital-first-report.pdf*
[14] *Natural Capital Committee (2019) http://www.naturalcapitalcommittee.org/natural-capital/*
[15] *Mace et al. (2015) Towards a risk register for natural capital, Journal of Applied Ecology, 52: 641-653. https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.12431*

2. SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS

This section outlines the socio-economic and demographic characteristics of the people living in the coastal corridor (usual residents). Demographic indicators provide information on the number of people living in the coastal corridor (population size), the structure of this population (percentage of the population in different age ranges), how/where people live within the corridor (population density) and the population status or dynamism (immigration/out-migration, population growth rate). Socio-economic indicators provide an impression of economic progress and social change. For the coastal corridor, socio-economic indicators are used to provide a picture of not only the economic activities of the usual residents of the coastal corridor (e.g. labour force participation rates, unemployment rates) but also their state of wellbeing (general health) and quality of life (index of multiple deprivation, income per household). Together these indicators provide a picture of the socio-economic context within which any planned environmental changes and investment will play out. Furthermore, these indicators can aid the project partners to understand the number of people who could be influenced by investment, the beneficiaries of ecosystem goods and services, and where investments could be targeted in relation to different aspects of the population structure and quality of life.

2.01 Population Size

- *Using best-fit methods and ONS 2011 Census data[16], 32%-37% of the total population of Cornwall is estimated to be resident within the coastal corridor, equating to between 169,181 to 197,142 usual residents (ONS 2011).*
- *Using Census Output Areas (OAs[17]), 48% of Cornwall's population is thought to reside in output areas which intersect with the coastal corridor (ONS 2011). In comparison, only 28% of the regional population of the SW reside in OAs which intersect with the coastal corridor.*
- *The population of the coastal corridor is relatively dispersed. 42% of the population of the coastal corridor reside in urban areas and 58% in rural areas.*

Cornwall has an estimated resident population of 549,404 (Cornwall Council 2017[18]). Estimation of the population of the coastal corridor was made using the Office of National Statistics (ONS) National Census data (ONS 2011). The coastal corridor is not an official statistical geography, for example, a census output area (OA) or Lower Super Output Area (LSOA), parish, ward or county. Consequently 'best fit' methods had to be used to estimate the resident population. Estimates were also made using the CEH UK gridded population 2011, based on Census 2011 and Land Cover Map 2015 spatial dataset (Reis et al. 2017[19]). The CEH UK gridded population 2011 provides a population estimate for 1km^2 cells for the whole of the UK based on 2011 census data. The cells intersecting the coastal corridor were extracted, and population estimates were adjusted for the proportion of the grid cell which intersected with the coastal corridor. Based on the CEH UK gridded population dataset the coastal corridor had a population in 2011 of 169,181, this represents 32% of the total population of Cornwall in 2011.

Using the ONS OA dataset (adjusted to the coastal corridor using the proportional best fit method outlined above for the UK gridded population dataset) provides a population estimate of 197,142, 36.7% of the total population of Cornwall in 2011. Extending the area to cover all 2011 census Output Areas (OA[20]) which intersect with the coastal corridor (see Map.1) suggests that the coastal corridor and its immediately surrounding areas has an approximate population of 258,400, which equates to 48% of the total population of Cornwall in 2011.

OAs are defined by the ONS as urban if they have a population of 10,000 or more[21]. Using the ONS rural-urban classification suggests that the coastal corridor has an urban population of 84,294 which equates to 42% of the population of the coastal corridor. In comparison, 86% of Cornwall's population is classified as rural. Discounting urban areas, the coastal corridor still contains an estimated 21% of the Cornish population.

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[16] *Office for National Statistics; National Records of Scotland ; Northern Ireland Statistics and Research Agency (2016): 2011 Census data. UK Data Service (Edition: June 2016). DOI: http://dx.doi.org/10.5257/census/aggregate-2011-1. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3].*

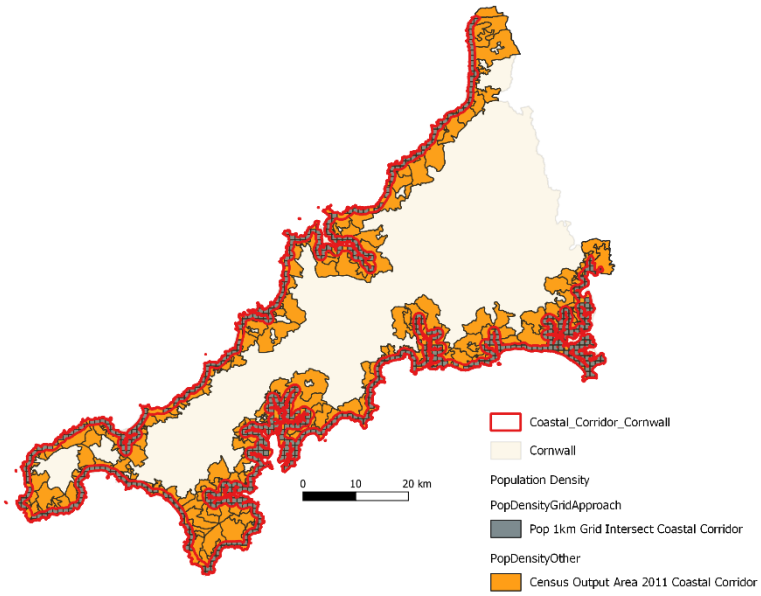
[17] *Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: https://borders.ukdataservice.ac.uk/. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3].*

[18] *Cornwall Council (2017) https://www.cornwall.gov.uk/council-and-democracy/data-and-research/data-by-topic/population/*

[19] *Reis et al. (2017) UK gridded population 2011 based on Census 2011 and Land Cover Map 2015. NERC Environmental Information Data Centre. https://doi.org/10.5285/0995e94d-6d42-40c1-8ed4-5090d82471e1https://catalogue.ceh.ac.uk/documents/0995e94d-6d42-40c1-8ed4-5090d82471e1*

[20] *ONS (2011) https://www.ons.gov.uk/methodology/geography/ukgeographies/censusgeography*

[21] *ONS (2011) Rural-urban classification - https://www.ons.gov.uk/methodology/geography/geographicalproducts/ruralurbanclassifications/2011ruralurbanclassification*



Map 1. Areas used to estimate the population of the coastal corridor (Source: ONS 2011[22] and Reis et al 2017[23])

2.02 Population Density

- *The coastal corridor has a population density more than twice that of the rest of Cornwall.*

Cornwall is one of England's most dispersed counties, largely consisting of suburban/edge-land with little truly rural space. However, many of Cornwall's largest urban areas, towns and villages are concentrated around the coast and estuarine areas. This concentration of people around the coastal corridor is reflected in the higher population density of the coastal corridor. Based on the ONS OA Census data (2011), the coastal corridor has an average population density of 3.04 usual residents per ha, more than twice the population density of the rest of Cornwall, 1.14 usual residents per ha. The coastal corridor has a maximum population density of 58.1 usual residents per ha compared to the rest of Cornwall with a maximum population density of 45.1 usual residents per ha.

	Coastal Corridor	Rest of Cornwall	Cornwall
All Usual Residents (ONS OA 2011 Census)	197,142	338,858	536,000
Area (ha)	64,814	296,530	361,344
Population density (usual residents per ha)	3.04	1.14	1.48

Table 1. Population density of the coastal corridor (ONS 2011)

2.03 Population Growth

- *Population predictions for the whole of Cornwall suggest that the coastal corridor could see a 9.15% increase in population levels by 2030, an increase from 197,142 usual residents in 2011 to 220,578 by 2030.*
- *By 2030 the population density of the coastal corridor could rise from 3.04 usual residents per ha to 3.4 usual residents per ha.*

Cornwall's population has been growing steadily since the 1960s and has consistently grown quicker than the rest of the South West (SW) and is one of the fastest growing areas in the UK (Cornwall Council 2011[24]). Population projections are made by the ONS based on assumptions about past and future levels of fertility, mortality and migration[25]. They should be used with caution as they rely on assumptions and can be affected by difficult to predict phenomena, such as economic recessions. Therefore, the use of

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[22] *Office for National Statistics; National Records of Scotland ; Northern Ireland Statistics and Research Agency (2016): 2011 Census data. UK Data Service (Edition: June 2016). DOI: http://dx.doi.org/10.5257/census/aggregate-2011-1. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3].*

[22] *Office for National Statistics, 2011 Census: Digitised Boundary Data (England and Wales) [computer file]. UK Data Service Census Support. Downloaded from: https://borders.ukdataservice.ac.uk/. This information is licensed under the terms of the Open Government Licence [http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3].*

[23] *Reis et al. (2017) UK gridded population 2011 based on Census 2011 and Land Cover Map 2015. NERC Environmental Information Data Centre. https://doi.org/10.5285/0995e94d-6d42-40c1-8ed4-5090d82471e1https://catalogue.ceh.ac.uk/documents/0995e94d-6d42-40c1-8ed4-5090d82471e1*

[24] *Cornwall Council (2011) 2011 Census at a glance, Available at: https://www.cornwall.gov.uk/media/3624040/Census_at_a_glance_1stRelease.pdf*

[25] *https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections*

population projection figures should be treated as a guide to what the future population trends and levels might look like, if past trends continue.

The ONS projects national and subnational population trends every two years[26]. Much like the rest of England, the population of Cornwall is predicted to grow over the next few decades (Cornwall Council 2011, 2013[27]). Past trends suggest that the population in Cornwall grows by on average 3,850 persons per year (Cornwall Council 2013). Simple extrapolation of past trends suggests that Cornwall's population could reach 607,154 by 2030, a 10.5% increase on 2015 population levels. However, more detailed annual population projections, released by the ONS in 2016, suggest that Cornwall's population will reach 605,892 by 2030, a 9.15% increase from 2015 levels, and 630,285 by 2040, a 13.5% increase on 2015 population levels (Cornwall Council 2018[28]). It must be noted that estimates vary depending on the data available and the use of national or local data (Cornwall Council 2014[29]).

Applying Cornwall-wide population growth projections to the coastal corridor suggests that population levels, based on ONS 2011 Census data, could reach 220,500 by 2030 and 229,400 by 2040[30]. Subnational analysis suggests that the main driver of population growth in Cornwall is migration, specifically in-migration for economic and lifestyle reasons. The growth of the higher education sector and improved employment prospects are both factors thought to have driven recent population expansion (Cornwall Council 2013).

2.04 Population Structure

- *Usual residents of the coastal corridor and its immediate surrounding area have a slightly higher mean age and median age compared to the rest of Cornwall.*
- *The age differential across Cornwall is predicted to grow, with 31% of the population predicted to be 65 or over by 2030.*

Demographic structures vary at the local level. Alongside an increase in overall population levels in the coastal corridor, population projections suggest that there is also likely to be an increasingly older population (Cornwall Council 2013, 2014 and 2016). Population projections by age group suggest that broadly speaking in Cornwall there will be a "*similar proportion of younger aged people, a lower proportion of working age people and a higher proportion of older people in the population by 2030*" (Cornwall Council 2013). Although an ageing population reflects national trends, the predicted dependency ratio (the ratio of working age people supporting younger and older groups of the population) is higher in Cornwall than for the whole of the SW. In 2010, every 100 people of working age in Cornwall were supporting 60 young/pension age people, in comparison to a ratio of 100:56.5 for the whole of the SW. By 2030 the dependency ratio for Cornwall is predicted to reach 100:78.8 compared to 100:74.4 for the whole SW (Cornwall Council 2018[31]). A higher dependency ratio means more people not working or paying taxes, and more people in need of care (Cornwall Council 2013, 2018).

Mean age and average for the coastal corridor were estimated using ONS 2011 Census dataset for Output Areas (OAs). It was not possible to extract data specifically for the coastal corridor, or use best-fit methods, instead OAs which intersected or lie within the coastal corridor were used to estimate mean and median age for the coastal corridor, and all other OAs were used to estimate mean and median age for the 'rest of Cornwall'. This approach is acknowledged to be limited, as the population used to estimate mean age and the median age for the coastal corridor, 240,737, is notably higher than the estimated population outlined in Section 2.01 and includes residents who live close to but outside of the coastal corridor.

The Census 2011 OAs data suggest that the coastal corridor is likely to have a slightly higher percentage of its population aged between 45-64 than the rest of Cornwall (+0.5%) and a slightly higher proportion of its population aged over 65+ (+3.5%). In terms of overall population age, OA intersecting or within the coastal corridor have a higher mean age (+2.5 years) and median age (+2.9 years) compared to the rest of Cornwall. The higher population over 45 and over 65 is not unexpected, looking at the national picture shows that populations with the highest median age are often concentrated in coastal areas, national parks, and the SW (ONS, 2018). In terms of projected population growth, 31% of the population is predicted to be 65 or over in Cornwall by 2030.

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[26] *ONS – Population projections* https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections

[27] https://www.cornwall.gov.uk/media/3642933/BN3-Population-v3-Nov-13.pdf

[28] *Cornwall Council (2018)* https://www.cornwall.gov.uk/health-and-social-care/public-health-cornwall/joint-strategic-needs-assessment-jsna/data-maps-and-infographics/tab-placeholder-hidden/data/population-projections/

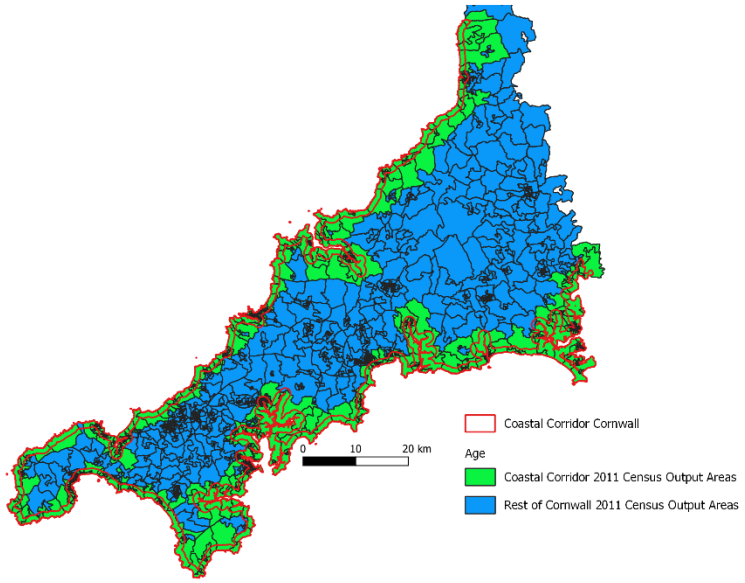
[29] *Cornwall Council (2014)* https://www.cornwall.gov.uk/media/22243248/2014-based-local-population-projections_pyramids.pdf

[30] *For the Coastal Corridor the 2011 census estimates were first adjusted to 2015 levels using the recorded changes in Cornwall's overall population levels between 2011 and 2015 recorded by Cornwall Council as a 2.5% increase. ONS population projections were then applied.*

[31] https://www.cornwall.gov.uk/health-and-social-care/public-health-cornwall/joint-strategic-needs-assessment-jsna/data-maps-and-infographics/tab-placeholder-hidden/data/population-projections/

Age	Coastal Corridor	Rest of Cornwall
Under 15	15.7%	17.8%
16 to 24	9.8%	10.2%
25 to 44	21.7%	23.1%
45 to 64	29.2%	28.7%
Over 65	23.7%	20.0%
Mean Age	44.7	42.2
Median Age	46.7	43.8

Table 2. Age profile of Census 2011 Output Areas intersecting or within the coastal corridor and those in the Rest of Cornwall (Source: ONS 2011 and Reis et al 2017)



Map 2. 2011 ONS Census Output Areas classed as the coastal corridor (green) and classed as the Rest of Cornwall (Blue)

2.05 Population Health

- *Populations living near the coast in England are generally thought to be healthier than those inland (Wheeler et al., 2012[32]) and longitudinal national data suggest that individuals are healthier during periods when they live closer to the coast (White et al., 2013[33]).*
- *In the coastal corridor, 78.6% of usual residents report good or very good health, which is slightly lower than the rest of Cornwall where 79.1% report good or very good health (ONS 2011).*
- *The ageing population in Cornwall set out in Section 2.04, is likely to reduce population health in the future and place a higher demand on services such as health and care provision.*

Health is closely related to productivity and economic prosperity, and social wellbeing and the wealth of communities. The 2011 ONS Census dataset also provides an indication of the general wellbeing and health of the population. Health and wellbeing is self-assessed, based on the individual's perception and therefore provides only a general indicator of wellbeing and health-related quality of life. In England over 81.2% of people reported their general health as either very good or good (ONS 2013[34]). To estimate the general health of residents of the coastal corridor the ONS 2011 Census OA dataset was used, adjusted using best-fit methods to the coastal corridor and the rest of Cornwall. Estimates suggest very little difference between the self-reported health of usual

[32] *Wheeler et al. (2012) Does living by the coat improve health and wellbeing? Health Place 18(5): 1198-1201. oi: 10.1016/j.healthplace.2012.06.015*
[33] *White et al. (2014) Coastal proximity and physical activity: Is the coast an under-appreciated public health resource? Preventive Medicine 69: 135-140. https://doi.org/10.1016/j.ypmed.2014.09.016*
[34] *ONS https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandwellbeing/articles/generalhealthinenglandandwales/2013-01-30*

residents within the coastal corridor and in the rest of Cornwall (Table 3). Within the coastal corridor, 78.6% of usual residents report good or very good health which is slightly lower than the rest of Cornwall where 79.1% report good or very good health.

General Health	Coastal Corridor	Rest of Cornwall	Cornwall
Very Good	44.9%	45.5%	45.3%
Good	33.7%	33.6%	33.6%
Fair	15.1%	14.7%	14.8%
Bad	4.9%	4.8%	4.9%
Very Bad	1.4%	1.4%	1.4%

Table 3. Self-Reported Health for the Coastal Corridor and Rest of Cornwall (Source: ONS 2011)

Broadly, the 2011 ONS census figures suggest that an increasing percentage of Cornwall's population identify their health as good compared to 2001 levels (Whittaker 2017[35]). However, the ageing population in Cornwall, set out in Section 2.04, is likely to affect these figures in the future. Available health data suggest that Cornwall has higher levels of obesity in adults, incidence of malignant melanoma, hospital stays for self-harm and alcohol-related harm. Priorities in Cornwall include reducing smoking, physical inactivity, unhealthy diets, excess alcohol and lack of social connections. Whittaker (2017) found that for elective hospital admissions, such as a hip replacement, the ratio in Cornwall is 140 (any figure above 100 is a higher proportion of admissions than had been expected), compared to a 123 in the SW. This may reflect Cornwall's high ageing population and thus a higher demand on services such as healthcare provision. Furthermore, 25% of children and adults are classified as obese in Cornwall, compared with 24.7% in the SW and 24.1% in England. Finally, the ageing population and proportionally higher numbers of older people in Cornwall, in addition to a swell of tourists throughout the year, puts an extremely high demand on the NHS, utility services and infrastructures (Whittaker 2017).

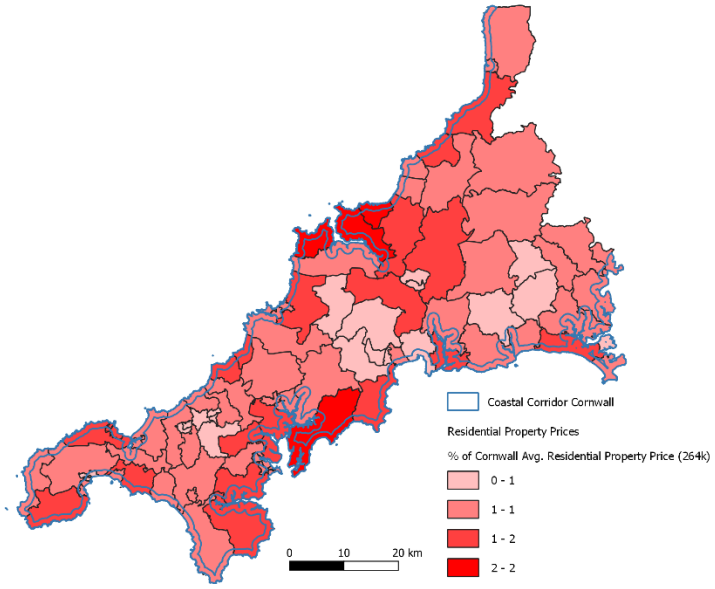
2.06 Residential Property Prices

- *Average residential property price within the coastal corridor was estimated to be around £336 thousand pounds, 27% higher than the average for the whole of Cornwall.*

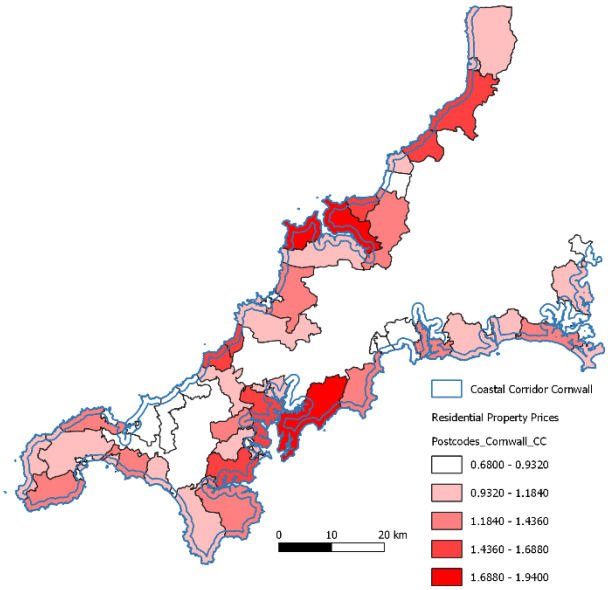
Residential property is generally the most valuable asset that people own. The significance of residential property prices means that these can provide a basic indicator of the socio-economic status of a location (Coffee et al 2013[36]). To estimate house prices within the coastal corridor, house price data were accessed through the HML Land Registry (2019) Price Paid dataset[37]. This provides purchase price data alongside postcodes. Average purchase prices were mapped against post-code boundaries (Pope 2017[38] [39]).

The average property price for residential property across the whole of Cornwall was found to be £264k. Average price per postcode was compared with the average residential property price for the whole of Cornwall. Postcodes overlapping with the coastal corridor had a higher than average residential price of £294k, 11.4% higher than the average for the whole of Cornwall. When weighted by area of each postcode intersecting with the coastal corridor the average residential property price within the coastal corridor was found to be £336k, 27% higher than the average for the whole of Cornwall.

[35] *Whittaker L (2017) Cornwall's Vital Issues 2017, Cornwall Community Foundation, Available at: http://www.ukcommunityfoundations.org/wp-content/uploads/2017/10/Cornwalls-Vital-Issues-2017.pdf*
[36] *Coffee et al. (2013) Relatively residential property value as a socio-economic status indicator for health research, Int J Health Geography, 12: 22, 10.1186/1476-072X-12-22*
[37] *HM Land Registry (2019) Price Paid Dataset: https://www.gov.uk/government/statistical-data-sets/price-paid-data-downloads*
[38] *Pope (2017). GB Postcode Area, Sector, District, [Dataset]. University of Edinburgh. https://doi.org/10.7488/ds/1947.*
[39] *Contains Ordnance Survey data © Crown copyright and database right 2012 Contains Royal Mail data © Royal Mail copyright and database right 2012 Contains National Statistics data © Crown copyright and database right 2012. GIS vector data.*



Map 3. Residential property price data compared to the average for Cornwall (Source: HM Land Registry (2019) and Pope and Addy (2017))



Map 4. Residential property prices compared to the average for Cornwall for the coastal corridor (Source: HM Land Registry (2019) and Pope and Addy (2017))

2.07 Economically Active/Inactive

- *The coastal corridor contains a slightly lower percentage of economically active residents (-3%) than the rest of Cornwall (2011), and a higher percentage of economically inactive residents who are retired (+2%) or a full-time student (ONS 2011).*
- *90% of economically active usual residents of the coastal corridor are in employment, a very similar figure to the rest of Cornwall (91%) (ONS 2011)*
- *24% of economically active residents in employment in the coastal corridor are self-employed, 2% higher than for the rest of Cornwall and 10% higher than the national average (ONS 2011)*

The percentage of people in Cornwall and the Isles of Scilly employed and economically active is thought to be increasing at a faster rate than that seen in England. When compared to other LEP areas, Cornwall and the Isles of Scilly have the lowest proportion of

full-time workers. Similarly, the male full-time employment proportion in Cornwall is significantly less than the England average and, again, the lowest of all the LEP areas.

The economic activity of usual residents within the coastal corridor and the rest of Cornwall are very similar, however, there are some minor variations (ONS 2011). A slightly lower percentage of usual residents in the coastal corridor are economically active (65%) compared to the rest of Cornwall (68%). Of those usual residents who are economically active in the coastal corridor 90% are in employment, 5.1% are economically active but unemployed and 4.7% are full-time students, this is a slightly higher amount of full-time students and a lower percentage unemployed than the rest of Cornwall (ONS 2011). Assessing economically active usual residents in employment shows that there is a slightly lower percentage in full-time employment than in the rest of Cornwall (-2%) and a slightly higher percentage that are self-employed (+2%).

The higher levels of self-employed economically active residents in the coastal corridor could reflect (a) strong demand for 'lifestyle' businesses; and (b) self-employment as a necessity, reflecting an absence of attractive employment options. High self-employment levels also pose challenges in relation to (1) the capacity of those individuals to benefit from training and development support, networking opportunities and business support processes; and, (2) how those entrepreneurs can be supported to become employers and run high growth businesses (Buckman and Southern 2015[40]). Self-employment is known to be particularly important in the agriculture, forestry and fishing industry (68% of workers are self-employed); construction (52%); arts, entertainment and recreation (36%); administrative support services (35%); and, professional, scientific and technical activities (34%) (Buckman and Southern 2015). Notably, self-employment was at its highest level in 40 years at the time of the 2011 Census (ONS 2011[41]).

Finally, in terms of unemployment, figures suggest that the coastal corridor is very similar to the rest of Cornwall. However, there is a slightly higher percentage of unemployed aged between 50-74; this is likely to be reflecting the older population indicated in section 2.04. Furthermore, there is a lower percentage of usual residents who have never worked (-2%) in the coastal corridor (ONS 2011).

	Coastal Corridor	%	Rest of Cornwall	%
All usual residents aged 16 to 74	**143,001**	**37%**	**249,069**	**63%**
Economically Active	93384	65%	168325	68%
Economically Inactive	49617	35%	80744	32%
Economically active	**93384**		**168325**	
In employment	**84484**	**90%**	**153768**	**91%**
In employment: Employee: Part-time	*21558*	*26%*	*38702*	*25%*
In employment: Employee: Full-time	*43002*	*51%*	*81063*	*53%*
In employment: Self-employed	*19925*	*24%*	*34003*	*22%*
Unemployed	**4531**	**5.1%**	**8049**	**5.2%**
Full-time student	**4369**	**4.7%**	**6497**	**4.2%**
Economically Inactive	**49617**		**80744**	
Retired	*28993*	*58%*	*45241*	*56%*
Student (including full-time students)	*6927*	*14%*	*9892*	*12%*
Looking after home or family	*5257*	*10%*	*10380*	*13%*
Long-term sick or disabled	*6060*	*12%*	*11006*	*14%*
Other	*2379*	*5%*	*4225*	*5%*
Unemployed	**4531**	**3.2%**	**8060**	**3.2%**
Unemployed: Age 16 to 24	*1354*	*30%*	*2498*	*31%*
Unemployed: Age 50 to 74	*1102*	*24%*	*1797*	*22%*
Unemployed: Never worked	*415*	*9%*	*869*	*11%*
Long-term unemployed	*1660*	*37%*	*2897*	*36%*

Table 4. Economic Activity of Usual Residents in Coastal Corridor and Rest of Cornwall (Source: ONS 2011)

2.08 Industry Employed-In

- *Wholesale, retail trade, repair, motor vehicle/cycles (15.9%); human health or social work (13.1%); accommodation or food services activities (11.6%); education (10.5%); and construction (8.4%) are the most important industries for the coastal corridor in terms of employment (ONS 2011).*

[40] Buckman and Southern (2015) https://www.cioslep.com/assets/uploads/documents/1469447094_Employment%20and%20Skills%20Strategy%20(new%20version).pdf
[41] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/articles/transitionfromamanufacturingtoserviceledlabourmarketoverpast170years/2015-08-06

- *Notably, the coastal corridor has a higher percentage of usual residents active in accommodation and food services (+3.9%); education (+1.2%); transport and storage (+0.4%); professional, scientific and technical (+0.7%); information and communication industries (+0.4%); finance or insurance (+0.2%); and real estate (+0.3%) (ONS 2011).*
- *Existing key employment sectors are predicted to continue to provide the majority of employment in Cornwall in the foreseeable future (Buckman and Southern 2015).*

The 2011 Census (ONS 2011) captures both the economically active usual residents and the industry they are employed-in. Industry employed-in provides a snapshot of the labour market structure of usual residents of the coastal corridor and the rest of Cornwall. The Census 2011 dataset only provides information on usual residents aged between 16 and 74 in employment the week before the census in England and Wales by industry. The estimates are as at census day, 27th March 2011. Industries are coded using the UK Standard Industrial Classification of Economic Activities (UKSIC). To estimate the industry employed-in of usual residents of the coastal corridor the ONS 2011 Census OA dataset was used, adjusted using best-fit methods to the coastal corridor and the rest of Cornwall.

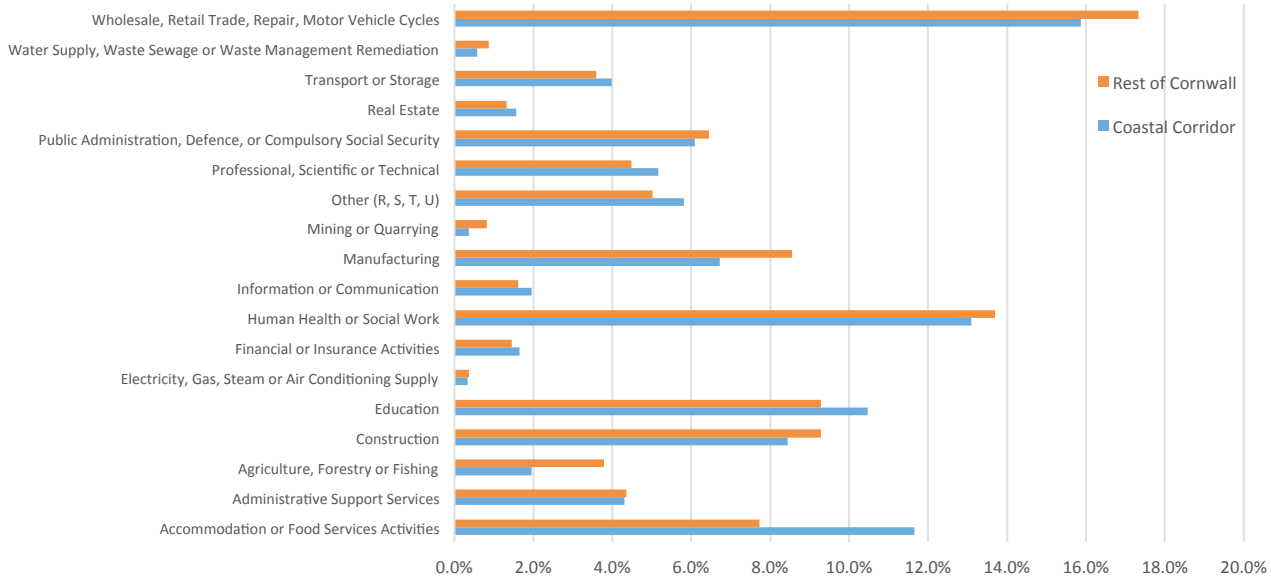
Table 5 and Graph 1 compare the percentage of usual residents by industry-employed in the coastal corridor with the rest of Cornwall. The most dominant industries, in terms of percentage of usual residents employed, include: wholesale, retail trade, repair, motor vehicle cycles (15.9%); human health or social work (13.1%); accommodation or food services activities (11.6%); education (10.5%); and construction (8.4%). The dominance of sectors such as 'wholesale, retail trade, repair and motor vehicles/cycles' and 'human health/social work' is not unexpected, these are linked to services sectors and tend to be the major employers everywhere. These service sectors are only likely to grow further with rising population levels and an increasingly ageing population in Cornwall, as older people have a greater likelihood of preference for services over goods (LEP 2012). In terms of Cornwall as a whole, looking at employment broken down by sector highlights the importance of retail; health and social care; education; hospitality; construction; manufacturing; and, public administration in total employment terms. A 2015 report by CIOSLEP (Buckman and Southern 2015) suggests that existing key employment sectors will continue to provide the majority of employment in the LEP area in the foreseeable future.[42]

Notably, the coastal corridor has a higher percentage of usual residents active in accommodation and food services (+3.9%); education (+1.2%); transport and storage (+0.4%); professional, scientific and technical (+0.7%); information and communication industries (+0.4%); finance or insurance (+0.2%); and real estate (+0.3%). There are higher percentages of usual residents employed in industries linked to tourism, e.g. accommodation and food services, transport and storage, and also those often associated with urban areas such as professional, scientific and technical, information and communication industries. There are notably lower percentages of usual residents employed in agriculture, forestry or fishing (-1.9%); manufacturing (-2.1%); and wholesale, retail trade, repair, motor vehicle cycles (-1.4%) industries. If urban areas are removed this shows a similar picture.

Industry Employed In	Coastal Corridor		Rest of Cornwall		Cornwall
	Count	%	Count	%	%
Agriculture, Forestry or Fishing	1713	1.9%	6018	3.8%	3.1%
Mining or Quarrying	315	0.4%	1290	0.8%	0.6%
Manufacturing	5917	6.7%	13589	8.6%	7.9%
Electricity, Gas, Steam or Air Conditioning Supply	286	0.3%	589	0.4%	0.4%
Water Supply, Waste Sewage or Waste Management Remediation	505	0.6%	1370	0.9%	0.8%
Construction	7422	8.4%	14761	9.3%	9.0%
Wholesale, Retail Trade, Repair, Motor Vehicle Cycles	13951	15.9%	27530	17.3%	16.8%
Transport or Storage	3504	4.0%	5713	3.6%	3.7%
Accommodation or Food Services Activities	10243	11.6%	12286	7.7%	9.1%
Information or Communication	1722	2.0%	2568	1.6%	1.7%
Financial or Insurance Activities	1444	1.6%	2301	1.4%	1.5%
Real Estate	1380	1.6%	2105	1.3%	1.4%
Professional, Scientific or Technical	4548	5.2%	7129	4.5%	4.7%
Administrative Support Services	3779	4.3%	6933	4.4%	4.3%
Public Administration, Defence, or Compulsory Social Security	5354	6.1%	10257	6.5%	6.3%
Education	9212	10.5%	14754	9.3%	9.7%
Human Health or Social Work	11517	13.1%	21769	13.7%	13.5%
Other (R, S, T, U)	5109	5.8%	7972	5.0%	5.3%
Industry: All categories	87920		158934		

Table 5. Usual residents by industry employed-in for the coastal corridor and the rest of Cornwall (Source: ONS 2011)

[42] *"Accommodation and food services" – with clear links to tourism – accounts for around 25,000 employee jobs in Cornwall & Isles of Scilly; compared to the national average, this is double the number that might typically be expected in an economy of this scale (2011).*



Graph 1. Usual residents by industry employed-in for the coastal corridor and the rest of Cornwall (Source: ONS 2011)

2.09 Occupation

- *There is a slightly higher percentage of usual residents of the coastal corridor who are employed as managers, directors and senior officers and in professional occupations (39%) compared to the rest of Cornwall (33%).*

The 2011 Census captures the occupation of usual residents aged 16 to 74 in employment the week before the census (ONS 2011). A person's occupation provides an understanding of the workforce and type of skills available in an area, and is particularly useful in understanding local economic development, monitoring labour market trends[43]. Occupations are classified based on the Standard Occupational Classification 2010[44]. The ONS 2011 Census OA dataset was used to estimate the occupations of usual residents in the coastal corridor; data for OA was adjusted using best-fit methods to the coastal corridor and the rest of Cornwall.

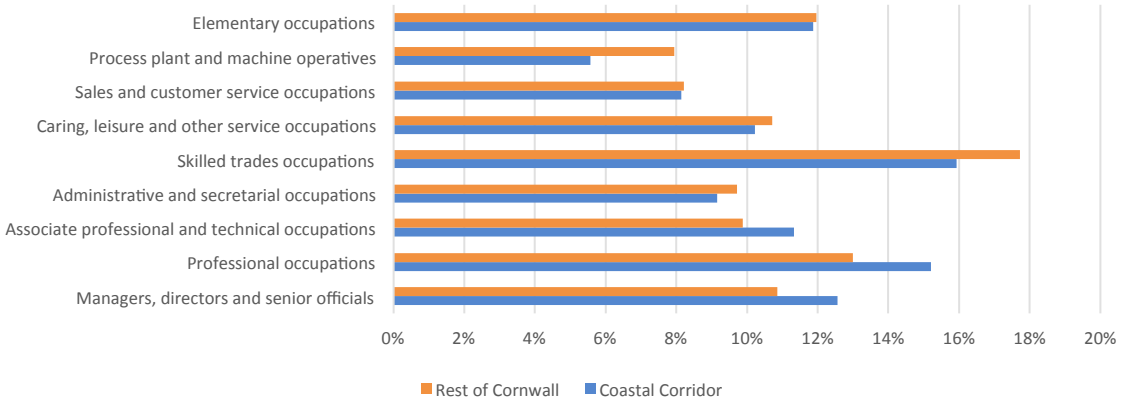
Table 6 and Graph 2 compares the occupations of usual residents in the coastal corridor with the rest of Cornwall. The highest percentage occupations in the coastal corridor include skilled trades occupations (16%), professional occupations (15%), managers, directors and senior officials (13%) and elementary occupations (12%). Dominant occupations in the coastal corridor echo those for the rest of Cornwall, however, there are some notable differences. Professional occupations; managers, directors and senior officials; and associate professionals, account for 39% of the usual residents' occupations in the coastal corridor, compared to 33% in the rest of Cornwall. There are also notably lower levels of process plant and machine operatives and skilled trades occupations in the coastal corridor.

Occupation	Coastal Corridor		Rest of Cornwall		Cornwall
	Count	%	Count	%	%
Managers, directors and senior officials	11050.7	13%	17248	11%	10.9%
Professional occupations	13372.6	15%	20662	13%	13.8%
Associate professional and technical occupations;	9953.2	11%	15691	10%	11.2%
Administrative and secretarial occupations	8053.6	9%	15455	10%	8.8%
Skilled trades occupations	14010.4	16%	28158	18%	16.3%
Caring, leisure and other service occupations	8991.2	10%	17031	11%	10.6%
Sales and customer service occupations	7151.3	8%	13044	8%	7.5%
Process plant and machine operatives	4894.6	6%	12629	8%	5.9%
Elementary occupations	10442.3	12%	19018	12%	14.8%
All categories: Occupation	87919.7		158934		

Table 6. Occupation of usual residents in the coastal corridor and rest of Cornwall (Source: ONS 2011)

[43] *ONS - Occupation* https://www.nomisweb.co.uk/census/2011/qs606uk

[44] *More information about SOC2010 can be found here:* http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/soc2010/index.html



Graph 2. Occupation of usual residents in the coastal corridor and rest of Cornwall (Source: ONS 2011)

2.10 Index of Multiple Deprivation

- *Six neighbourhoods which intersect the coastal corridor rank within the 10% most deprived Lower Super Output Areas (LSOAs) in England, out of a total of seventeen neighbourhoods which rank amongst the 10% most deprived in England across the whole of Cornwall (35%).*
- *Eight neighbourhoods which intersect the coastal corridor are within the 20% most deprived LSOAs in England, out of a total of twenty-seven neighbourhoods in Cornwall classed as amongst the 20% most deprived in England (30%).*

As of 2015, Cornwall as a whole is not deprived but there are neighbourhoods with consistently high levels of deprivation. Since 2004, the UK government has measured how deprived different neighbourhoods are compared to one another. The Index of Multiple Deprivation (IMD) is the official measure of relative deprivation for small areas (or neighbourhoods) in England[45]. Deprivation covers a broad range of issues and refers to unmet needs caused by a lack of resources of all kinds, not just financial. The Index measures deprivation in its broadest sense by assessing seven domains of deprivation: income, employment, health and disability, education, skills and training, barriers to housing and services, crime and the living environment. Indicator data is then combined to produce a single deprivation score for each area, which allows different areas across England to be ranked relative to each other according to their level of deprivation. Every neighbourhood in England is ranked, resulting in a ranking from 1 (most deprived area) to 32,844 (least deprived area). Deprivation is then measured generally in terms of whether a neighbourhood falls into the most deprived 10% or 20% of rankings. The ranked approach means that how deprived an area is depends on everywhere else. 2015 data show that Cornwall is now ranked 143 out of 326 local authority areas for deprivation (where 1 is having the highest proportion of the population living in the most deprived neighbourhoods). Whereas in 2010 Cornwall ranked 154 out of the 326 local authority areas for deprivation.

IMD is mapped spatially at the LSOA geography by the ONS[46]. The ONS class LSOAs as neighbourhoods, each LSOA contains roughly 1500 people but can be very different in terms of their actual size. There are 32,844 LSOAs across England. The IMD decile is calculated by ranking all 32,844 LSOA and then dividing them into 10 equal groups. Group 1 is the 10% most deprived LSOAs in the UK, whilst LSOAs in group 10 are the 10% least deprived areas in the UK[47]. Estimations of deprivation levels in relation to the Coastal Corridor were made using the English Indices of deprivation 2015 dataset (Ministry of Housing, Communities and Local Government 2015[48]). All LSOAs intersecting the coastal corridor were selected and analysed; it was not possible to use best-fit methods.

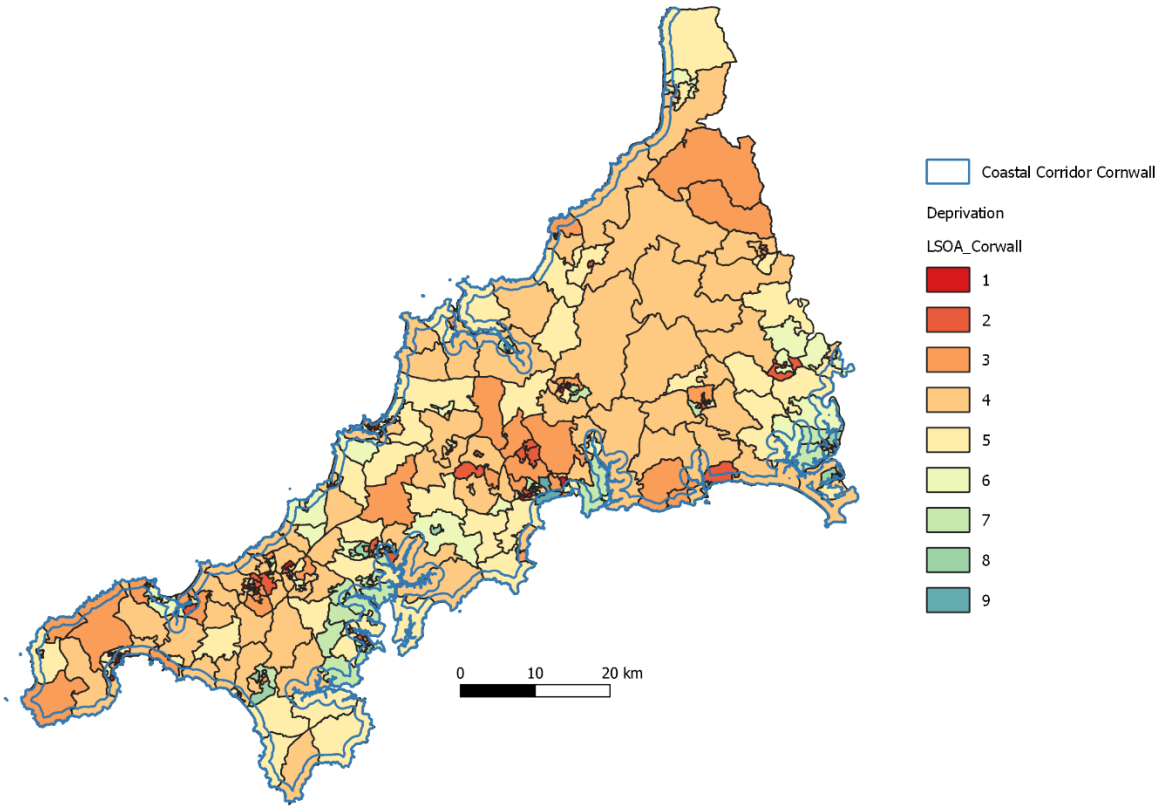
Six neighbourhoods which intersect the coastal corridor are within the 10% most deprived LSOAs in England, out of a total of seventeen across the whole of Cornwall (35%). Eight neighbourhoods which intersect the coastal corridor are within the 20% most deprived LSOAs in England, out of a total of twenty-seven neighbourhoods in Cornwall classed as amongst the 20% most deprived

[45] https://esriukeducation.maps.arcgis.com/apps/Cascade/index.html?appid=3c16c360b5704192a550f844b13ffb0a
[46] ONS (2015) https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015; https://www.ons.gov.uk/aboutus/transparencyandgovernance/freedomofinformationfoi/indexofmultipledeprivation
[47] https://esriukeducation.maps.arcgis.com/apps/Cascade/index.html?appid=3c16c360b5704192a550f844b13ffb0a
[48] https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

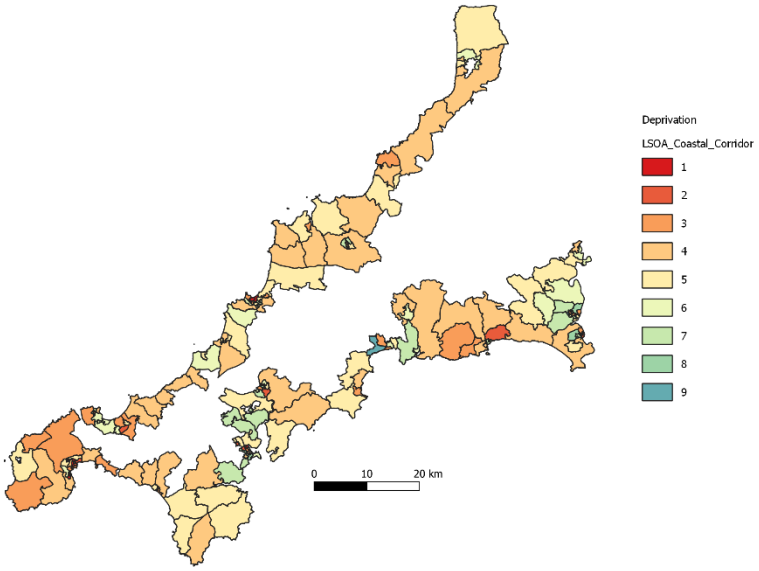
in England (30%). These include neighbourhoods at Hayle, Penzance (Treneee), Newlyn, Falmouth, Penryn, Truro, Newquay, Looe and Torpoint.

LSOA Name (2011)	Index of Multiple Deprivation (Where 1 is most Deprived)	Index of Multiple Deprivation Decile (where 1 is most deprived 10% of LSOAs)
Cornwall 070D	2,938	1
Cornwall 068A	2,147	1
Cornwall 067E	414	1
Cornwall 062D	2,541	1
Cornwall 021C	2,797	1
Cornwall 020B	2,378	1
Cornwall 068C	3,724	2
Cornwall 067D	3,500	2
Cornwall 062E	4,084	2
Cornwall 060C	4,432	2
Cornwall 057E	3,598	2
Cornwall 042D	6,330	2
Cornwall 029A	5,524	2
Cornwall 028E	4,428	2

Table 7. 10% most deprived LSOA (neighbourhoods) intersecting the coastal corridor (ONS 2015)



Map 5. Deprivation LSOA by Decile of deprivation (1 = 10% most deprived 10 = 10% least deprived) (Source ONS 2015)



Map 6. LSOA Deprivation by Decile of Deprivation (1 = 10% most deprived 10 = 10% least deprived) (Source ONS 2015)

	Coastal Corridor	Rest of Cornwall	Cornwall
All Deprivation classification households	107811	124764	232575
Household is not deprived in any dimension	40.9%	39.6%	40.2%
Household is deprived in 1 dimension	34.8%	34.5%	34.6%
Household is deprived in 2 dimensions	19.2%	20.5%	19.9%
Household is deprived in 3 dimensions	4.6%	5.0%	4.8%
Household is deprived in 4 dimensions	0.50%	0.49%	0.5%

Table 8. Deprivation Classification of Households in Output Areas intersecting the coastal corridor compared to the rest of Cornwall, ONS Census 2011

3. ECONOMIC CHARACTERISTICS

3.01 Gross Value Added

- *The Gross Value Added (GVA) for the coastal corridor is estimated to range between £3,757 million and £4,179 million per year, which is around 38%-44% of Cornwall's total GVA. It is important to note that these estimates are subject to the effects of commuting and variations in the age structure of populations.*
- *The largest contributions to the coastal corridor's GVA are derived from public administration, education and health (23%); real estate (19%); distribution and transport, accommodation and food (18%); and construction (12%). These sectors largely reflect the most important sectors for GVA in Cornwall, with the exception of the construction sector which is of higher importance to GVA in the coastal corridor than in Cornwall as a whole.*
- *Assessing the coastal corridor GVA as a percentage of total GVA per sector in Cornwall indicates that: the coastal corridor is particularly important for financial and insurance activities, where the coastal corridor contributes 72% of total GVA from this sector, information and communication (69%), construction (68%) and other services and household activities (51%).*

Gross Value Added, or GVA, is an estimate of the state of economic activity from the producer's or supply-side perspective. Providing a measure of the contribution to the economy of each industry or sector, GVA is calculated by measuring the value of the goods or services as they leave a sector, industry or area, minus the cost of inputs used to produce them. GVA can be used to provide an impression of the sectoral structure of Cornwall's economy and give some indication of the contribution made by the coastal corridor. There are however a number of commonly cited limitations of GVA as a measure of economic productivity, including a failure to capture the value of certain activities, e.g. caring for children or volunteering, and a lack of adjustment for negative externalities. Furthermore, income-based approaches to calculating GVA can be subject to distortion due to the effects of commuting and variations in the age structure of populations (ONS 2017[49]). Despite these limitations, GVA and GVA per head are widely used indicators of the economic well-being of an area and provide a means of comparison/benchmarking with other areas.

Until very recently, it has been unusual for GVA to be published at geographical scales below the region or county. ONS estimates of GVA are only available for existing administrative and statistical areas down to the Local Authority level and are not available for local areas such as Census OAs or wards. Consequently, GVA estimates cannot be calculated for the coastal corridor using best-fit methods as used throughout Section 2. Instead, GVA has to be estimated using assumptions about the economic characteristics and residents of the coastal corridor following the approaches set out in the Valuing England's National Parks Study (Cumulus Consultants Ltd and ICF GHK, 2013[50]).

The Valuing England's National Park study highlights that GVA can be estimated for non-statistical geographies using: (1) GVA per business, (2) per worker, or (3) per £1 of output, based on relevant data at the national and county level (Cumulus Consultants Ltd and ICF GHK, 2013). Calculating GVA per business uses estimates of the GVA generated per £1 of output across different sectors to generate a ratio of GVA per unit of turnover, this would then be applied to an estimated turnover of sectors present in the study area. Although GVA per business can provide good estimates of GVA, local turnover data were not available for the coastal corridor and therefore it has not been possible to use this method. Estimating GVA per worker uses LA total GVA estimates and proportions these per sector and per worker. GVA per worker and sector can then be linked to the level of employment per sector in the study area. This approach calculates a GVA value per job by broad sector, which is then attributed to the number of workers in each sector in a specific area, it is however limited due to the effects of commuting. Furthermore, this approach is likely to provide an over-estimate of local GVA where there is a focus on relatively low-value economic activities such as agriculture and tourism. Simpler estimates can be made using broad estimates of local level employment (GVA per employee) and average GVA per worker for the LA.

The GVA per worker approach was adopted to calculate GVA for the coastal corridor, as estimates of worker numbers in the coastal corridor were available (see Section 2.08) (Table 9). Using this approach (see table 9) the GVA of the coastal corridor was estimated to be £4,179 million, 44% of the total GVA in Cornwall of £9,579 million[51] (ONS 2016). In addition, GVA per employee was calculated based on estimates of total local level employment and average GVA per employee in Cornwall, which resulted in a lower estimate

[49] *ONS (2017) https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/regionalgvaibylocalauthorityintheuk*
[50] *Cumulus Consultants Ltd and ICF GHK (2013) https://www.nationalparksengland.org.uk/__data/assets/pdf_file/0004/717637/Valuing-Englands-National-Parks-Final-Report-10-5-13.pdf*
[51] *GVA by sector 3-year average (2013-2015 £million), Source ONS (2016)*
https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/regionalgrossvalueaddedbalancedbylocalauthorityintheuk

of £3,757 (million) or 38% of total GVA in Cornwall (Table 10). Both estimates are limited as they do not take into account the effects of commuting.

Cornwall's GVA (income) and employment give an indication of the importance of certain industrial sectors to the economy and working communities[52]. The most important sectors for GVA in the coastal corridor were found to be public administration, education and health (23%), real estate (19%); distribution, transport, accommodation and food (18%); and construction (12%). As shown in Table 9, the importance of sectors for GVA in the coastal corridor is very similar to the whole of Cornwall, with the exception of the construction sector which is of higher importance to GVA in the coastal corridor. Assessing the coastal corridor GVA as a percentage of total GVA per sector in Cornwall indicates that the coastal corridor is particularly important for: financial and insurance activities, where the coastal corridor contributes 72% of total GVA from this sector, information and communication (69%), construction (68%) and other services and household activities (51%).

Cornwall Council suggest that Cornwall's economy has grown most in areas relating to tourism and ageing population, whilst agriculture is in decline in terms of contribution to GVA (Cornwall Council 2016[53]). Monitoring of the economy by Cornwall Council suggests growth in the following areas in terms of GVA: (1) public administration – but falling employment and productivity, (2) construction – but falling productivity, (3) retail distribution, (4) food and drink manufacturing, (5) air transport, (6) finance and (7) social welfare. There have however been declines in the GVA contribution made by the fishing, mining and quarrying sectors (Cornwall Council 2016).

GVA per worker (employment based GVA estimates) Sector	Workers in Cornwall[54]	GVA by sector (£ million) (2015 ONS)[55]	% total GVA	Cornwall GVA per worker	Workers in the coastal corridor per sector[56]	GVA per sector in coastal corridor	% of total Corridor GVA	CC GVA as % total GVA per sector Cornwall
Agriculture, forestry and fishing	4500	240	3%	£53,259	1713	£91,232,667	2%	38%
Production other than manufacturing	3000	304	3%	£101,222	1106	£111,951,532	3%	37%
Manufacturing	16000	737	8%	£46,042	5917	£272,430,514	7%	37%
Construction	11000	729	8%	£66,303	7422	£492,100,866	12%	68%
Distribution; transport; accommodation and food	76000	2078	22%	£27,346	27698	£757,429,508	18%	36%
Information and communication	2500	178	2%	£71,067	1722	£122,377,374	3%	69%
Financial and insurance activities	2000	164	2%	£82,167	1444	£118,649,148	3%	72%
Real estate activities	3500	2060	22%	£588,476	1380	£812,096,880	19%	39%
Business service activities	24000	627	7%	£26,111	8327	£217,426,297	5%	35%
Public administration; education; health	55000	2045	21%	£37,176	26083	£969,661,608	23%	47%
Other services and household activities	10000	418	4%	£41,833	5109	£213,724,797	5%	51%
Total		**£9,579 million**				**£ 4,179 million**		43.6%

*Table 9. Employment based GVA estimates for Cornwall Coastal Corridor by Sector (using 2015 and 2011 ONS data) (*Not adjusted to 2018)*

GVA per employee (GVA estimates based on county level productivity)	Economically Active Cornwall (2015[57])/2011 Census	GVA per employee/worker (£)	Estimated GVA (2015)
Cornwall	244,800	£40,236.9	£9,850 (million)
Coastal Corridor	93,384	£40,236.9	£3,757 (million)

*Table 10. GVA per employee estimates for the coastal corridor and Cornwall (GVA estimates based on county level productivity) (*not adjusted to 2018 prices)*

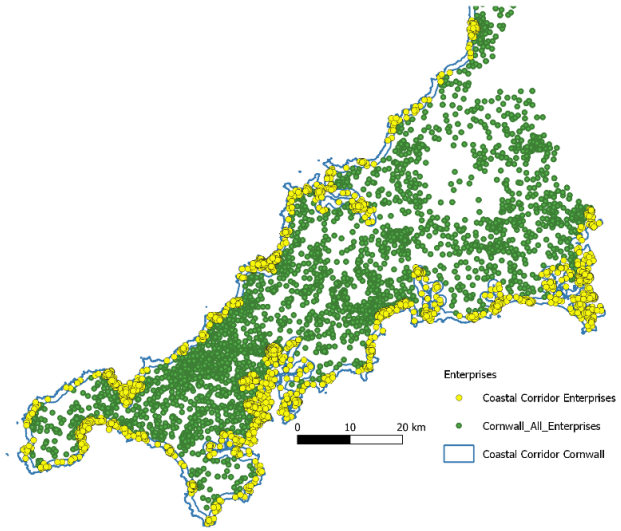
3.02 Businesses/Enterprises

- *44% [9225] of all enterprises in Cornwall registered with Companies House fall within the coastal corridor, this excludes enterprises not registered for VAT or PAYE.*
- *Notably the coastal corridor contains 39% of large enterprises in Cornwall, 24% of medium enterprises, 42% of minor enterprises and 46% of small enterprises.*

[52] *Looking at the size of sectors only in relation to GVA does not provide a complete picture of productivity and also the number of people employed.*
[53] *Source: https://www.cornwall.gov.uk/media/17635607/state-of-the-economy-jan16.pdf*
[54] *Workers by Industry Employed in (ONS 2015) (Business register and employment survey ONS 2015)*
[55] *GVA by sector 3-year average (2013-2015 £million)*
[56] *See Section 2.08 (Census 2011)*
[57] *Source: https://www.cornwall.gov.uk/media/17635607/state-of-the-economy-jan16.pdf*

3.02.01 Number of enterprises

There are an estimated 23,795 registered enterprises in Cornwall and the Isles of Scilly (VAT and/or PAYE businesses), with 28,045 business units[58] (ONS 2018[59]). An enterprise is the smallest combination of legal units which has a certain degree of autonomy within an enterprise group. The number of registered enterprises in Cornwall has steadily grown between 2010 and 2018 with an increase of 14% from 2010 levels (ONS 2018). Cornwall contains 10% of all registered enterprises in the SW (ONS 2018). Companies House[60] provides information on only 20,790 registered enterprises in Cornwall (87%) (TEVI pers comm; Companies House 2019[61]), this excludes enterprises not registered for VAT or PAYE. Once mapped across Cornwall, 9225 enterprises fall within or intersect the coastal corridor (44%) (Map 7). As to be expected, enterprises cluster around urban centres, including Penzance, Truro, St Ives and Newquay. Within the coastal corridor, the density of enterprises per ha is 0.14 while it drops to 0.039 per ha for the rest of Cornwall. Notably, Cornwall is distinct in terms of its distribution of businesses as the number located in rural areas is significantly higher than in urban areas (Whittaker 2017[62]). The rural/urban ratio in Cornwall is 2:1; SW 1:1; and England 1:3.



Map 7. Enterprises in Cornwall (green) in the coastal corridor (yellow)

3.02.02 Scale of enterprises

Different estimates are available of the number of employees for enterprises across Cornwall. ONS (2018) data suggest that 88% of all enterprises in Cornwall are micro (Table 11), whereas the Companies House dataset suggests 98% of enterprises are micro scale (see Tables 12 and 13). Only the Companies House dataset is mappable and has been used to establish the number of employees per enterprise within the coastal corridor. Table 13 shows little difference between the number of employees per enterprise between the coastal corridor and the rest of Cornwall. Notably, the coastal corridor contains 39% of large enterprises, 24% of medium enterprises, 42% of minor enterprises and 46% of small enterprise in Cornwall. There is a slightly higher percentage of micro enterprises within the coastal corridor, which fits with findings in Section 2.07 of the higher percentage of self-employed usual residents in the coastal corridor. There is a "*fuzzy line*" between self-employment and micro-businesses, hence the '*real'* number of enterprises could be higher. The largest companies (+250 employees) withinthe coastal corridor are listed in Table 14.

Enterprises	Cornwall (ONS 2018)	
	(Numbers)	(%)
Micro (0 to 9)	20,980	88.2
Small (10 to 49)	2,455	10.3
Medium (50 to 249)	295	1.2
Large (250+)	65	0.3
Total	**23,795**	

Table 11. UK Business Counts enterprises by number of employees in Cornwall (Source: ONS 2018)

[58] *This figure is an estimate as businesses do not fall neatly into pre-defined sectors and they defy easy measurement through official statistics.*
[59] *ONS (2018)UK Business Counts - Inter Departmental Business Register: https://www.nomisweb.co.uk/reports/lmp/la/1946157349/report.aspx?#tabidbr*
[60] *Companies House https://www.gov.uk/government/organisations/companies-house*
[61] *https://beta.companieshouse.gov.uk/*
[62] *Whittaker (2017) Cornwall's Vital Issues 2017 Report: https://www.cornwallcommunityfoundation.com/wp-content/uploads/2018/12/Cornwalls-Vital-Issues-2017-Final-2.pdf*

Enterprises	Cornwall (Companies House)	
	Count	(%)
Micro (0 to 9)	14626	97.8%
Small (10 to 49)	116	0.8%
Medium (50 to 249)	142	0.9%
Large (250+)	67	0.4%
Total	14951	

Table 12. Enterprises by employee number in Cornwall (Companies House 2019; TEVI)

Enterprises (number of employees)	Coastal Corridor		Rest of Cornwall		% of total in Cornwall
	Count	%	Count	%	
Micro (0 to 9)	6665	98.0%	7961	97.7%	46%
Small (10 to 49)	49	0.7%	67	0.8%	42%
Medium (50 to 249)	59	0.9%	83	1.0%	42%
Large (250+)	26	0.4%	41	0.5%	39%

Table 13. Companies House enterprises by number of employees in the Coastal Corridor and the rest of Cornwall (Companies House 2019; TEVI)

Company Name	Employees	Sector	Address
IMERYS MINERALS LIMITED	1038	Mineral processing, mines and quarries	Par Moor Centre, Par Moor Road, Par, PL24 2SQ
CORSERV LIMITED	1994	Council owned - diverse	Higher Trenant Rd, Wadebridge PL27 6TW
CORMAC SOLUTIONS LIMITED	1743	Council owned – Construction, facilities and plant maintenance	Higher Trenant Rd, Wadebridge PL27 6TW
GILLETT'S (CALLINGTON) LIMITED	494	Food services activities	Gilletts Callington Limited Forge Lane Moorlands Trading Estate Saltash PL12 6LX
VIA EAST MIDLANDS LIMITED	578	Design, construction and highways, Joint venture company, Council and CORSERV	Hall New County Hall Treyew Road Truro **Cornwall** TR1 3AY
PENDENNIS SHIPYARD (HOLDINGS) LIMITED	402	Marine	The Docks, Falmouth TR11 4NR
PENDENNIS SHIPYARD LIMITED	394	Marine	The Docks, Falmouth TR11 4NR
H.TEMPEST LIMITED	788	Photographic and film processing	The Colour Laboratory, Lelant, Saint Ives TR26 3HU
SOUTH EAST CORNWALL MULTI ACADEMY REGIONAL TRUST	469	Education	Wearde Road, Saltash Cornwall, PL12 4AY
NEWQUAY EDUCATION TRUST	354	Education	Newquay Tretherras, Trevenson Road, Newquay Cornwall, TR7 3BH
SPECIAL PARTNERSHIP TRUST	307	Education	Pencalenick School, St Clement, Truro, TR1 1TE
PROVENANCE BRANDS LIMITED	564	Food services activities	Ocean House Lower Quay, Gweek, Helston, Cornwall, TR12 6UD
CORNWALL GLASS & GLAZING LIMITED	296	Construction	Old Mansion House, 9 Quay Street, Truro, Cornwall, England, TR1 2HE
SEAFOOD TRADING LIMITED	310	Food services activities	Riverside, Padstow**, Cornwall,** PL28 8BY
THE SEAFOOD RESTAURANT (PADSTOW) LIMITED	310	Food services activities	Riverside, Padstow**, Cornwall**, PL28 8BY
THE LEARNING ACADEMY TRUST	316	Education	Treloggan Ln, Newquay TR7 1HX
RED HOTELS LIMITED	344	Accommodation and Hospitality	The Scarlet Hotel, Tredragon Rd, Mawgan Porth, Newquay TR8 4DQ
ATLANTIC CENTRE OF EXCELLENCE MULTI ACADEMY TRUST	375	Education	St Columb Minor ACE Academy, Porthbean Road, Newquay TR7 3JF
THE CORNISH BAKERY SHOPS LIMITED	291	Food services activities	7 Arwenack Street, Falmouth, Cornwall, TR11 3HZ
WATERGATE BAY HOTEL LIMITED	283	Accommodation and Hospitality	Watergate Bay Hotel, Watergate Bay, Newquay, Cornwall, TR8 4AA
NETTLETON HOLDINGS LIMITED	277	Real Estate and Property Management	Lowin House, Tregolls Road, Truro, Cornwall, TR1 2NA
SWALLOWCOURT HOLDINGS LIMITED	414	Care and human health	Peat House Newham Road Truro, Cornwall TR1 2DP
CORNWALL HOSPICE CARE LIMITED	283	Care and human health	Mount Edgcumbe Hospice, Porthpean Rd, Saint Austell PL26 6AB
PORTHIA GROUP LIMITED	338	Real Estate and Property Management	Godrevy House, Trewidden Road, St Ives, Cornwall, TR26 2BX
SWALLOWCOURT LIMITED	317	Care and human health	Peat House Newham Road Truro, Cornwall TR1 2DP
BEDRUTHAN HOTEL LIMITED	344	Accommodation and Hospitality	Bedruthan Hotel and Spa Cornwall Trenance, Mawgan Porth TR8 4BU

Table 14. Enterprises with more than 250 employees within the coastal corridor (Source: Companies House 2019)

3.02.03 Enterprises by sector/industry

Enterprise counts by industry give an indication of the importance of an area for different industries and the largest industries in an area. Agriculture, forestry and fishing are the largest industry group by enterprise count in Cornwall, accounting for 18% of all

registered enterprises, construction accounts for 14% of all registered enterprises, while accommodation and food services and professional, scientific and technical enterprises both account for 10%. Notably, both the agriculture, forestry and fishing industry and accommodation and food services industry are closely dependent on natural capital assets. A full dataset from which to map enterprises by sector was not available for the coastal corridor and instead only qualitative information and grey literature were available from which to indicate the spatial distribution of different sectors and industries in relation to the coast.(see Table 15)

Industry	Cornwall[63]	
	Count	%
A : Agriculture, forestry and fishing	4240	18%
B : Mining and quarrying	25	0.1%
C : Manufacturing	1250	5%
D : Electricity, gas, steam and air conditioning supply	135	1%
E : Water supply; sewerage, waste management and remediation activities	60	0%
F : Construction	3260	14%
G : Wholesale and retail trade; repair of motor vehicles and motorcycles	3435	14%
H : Transportation and storage	600	3%
I : Accommodation and food service activities	2335	10%
J : Information and communication	815	3%
K : Financial and insurance activities	255	1%
L : Real estate activities	760	3%
M : Professional, scientific and technical activities	2410	10%
N : Administrative and support service activities	1510	6%
O : Public administration and defence; compulsory social security	160	1%
P : Education	315	1%
Q : Human health and social work activities	860	4%
R : Arts, entertainment and recreation	570	2%
S : Other service activities	810	3%

Table 15. Distribution of enterprises by Business Sector in Cornwall (Source: Nomis, UK Enterprise Counts 2015)

There is some notable spatial clustering of industries in relation to the coastal corridor. There are clusters of marine-based businesses (including marine civil engineering) in and around Falmouth (42%) which directly and indirectly employ some 14,000 workers in Cornwall (CIoSLEP 2012[64]). The Falmouth area is of particular importance for boat building and ship repair (e.g. A&P Falmouth and Superyachts builders). Tourism and recreational enterprises also have a clear presence throughout the coastal corridor and can be seen as the economic bedrock of the area. Many tourism and leisure enterprises have increased their profile over recent years, and retain a significant relationship to the natural environment (CIoSLEP 2012).

In contrast, major food producing enterprises are not particularly spatially clustered and are instead disturbed widely across Cornwall but have significant local supply chains with links to the coastal corridor or branding linked to the coastal identity of Cornwall (LEP 2012). A lack of spatial clustering is also true for digital/new media and creative activities (e.g. Spider-eye Animation) which are again found across the geography of Cornwall (LEP 2012).

In terms of turnover, the areas with the highest proportion of businesses with over £1 million turnovers are inland, Camborne and Redruth, but these are closely followed by St Austell and Newquay which lie within the coastal corridor. However, in absolute numbers, North Cornwall has the greatest number of business with over £1 million turnovers (315) (CIoSLEP 2012). North Cornwall area is also in the lead when it comes to agricultural business (27% - 5,005 businesses), followed closely by South East Cornwall with 22% of businesses operating in the agricultural industry. In contrast, Truro and Falmouth and St Austell and Newquay have less than half the proportion of agricultural businesses as North Cornwall but have the greatest proportion of professional, scientific and technical businesses (14%) and construction businesses (12%). North Cornwall, St Ives and St Austell & Newquay have the highest proportion of accommodation & food businesses.

A number of predicted growth areas for sectors in Cornwall are highlighted by Cornwall LEP and Cornwall Council (Buckham and Southern 2017[65]). Cornwall Council has utilised models from both Experian and Cambridge Econometrics which have produced

[63] *Nomis, UK Enterprise Counts (2015)*
[64] *http://www.sqw.co.uk/files/2313/8531/4708/Strat_5.pdf*
[65] *Buckham and Southern (2017) https://www.cioslep.com/assets/file/Cornwall%20and%20IoS%20Employment%20and%20Skills%20Strategy%20Appendix%201_P1.pdf*

similar estimates of growth and identified the shared projections. Broadly, Buckham and Southern (2017) identify the following trends: (1) growth in professional, scientific and technical businesses following the national trend, (2) growth of higher skilled jobs (16% in Cornwall) (Buckham and Southern, 2017), (3) growth in maritime industries and the renewable energy/environment technology sector, (4) growth in the care sector (health or social care) and leisure roles, reflecting the influence of demographic changes such as ageing on service requirements, (5) a diminishing role of public sector employment in terms of overall employment growth, (6) decline in manufacturing employment, and (7) growth in the accommodation and food services sector (See Table 16).

10 largest sectors in 2030 (by employment)		10 Fastest Growing Sectors (By employment 2014-2030)	
Food and beverage services	11%	Other manufacturing and repair	91.8%
Retail trade	10%	Chemicals	67.2%
Construction	9%	Food and beverage services	49.3%
Education	7%	Other professional services	34.1%
Health	7%	Business support services	29.7%
Residential and social	7%	Arts	27.1%
Business support services	6%	Other services	25.3%
Accommodation	5%	Residential and social	19.3%
Other services	4%	Construction	13.9%
Public Administration and Defence	4%	Other transport equipment	13.2%

Table 16. Ten largest sectors and ten fastest growing sectors (Cambridge Economic April 2015 forecast)

3.03 Sectoral Analysis

This section explores the significance of the coastal corridor for target sectors. The sectors included have been selected based on their relevance to the coastal corridor (enterprise counts/scale) and their clear link to the natural capital assets present in the coastal corridor (see Section 4). This analysis is limited to only a few niche target sectors, considered to be particularly relevant to the One Coast project focus on the coastal corridor stretching from mean high water to 1km inland, and limited to established sectors. The aim of this section is to provide a quick snapshot of the target sectors and, where possible, estimate the potential significance of the coastal corridor.

3.03.01 Tourism

- *Tourism is a main driver of the Cornish economy, it is also a sector which is "inextricably linked to Cornwall's unique environment, including its coastline and cultural heritage" (Cornwall Council 2012[66]).*
- *53% of tourist sites (broadly defined) lie within or intersect the coastal corridor (e.g. campsites, hotels, beaches, coves, nature reserves, museums, monuments, holiday cottages etc.).*
- *There are an estimated 5.34 million day/staying visits per year (SWRC 2016[67], 2018[68]) to coastal areas in Cornwall, 28% of total tourism visits. For 12% of visitors (2.28 million) walking in the coastal corridor is the sole reason for their visit.*
- *Looking specifically at the coastal corridor, the SW Research Company (SWRC 2016[69]) suggests that the corridor receives an estimated 2.26 million visitors per year (2010-2015 average visitor numbers) based on estimates for the Cornish section of the coastal path estimates. However, the number of visitors to the coastal corridor could be as high as 14.88 million visitors per year (SWRC 2016), or 78% of total visitors.*
- *Visitor spend in all coastal areas is estimated to be around £666 million per year (including day trip and staying visitors), 34% of average visitor spend 2010-2015 (SWRC 2016, 2018).*
- *Visitor spend in the coastal corridor can be extrapolated from visitor numbers. Looking solely at 'other coastal areas, excluding beaches', average annual spend is estimated to be £178 million per year (2010-2015 average) equating to on average 10% of the total visitor spend in Cornwall and 26% of coastal spend (SWRC 2016, 2018[70]).*

[66] *Cornwall Council (2012) Economy and Culture Strategy Evidence Base - https://www.cornwall.gov.uk/media/3624007/Economy-and-Culture-Strategy-Evidence-Base.pdf*
[67] *Please note that this data excludes regular non-tourism related residential use such as dog walking.*
[68] *SWRC (2018) Cornwall Visitor Survey 2018/19 Quarterly update, Produced on behalf of Visit Cornwall.*
[69] *SWRC (2016) SW Coast Path Monitoring and Evaluation Framework, Year 5 (2015) Key Findings, Produced on behalf of the SW Coast Path Team.*
[70] *Observatory of the Cornwall Marine Leisure Industry Draft in preparation 2010. Nautisme Espace Atlantique Project, Cornwall Development Company.*

Tourism in Cornwall

The tourism industry is considered a cornerstone or bedrock industry of the Cornish economy (Cornwall Council 2012[71], 2011[72]). Annual visitor spend estimates suggest that the tourism industry has a value of around £1.95 billion per year to the Cornish economy (SWRC 2018). There are an estimated 19.06 million visitors (domestic and international) to Cornwall every year (3 year rolling average 2015-2017), this includes 4.7 million staying visitors and 14.4 million day visitors (Visit Cornwall 2017[73]). As a percentage of total Gross Value Added (GVA) estimates suggest that the tourism industry contributes between 9.9% to 16% (SWRC 2014[74]; S4W 2017[75]). The significance of the tourism industry to the Cornish economy is highlighted by the ONS (2013[76]) tourism ratio. The tourism ratio measures the economic importance of tourism within a sub-region, calculated by dividing the total demand within an area (visitor expenditure) by total supply (or overall output of all industry) in the region (ONS 2013). Cornwall and the Isles of Scilly have a tourism ratio of 9.9%, considerably higher than the UK average, 3.7%, and the average for the SW (4.5%). Cornwall and the Isles of Scilly have the top tourism ratio out of all sub-regions in the UK (ONS 2018). Furthermore, 12.9% of all enterprises in Cornwall are thought to be directly or indirectly linked to tourism and recreation (SWRC 2018). The tourism industry is also estimated to be directly or indirectly linked to some 17-25% of all employment in Cornwall, with 54,000 people employed directly or indirectly through the tourism industry in 2018 (SWRC 2018[7778]; S4W 2017). In comparison, tourism is only linked to 12% of employment in Devon and Dorset and 9% in Somerset. Cornwall's tourism season is also thought to be extending, with a growing number of visitors outside of the summer period, which could see the value of the sector continue to grow. High visitor numbers come with inevitable challenges for the local infrastructure and services, as well as placing pressure on the natural environment. Notably, Cornwall Council has already acknowledged that any growth of the tourism industry is reliant on natural capital, highlight that *"*improvements to the status of Cornwall's natural and historic marine environment will enhance tourism and leisure activities whilst also improving awareness and understanding*" (Cornwall Council 2012[79]).* The Council's position provides a strong basis for investment in the natural capital assets of the coastal corridor as a means to invest in the future growth and resilience of the tourism sector[80]). However, thus far major tourism investment projects in the coastal corridor have focused on cultural heritage (SWCP 2016[81]).

Total value of Tourism to Cornwall's Economy	£1,951,266,000
Staying plus day visitor spend plus other tourism spend	
Total Employment (Actual)	54,452
Direct Employment (Actual)	36,570
Indirect/Induced Employment (Actual)	17,882
**3 year rolling average (2015-2017)*	
Total Employment FTE	40,629
Direct Employment (FTE 's)	24,943
Indirect/Induced Employment (FTE 's)	15,686
% Of All Employment	21%
As a % of all employment in area.	
Estimated contribution to Cornwall's GVA	£1,555,867,333
Total tourism supported business turnover	£2,792,910,333

Table 17. The Value of tourism for Cornwall (Source: SWRC 2018)

[71] *Cornwall Council (2012) A future for maritime Cornwall: The Cornwall Maritime Strategy 2012-2030, Annex: background information 2, https://www.cornwall.gov.uk/media/3623049/Annex-background-information-2-.pdf*

[72] *Cornwall Council (2011) Tourism Issues Paper, Core Strategy Evidence Papers, Cornwall Council Planning Department, https://www.cornwall.gov.uk/media/3639137/Tourism.pdf*

[73] *Visit Cornwall (2017) Value of Tourism in Cornwall 2017, The SW Research Company.*

[74] *Visit Cornwall and Cornwall Council (2014) Cornwall's Visitor Economy Strategy 2014-2020, Consultation Document, https://www.visitcornwall.com/sites/default/files/generic_files/Cornwall%20Visitor%20Economy%202014-20%20Consultation.pdf*

[75] *S4W (2017) Economic and Social Impacts of EEA Area Workers in Cornwall and the Isles of Scilly, Research Report, Cornwall Council and the Cornwall and Isles of Scilly Local Enterprise Partnership Cornwall Council, https://www.cioslep.com/assets/file/Economic%20and%20Social%20Impacts%20of%20EEA%20Area%20Workers%20on%20Cornwall%20and%20the%20Isle.pdf*

[76] *ONS (2013) ONS Regional Tourism Ratios https://www.ons.gov.uk/peoplepopulationandcommunity/leisureandtourism/articles/theregionalvalueoftourismintheuk/2013*

[77] *Tourism Ratio at the Sub-regional level in the UK 2013 (top 15) Source: UK TSA (2013) ONS IO & SUIT 2013: Annual Business Survey 2013, GB Day Visits Survey 2013; GB Tourism survey 2013; International passenger survey 2013*

[78] *SW Research Company Ltd and Visit Cornwall (2018) The economic impact of Cornwall's Visitor Economy 2017; Cornwall Annual Population Survey (2016) employment in Tourism; Cornwall Futures Group (2017) A Catalyst for Change – Implications, Risk and Opportunities of Brexit for Cornwall and the Isles of Scilly, CloS Futures Group, January 2017 https://www.cornwall.gov.uk/media/24227365/catalyst-for-change-brexit-report.pdf*

[79] *Cornwall Council (2012) A future for maritime Cornwall: The Cornwall Maritime Strategy 2012-2030, Annex: background information, https://www.cornwall.gov.uk/media/3623049/Annex-background-information-2-.pdf*

[80] *Science and Policy Integration for Coastal System Assessment. http://www.spicosa.eu/index.htm*

[81] *https://www.southwestcoastpath.org.uk/media/uploads/swcp_year_5_analysis_summary_-_key_findings.pdf*

3 year rolling average 2015-2017	Trips	Estimated Spend
Combined Day Trips and Staying Visits	19,061,000	£1,889,020,333
Day-visits	14,391,333	£505,130,333
Staying visits (UK and Overseas visitors)	4,669,667	£1,383,890,000

Table 18. Tourism visitor numbers and spend in Cornwall (Source: SWRC 2018)

Tourism and the coastal corridor

Tourism is a main driver of the Cornish economy[82], it is also a sector which is "*inextricably linked to Cornwall's unique environment, including its coastline and cultural heritage*" (Cornwall Council 2012). Cornwall's coastal setting is often referred to as the main draw for tourists, alongside its maritime and cultural heritage. Therefore, the strength of the tourism industry can be considered heavily reliant on the quality of its natural maritime environment, characterised by its long and varied coastline of coves and dramatic cliffs, accessible sandy beaches and dunes, inshore waters and traditional fishing villages and harbours (Cornwall Council 2012).

Given the '*inextricable*' connection between tourism and Cornwall's coastal geography, it is difficult to try to extract the value of the coastal corridor from the wider value of the tourism sector. Indeed, the significance of the coastal corridor for the Cornish tourism sector has never been formally reviewed. However, there are a number of existing studies which provide some estimates of the value of the features of the tourism industry which lie within the coastal corridor, including studies of the economic value of the SW coastal path and the marine leisure industry. The figures reported in the following paragraphs should, however, be acknowledged as likely to be an underestimate of the wider value of the coastal corridor for the Cornish tourism sector.

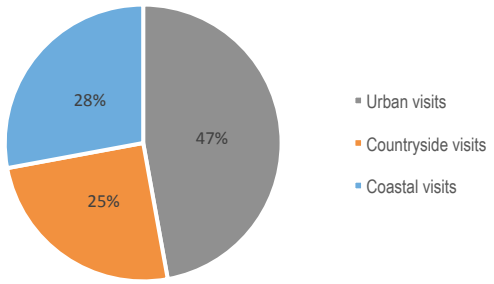
Tourist sites

Out of a total of 1,185 spatial features linked directly to the tourism sector (including YHA, hotels, campsites, tourist attractions, beaches, nature reserves, historic sites and monuments, country houses, covers, holiday cottages, museums etc.), 52.9% [628] lie within or intersect the coastal corridor.

Visitor Numbers

A number of approaches can be used to try to estimate the number of visitors to the coastal corridor.

Firstly, estimates of visits to Cornwall's coastal areas can be made using data collected under the GB Day Visit Survey (GBDV[83]). The GBDV records the number of days visits to different locations including urban, countryside and coastal visits. In Cornwall, an estimated 28% of day trips were thought to be to coastal areas (SWRC 2016[84]). Based on the assumption that any visit to a coastal area can also be counted as a visit to the coastal corridor, these figures suggest that there are at least 5.337 million coastal visits per year[85] in Cornwall (SWRC 2018[86]; Table 19).



Graph 4. Proportion of Tourism Visits to urban, countryside and coastal areas (SWRC 2016)

In 2016 the SW Research Company estimated visitor numbers specifically for the SW Coastal Path, which runs through the coastal corridor. Visitor estimates were based on a face-to-face survey alongside analysis of three national tourism surveys: Great Britain Tourism Survey, Great Britain Day Visits Survey and the International Passenger Survey. The SWRC (2016) worked to refine visitor estimates to try and capture visits solely to the coastal areas but not including beaches (i.e. above MHW). The SWRC defined a visit to the coastal path as *"any visit to an 'other coastline area' as opposed to a beach, resort or town for leisure purposes and in line with the day visitor definition*" (SWRC 2016). As this definition is focused on coastal areas excluding beaches but not adjacent coastal areas it also broadly fits with the definition of the coastal corridor when the values for Cornwall alone are extracted. The estimates made by the SWRC (3026) suggests that the coastal corridor received around 2,260,995 visitors per year (based on average visitor numbers 2010-2015) (Table 19).

[82] *Cornwall Council (2012) Economy and Culture Strategy Evidence Base - https://www.cornwall.gov.uk/media/3624007/Economy-and-Culture-Strategy-Evidence-Base.pdf*
[83] *GBDV https://www.visitbritain.org/gb-tourism-survey-2018-overview*
[84] *There is no accompanying figure for staying visitors and therefore the figures for staying visitors are assumed to be the same as day trips.*
[85] *Please note that this data excludes regular non-tourism related residential use such as dog walking).*
[86] *28% of total visits using a three year rolling average 19 million visits.*

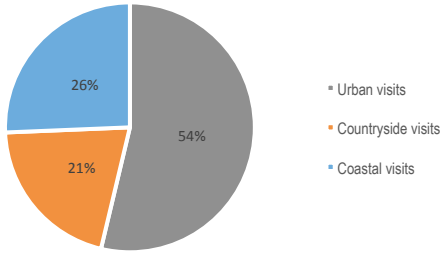
	2010	2011	2012	2013	2014	2015
Total coastal staying visitors	703,010	680,839	658,815	672,004	647,800	740,625
Total day visitors on holiday	402,303	579,340	551,452	576,433	575,209	547,184
Total day visits from home	990,273	985,006	1,044,680	1,070,940	1,083,680	1,056,380
Total SWCP users	**2,095,586**	**2,245,186**	**2,254,947**	**2,319,377**	**2,306,689**	**2,344,189**

Table 19. SWCP visitor numbers (SWRC 2016)

The SWRC (2016) provides one estimate of the visitor numbers to the coastal corridor, however, it is acknowledged as likely to be an underestimate (see the start of section). In comparison additional surveys completed by the SWRC (2016) have suggested that (i) 52% of visitors are likely to walk cliffs and headlands during a visit (9.911 million), and (ii) up to 78% of visitors planned to or had already visited coastal areas (14.48 million) (SWRC 2016). While another observation is that for 12% of visitors (2.28 million) walking in the coastal corridor is the sole reason for their visit.

Visitor Spend

Visitor spend for the coastal corridor can be extrapolated from estimated visitor numbers, as set out in the previous section, combined with data from the GB Day Visit Survey and the Value of Tourism Survey. Spend in coastal areas is estimated to be around £666 million per year (including day trip and staying visitors) (SWRC 2016). Looking solely at other coastal areas, excluding beaches, average annual visitor spend is estimated to be £178 million per year (2010-2015) equating to on average 10% of the total visitor spend in Cornwall and 26% of total coastal spend (SWRC 2016).



Graph 5. Average annual visitor spend by location (Source: SWRC 2018, Average 2017-2011)

Day and Staying Visitor Spending in Coastal Areas (2015-2017 average)	
Coastal day visit spend	£ 128,624,143
Coastal/ non-coastal staying visitor non-accommodation spend in to coastal areas	£ 402,685,862
Coastal staying visits accommodation spend	£ 135,678,400
Estimated Total Spend in coastal areas (staying and day visitors)	£ 666,988,405

Table 20. Day and staying visitor spend in coastal areas (SWRC 2016)

	2010	*2011*	*2012*	*2013*	*2014*	*2015*
Total Spend by SWCP users	£157,959,312	£182,321,476	172,683,102	£184,900,715	£178,902,887	£194,373,901
Total Visitor Spend by county area	£1,580,660,971	£1,821,290,418	£1,765,711,000	£1,804,229,000	£1,754,663,000	£1,865,190,000
	10.0%	10.0%	9.8%	10.2%	10.2%	10.4%

Table 21. Visitor spend for the coastal path (SWRC 2016)

3.04.02 Agricultural Production and Food Processing

Although the value of agriculture production as a proportion of Cornwall's economic output has declined since the 1990s, Cornwall's economy is still more reliant on agricultural production and food processing (hereafter agri-food) than much of the rest of the UK. Nationally, 3% of the UK's Gross Value Added (GVA) is generated through the agri-food sector, while in Cornwall this rises to 6% of GVA (Cornwall Council and CIOS Futures Group 2017[87]). Agricultural production alone is thought to be worth around £217-224 million to the Cornish economy, 2.3% of total GVA (Cornwall Council and CIOS Futures Group 2017). Food-processing accounts for another £248 million, or 2.6% GVA. Collectively the agri-food sector is estimated to employ, directly and indirectly, around 30% of Cornwall's workforce, twice the UK average [15%] (Cornwall Council and CIOS Futures Group 2017). Agriculture is also the largest industry in the County in terms of business numbers (enterprise counts), with an estimated 4535 commercial farm holdings across

[87] *Cornwall Council and CIOS Futures Group (2017) https://www.cornwall.gov.uk/media/30280220/cornwall-council-and-cios-fg_brexit-and-local-government-inquiry-3-2.pdf*

Cornwall (Defra June Survey 2018). The agri-food sector is not only important to the rural economy but more widely to the Cornish economy, through services employment and the purchase of other goods and services in the supply chain economies (Cornwall Futures Group 2017). Enterprises involved in agri-food are widely distributed across Cornwall, however, there is some notable concentration, with two-thirds of all employment in agri-food located in Bodmin, Callington, Illogan, Launceston, Lostwithiel, and St Austell.

Agricultural production

- *The percentage area of agricultural land in the coastal corridor [64%] is notably lower than the percentage area for the rest of Cornwall [76%], this difference reflects the higher areas of urban/suburban and coastal habitats within the corridor and lower area of improved grassland [-26%].*
- *One-third [34%] of Cornwall's best and most versatile agricultural land (grade 1 or 2) lies within the coastal corridor, with the majority found along the southern section of the peninsula.*
- *The coastal corridor is of particular importance for arable and horticultural farm types. Arable and horticultural farm types generate approximately 35% of Cornwall's total agricultural production output (Defra 2018[88]). An estimated 25% of Cornwall's total area of arable and horticultural lands fall within the coastal corridor.*
- *Approximately 372 farms have land intersecting, within or close to the coastal corridor, 8.2% of the total estimated farms in Cornwall. This is an overestimate of the actual number within the corridor (Cumulus Consulting 2017[89]).*
- *Farms with land intersecting the coastal corridor are estimated to benefit from a total CAP basic payment (BPS) contribution of £9,723,000 per year (Cumulus Consulting 2017). The vast majority [99%] of land claimed is non-SDA (Severely Disadvantaged Area), i.e. 'lowland'. BPS equates to an average payment of £241/ha in the coastal corridor, higher than the average for the whole of the SW coastal strip £199.52/ha (Cumulus Consulting 2017).*
- *There are an estimated 253 AES agreement holders with land intersecting the coastal corridor (Countryside Stewardship [CS] and Environmental Stewardship [ES], combined), including approximately 60 CS agreement holders and 193 ES agreement holders. AES agreements cover a total area of some 13,916 ha of the coastal corridor, with a total annual value to agreement holders of £1.597 million, with an average payment of £115/per ha. Cumulus Consulting (2017) found that, in comparison to other areas in the SW coastal corridor, Cornwall benefits from the highest total annual cost (payment), although Dorset has the highest unit annual cost (payment per ha).*

DEFRA's annual farm census[90] provides a detailed picture of holding size, farm types, crop types and areas, livestock number and areas, and farm management for Cornwall. As shown in Table 22, an estimated 274,959 ha of land in Cornwall is thought to be farmed, roughly 74% of Cornwall's total land area (Defra 2018). The majority of farmland in Cornwall is classed as grazing farmland [68%] with a much smaller percentage area devoted to cereal farming [13%], arable and horticultural uses [7%]. The economic output of the agricultural industry in Cornwall is dominated by grazing livestock [65%] including, dairy [30%] and livestock production [29%]. The main dairy purchasers include Milk Link and Dairy Crest. Livestock production largely consists of beef farming [23%], with more limited contribution from pig, sheep and poultry sectors. Notably, Cornwall is considered the second most important area in the UK in terms of quality grazing land, and in the top ten areas in Europe for grazing pasture (Cornwall Council 2012[91]). However, the number of livestock is on a long-term downward trend, and cattle are increasingly concentrated in a few larger herds. Horticulture, including plant and flower production, makes up 17.1% of economic output of the agricultural sector.

Cornwall	Area (ha)	
Total Farmed area	274,959	
%		
Cereals	35851	13%
Arable crops (excl cereals)	16641	6%
Fruit and vegetables	2642	1%
Grassland	187915	68%

Table 22. Cornwall farmed area by farm type (Source: Defra (2016) June agri-census survey)

[88] *Defra June Survey (2018)*
[89] *Cumulus Consulting (2017) The potential impacts of Brexit on the SW Coast land the implications for future agricultural policy, Internal report for the National Trust, unpublished.*
[90] https://www.gov.uk/government/statistical-data-sets/structure-of-the-agricultural-industry-in-england-and-the-uk-at-june
[91] *Cornwall Council (2012) Agriculture and food issues paper:* https://www.cornwall.gov.uk/media/3638076/Agriculture-and-Food.pdf

	Cornwall	England
Total	% of total number (4571)	
< 20 ha	39%	38%
20 to 100 ha	44%	38%
> 100 hectares or more	17%	24%
		% of total Farmed area
< 20 ha	6%	4%
20 to 100 ha	38%	22%
> 100 hectares or more	56%	74%
		% land use
Grazing livestock	50%	42%
General cropping	17%	17%
Dairy	9%	6%
Livestock Numbers		
Cattle		323,146
Dairy		38%
Beef		32%
Sheep		506,588
Pigs		53,243
Poultry		1,131,335
Total % Output		
Total agricultural output	£477 million	
Livestock	£311 million	(65%)
Crop	£166 million	(35%)
Milk	£143 million	(30%)
Cattle	£109 million	(22.8%)
Plants and flowers	£54 million	(11.3%)
Sheep and goats	£30 million	(6.2%)
Fresh vegetables	£27 million	(5.8%)

Table 23. Cornwall farmland statistics (Source: Defra June Survey 2016 [Eurostat, Economic accounts for agriculture by NUTS 2 regions])

Variations in geography, soils, land ownership and climate, result in differences in the characteristics of the agricultural sector across Cornwall. In general, the North coast of Cornwall is less productive with agriculturally poorer areas, heavy soils (e.g. around Bude), small scale farming predominates in the North coastal plain that is linked to less productive and more exposed land, with a greater likelihood of independent farmers rather than estate land (Cornwall Council[92]). There is a greater amount of pastoral farming around West Penwith, along with important horticultural areas. The South coast is generally more productive, with a greater amount of good mixed farming/grain land and extensive areas of rough grazing around the Lizard. The land between Helston and St Austell sees the dominance of larger farmers, wealthier estates, productive and sheltered lands. Similar characteristics to the Helston and St Austell stretch exist on the coastal corridor between St Austell and Plymouth with productive and shelter areas, but with a higher number of larger farms, and arable based farms, and many farms linked to 4-5 main estates.

Agricultural production in the coastal corridor

Coastal agriculture and food production are important to the local economy, particularly due to the growing emphasis on local and niche products, including Cornish branded products, e.g. Dairy Crest's Davidstow brand. An estimated 64% [41,377 ha] of the coastal corridor is under commercial agricultural use[93] (Table 24). The percentage cover of agricultural land in the coastal corridor is 12% lower than the percentage area in the rest of Cornwall [76%] (Table 24), and this difference reflects the higher areas of urban/suburban and coastal habitats within the corridor. However, compared to the rest of Cornwall, the coastal corridor contains a notably high percentage cover of arable and horticulture areas (+14%) and a much lower percentage cover of improved grassland (-26%). For the farming sector, the coastal corridor is likely to be of particular importance in terms of its contribution to the arable and horticultural farm types, which generate 35% of the Cornish farming total industry's output.

[92] *Cornwall Council, Cornwall Farmstead Character Statement; https://www.cornwall.gov.uk/media/28925561/cornwall-farmsteads-character-statement2_red.pdf*
[93] *Classed as arable and horticulture or improved grassland under the LCM (2015).*

Land Cover Map Land Type	Coastal Corridor		Rest of Cornwall		Cornwall		CC as % of Cornwall
	Area (ha)	% total area	Area (ha)	% total area	Area (ha)	% total area	
Enclosed Grassland	41376.8	64%	226649.2	75.7%	268026.0	73.6%	15%
Arable and Horticulture	25055.6	38.6%	73564.3	24.6%	98619.9	27.1%	25.4%
Improved Grassland	16321.2	25.2%	153084.9	51.1%	169406.1	46.5%	9.6%

Table 24. Agricultural areas or farmed areas types in the coastal corridor (Source: CEH 2015, Land Cover Map)

Spatially, the importance of certain areas for agricultural production can be indicated through assessing the quality of agricultural land an area contains. Agricultural land quality is classed from Grade 1 (best and most versatile) to Grade 5 (land with very severe limitations which restrict use). Much like the rest of Cornwall, average or lower grade agricultural land is the norm in the coastal corridor, with Grade 3-5 land covering the vast majority [74.5%] of the coastal corridor. However, the coastal corridor contains an estimated 34% [9,885ha] of Cornwall's best and most versatile agricultural land (Grade 1 or 2). The concentration of high-quality agricultural land in the coastal corridor is linked to the productive sheltered lands along the south coast, which contain large areas of grade 2 land. Based on average UK agricultural land prices the coastal corridor has an estimated total land market price, as agricultural land, of between £698 - 1,037 million.

AGRICULTURAL GRADE LAND	Coastal Corridor		Rest of Cornwall		Cornwall		CC as % of Cornwall
	Area (ha)	% total	Area (ha)	% total	Area (ha)	% total	
Grade 1	116	0.2%	777	0.3%	893	0.3%	13%
Grade 2	9769	16.1%	18340	6.3%	28109	8.0%	35%
Grade 3	37362	61.5%	178017	61.1%	215379	61.1%	17%
Grade 4	6654	11.0%	60574	20.8%	67228	19.1%	10%
Grade 5	1184	2.0%	22119	7.6%	23304	6.6%	5%
Non-Agri	2309	3.8%	8895	3.1%	11204	3.2%	21%
Urban	3311	5.5%	2804	1.0%	6115	1.7%	54%
TOTAL AGRI GRADE	55086		279827		334913		16%
Grade 1 and 2	16.3%		6.6%,		8.2%,		
Grade 3, 4, and 5	74.5%		93.4%		86.9%		

Table 25. Agricultural Grade Land in Cornwall and the coastal corridor (Source: Natural England (2019) Provisional Agricultural Grade Land Classification Maps[94])

	Average £ per ha[95]	Area within the coastal corridor (ha)	Total Estimate £
All Agri Grade land	£ 16,882[96]	41377 ha	£ 698,545,133
	Average £ per ha	**Area within the coastal corridor (ha)**	**Total Estimate £**
Grade 1 or 2[97]	£ 22,230	9885	£ 219,743,550
Grade 3	£ 18,525	37362	£ 692,131,050
Grade 4 or 5	£ 12,350	10147	£ 125,315,450
Total			£1,037,190,050

Table 26. Agricultural Grade Land value estimates for the coastal corridor (Source: Savills 2017, 2018; Knight France 2018)

Estimates of the economic significance of agricultural areas within the coastal corridor can also be gauged using estimates of Farm Business Income (FBI). FBI attempts to measure the net profit made by farmers and acts as the main farm level measure of farming income (productivity) (Redman 2018[98]). Specifically, FBI is a measure of the financial return to all unpaid labour (farmers and spouses, non-principal partners and their spouses and family workers) and on all their capital invested in the farm business, including land and buildings or for corporate businesses it represents the financial return on the shareholders' capital invested in the farm business (Redman 2018). FBI per ha varies considerably annually, see Graph 6, and for different farm types. Using FBI is likely to overestimate net profit, as different farm types have different per ha incomes. Average FBI for the SW between 2008/09 and 2014/15 was £323 per ha per annum, compared to an average for England of £338 per ha per annum. Using estimates of average FBI income per ha for the SW (Duchy College 2016[99]) suggests that farming productivity in the coastal corridor could generate up to an estimated £13.36 million in net profit for farmer per annum[100], roughly 15% of total FBI in Cornwall. However, an estimated 67% (or 7.628 million per annum) of this farm income is thought to derive from direct payments (Duchy College 2016).

[94] *Natural England (2019) https://data.gov.uk/dataset/952421ec-da63-4569-817d-4d6399df40a1/provisional-agricultural-land-classification-alc*

[95] *Average agricultural land price is estimated from Knight Frank Farmland Index (2018) https://content.knightfrank.com/research/157/documents/en/english-farmland-index-q1-2019-6317.pdf; Savills 2018 Farmland Market Report (2018) https://www.savills.co.uk/research_articles/229130/274008-0.*

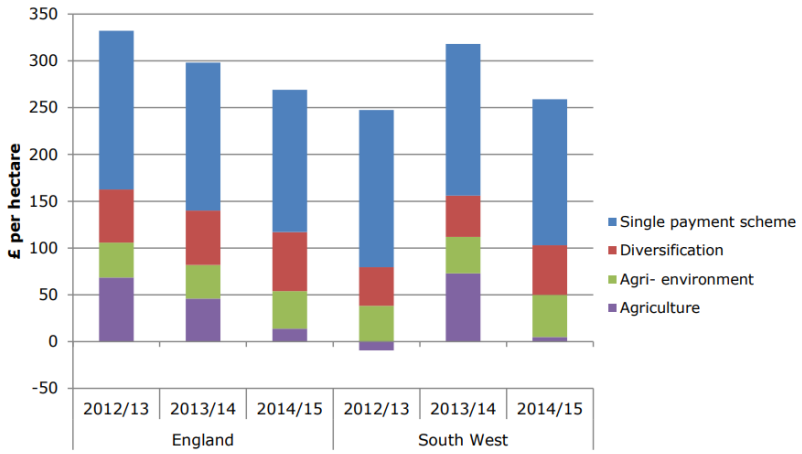
[96] *Average £6970 per acre (Knight Frank Farmland Index 2018); Savills (2018) £6970; Average value used £6835 per acres*

[97] *Average agricultural land price per grade is estimated from Savills (2017) https://www.savills.co.uk/research_articles/229130/228020-0*

[98] *Redman (2018) John Nix Pocketbook for farm management 2019, 49th Edition, Agro-Business Consultants, Melton Mowbray.*

[99] *Duchy College (2016) Farm Business Digest - Farm Business Survey https://www.ruralbusinessschool.org.uk/the-farm-business-survey/*

[100] *FBI calculation (area of agricultural land * average FBI for the SW (FBS 2012-2015 data))*

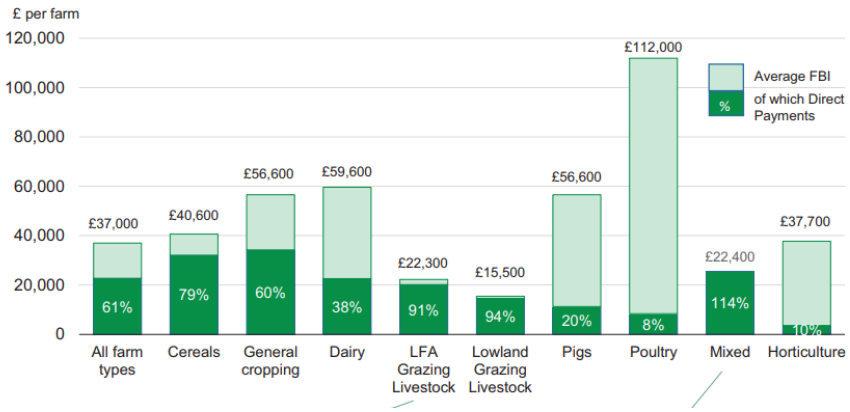


Graph 6. Farm Business Income per ha for England and the SW (Farm Business Survey, Farm Business Digest 2016, Duchy College)

Basic Payment and Agri-Environment Payments

EU payments including Common Agricultural Policy (CAP) Basic Payment (hereafter BPS) tend to form a large part of the profit of agricultural operations. In the SW, BPS is estimated to make up 67% of average Farm Business Income (FBI) (Duchy College 2018[101]), contributing on average around £20,000 per farm/annum. In comparison, across all farm types in England on average 61% of FBI is from BPS (2014/15 and 2016/17). In Cornwall, the average payment received by farms under BPS is thought to be slightly higher at £20,300 per farm/annum (FBS 2019[102]). Analysis by Cumulus Consulting (2017[103]) indicates there are approximately 372 farms with land intersecting, within or close to the coastal corridor. Between them, coastal farmers receive an estimated total BPS of £9,723,000 per year. The vast majority [99%] of land claimed is non-SDA (Severely Disadvantaged Area), i.e. 'lowland' for purposes of BPS. BPS equates to an average of £241/ha, higher than the average for the whole of the SW coastal strip £199.52/ha.

Some farm types are more reliant on BPS (Graph 7). The proportion of income received through BPS is likely to be higher for tenant farmers, an estimated 83% of income (Duchy College 2016). Grazing livestock and mixed farms are also thought to be more reliant on BPS. 19% of UK lowland grazing livestock farms and 22% of mixed farms made a loss including direct payment in 2015-2016, which rises to 53% and 55% respective without direct payments (Defra 2018[104]). Horticulture, pig and poultry farms are considered least likely to be negatively impacted by removal of direct payment. 29% of Cornish agricultural output is linked to lowland grazing livestock, which could mean that the Cornish farming industry is likely to be particularly influenced by changes to BPS under the new Agricultural Bill.



[101] https://www.ruralbusinessschool.org.uk/the-farm-business-survey/
[102] FBS (2019) http://www.farmbusinesssurvey.co.uk/
[103] Cumulus Consulting (2017) The potential impacts of Brexit on the SW Coast land the implications for future agricultural policy, Internal report for the National Trust, unpublished.
[104] Defra (2018) The Future Farming and Environment Evidence Compendium, Online Report, Available at; https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/683972/future-farming-environment-evidence.pdf

Graph 7. Average farm business income and the proportion that comes from Direct payments by 2016 farm type – based on - year matched data set 2014/15 to 2016/17 (Source: Defra 2018[105])

Agri-Environment Schemes, including Countryside Stewardship (CS) and Environmental Stewardship (ES) are estimated to be worth around £53 million to Cornish farmers between 2014-2020 (Cornwall Council 2018[106]). The income received through AES in Cornwall is notably lower than across the rest of the SW (FBS 2018). Farmers in Cornwall are thought to receive less on average through AES than the rest of the SW, with an average AES payment of £2000 per farm/annum compared to £5000 per farm/annum in the rest of the SW (Duchy College 2018). However, AES payments per ha in the coastal corridor are estimated to be similar to other counties (Cumulus Consulting 2017). In Cornwall, CS will deliver £1 million/annum to 225 agreement holders across Cornwall (on average £4,444 per annum/agreement holder), while ES will deliver £6.6 million per annum to 1,130 agreement holders (on average £5789 per annum/agreement holder). The Cornwall Futures Group (2018[107]) and Cornwall Council (2018[108]) suggest that the limited uptake of Countryside Stewardship (CS) is due to the limited land management options available, unattractive payment rates, a lack of appreciation of fit with the land management practice in Cornwall, and costs outweighing time taken to apply and manage CS contracts. There are an estimated 253 AES agreement holders with land intersecting the coastal corridor (CS and ES combined), including approximately 60 CS agreement holders and 193 ES agreement holders. AES agreements cover a total area of some 13,916 ha, with a total annual value to agreement holders of £1.597 million, with an average payment of £115/per ha. In comparison to other areas in the SW coastal corridor, Cumulus Consulting (2017) find that Cornwall benefits from the highest total annual cost (payment), although Dorset has the highest unit annual cost (payment per ha).

	No of agreements	Total Area (HA)	As % of total area	Total annual cost of agreements portioned with Coastal Corridor	Unit annual Cost of Agreement (£/ha)
Coastal Corridor	253	13,916	32.9%	£1,597,944	£115

Table 27. Agri-Environment Schemes in the Coastal Corridor (Cumulus Consulting 2017)

Horticulture and arable

The geography and climate of Cornwall give it a distinct advantage in horticultural production, with a longer and an earlier growing season than many parts of the UK. Within the SW, Cornwall is the largest producer of potatoes and brassicas. Cornwall also produces flowers, with daffodils being the most significant flower and flower-bulb crop. Notably, flower production has increased in Cornwall against a backdrop of declining production across England. Data on primary production in the horticulture sector is not readily available. Defra records just one crop per field per year, whereas in reality that same field may be used for growing two or more crops, particularly in Cornwall with the extended season. Crop maps therefore only provide a limited picture of crop types grown in the coastal corridor (e.g. CROME[109] or LCM 2017 plus Crop[110]).

Spatial data from the LCM 2017 Plus Crops map (CEH 2017), clipped to the coastal corridor, suggest that the crops covering the largest areas of the coastal corridor include spring barley, maize, winter wheat and oats and winter barley (Table 28). The profile of crops grown in the coastal corridor is similar to the rest of Cornwall. The value of these different crop types has been broadly estimated using average yield per ha, and average gross margins per ha (Redman 2018). Gross margins (GM) provide a measure of an enterprise's output less its variable costs. GMs are not, however, a profit figure as fixed costs or overheads have not been subtracted, and these still need to be covered before arriving at a profit figure. Fixed costs vary significantly based on farm structure, season, labour, machinery, rent, general overhead, soil, geography, climate etc, using a blanket fixed cost is therefore not advised by Redman (2018). Crops such as potatoes, maize and spring barley are thought to have higher average gross margins per ha, when combined with area under each crop type this suggests that spring barley, maize, winter wheat and oats and winter barley contribute the most in terms of agricultural productivity of crop areas. Based on GM per ha, the productivity of the crop areas in the coastal corridor is estimated to be between £8,952,847 and £17,905,694 per year, this range in value is given as the CEH crop map provides data on only one crop type per year whereas most fields will produce a secondary crop. Particularly high productivity crops for the CC include field beans, maize and spring barley, winter wheat and oats and other crops (i.e. rye, fruit, flowers, pea etc.), whilst for the rest of Cornwall potatoes, winter wheat and oats have a higher percentage share than in the coastal corridor.

[105] *Defra (2018) The Future Farming and Environment Evidence Compendium, Online Report, Available at;* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/683972/future-farming-environment-evidence.pdf
[106] https://www.cornwall.gov.uk/media/35785823/defra-consultation-final-submitted-response-4th-may-2018.pdf
[107] https://www.cornwall.gov.uk/media/24227365/catalyst-for-change-brexit-report.pdf
[108] https://www.cornwall.gov.uk/media/35807050/new-frontiers-2018_part_2.pdf
[109] *CROME Crop Map of England (2017)* https://data.gov.uk/dataset/e2f5de8d-a46e-4c8b-800d-3375cf19ad57/crop-map-of-england-crome-2017-north
[110] *CEH (2017) Land Cover Map Plus Crops 2017*

	Coastal corridor (Ha)		Cornwall (Ha)		Avg. yield tonnes per ha	CC Yield tonnes	Cornwall Yield tonnes	Avg. gross margins per ha	CC Agricultural productivity	Cornwall agri productivity
Field beans	275	2.6%	792	1.7%	4	1113	3209	£472	£129,706	£374,043
Maize	1442	13.8%	6374	13.5%	8	10818	47806	£884	£1,275,082	£5,634,677
Oilseed rape	314	3.0%	1094	2.3%	3	880	3062	£589	£185,123	£644,149
Other crops	3000	28.6%	13599	28.9%	7	22019	99815	£944	£2,831,906	£12,837,220
Potatoes	472	4.5%	2669	5.7%	45	21254	120087	£1534	£724,508	£4,093,640
Spring barley	2320	22.1%	9423	20.0%	6	13226	53710	£895	£2,076,758	£8,433,396
Spring Wheat	137	1.3%	713	1.5%	6	834	4349	£615	£84,071	£438,462
Winter barley	1195	11.4%	5227	11.1%	7	8124	35545	£592	£707,262	£3,094,494
Winter wheat & oats	1324	12.6%	7176	15.2%	7	9477	51381	£709	£938,432	£5,087,874
TOTAL	**10479**		**47067**			**87745**	**418964**		**£8,952,847**	**£40,637,955**

Table 28. Agricultural productivity of crops in the coastal corridor (Sources: Yield per tonne Defra 2017; Rural Business Survey; Defra June Survey, AHDC, Environmental Valuation Lookup Tool, Redman (2018)[111]

Grazing and Livestock

The coastal corridor has a considerably lower percentage cover of grazing areas (improved grassland) (25%) compared to the rest of Cornwall (51%). There is an estimated 78,000-79,000 livestock within the coastal corridor, including cattle and sheep. Livestock numbers were estimated based on the June Defra survey of total livestock numbers across Cornwall. Based on gross margin per ha, after forage costs, the agricultural productivity of livestock in the coastal is estimated to be around £14.45 million to £17.56 million per year[112], however, these figures have not been adjusted to account for fixed costs such as labour, rent etc.

Agri-food processing

The agri-food sector handles the secondary processing of agricultural products. 45% of Cornwall's manufacturing and wholesaling employment is in agri-food and drink processing, compared to only 21% in the UK. 3.2% of people in Cornwall are employed in the manufacture of food products and drinks in Cornwall, a higher proportion than across the SW (1.4%) and England (1.3%) (Cornwall Council 2012). In Cornwall, the agri-food industry is involved in the processing and preserving of meat, the production of meat products, the manufacture of bakery and flour-based products (confectionary) and the manufacture of dairy products (with one of the largest cheddar cheese production facilities in Europe). Dairy products have become more important in recent years (such as Davidstow Cheddar and Cathedral Cheddar). As a share of the economy, food and drink manufacturing contribute around 3% to Cornwall's GVA. The agri-food industry is reportedly increasingly interested in alternative energy sources and environmental sustainability (Lobley et al 2011). In 2017, there was an estimated 205[113] agri-food business across Cornwall (not including food services or hospitality) (Cornwall Futures Group 2017[114]), 24% of these businesses were involved in the production of confectionery, 15% breweries, and 7% meat processing.

The agri-food industry is spatially distributed across Cornwall with no identifiable concentration in the coastal corridor. Some of the major agri-business employers in Cornwall include Samworth Brothers, Dairy Crest, Milk link, Rodda's and FalFish. The beverage sector is wide-ranging (bottling water, microbreweries, large-scale breweries) (annual turnover of businesses range from £200,000 to £20m) (Lobley et al. 2011[115]). A number of major breweries operate across Cornwall, which have expanded over the last decade (Lobley et al. 2011). Major breweries including Skinners, Atlantic Brewing, Sharp's Brewery and St Austell Brewery. Many of Cornwall's breweries are located close to the coastal corridor, including 24% (8) within the coastal corridor, and 42% (14) within 4km of MHW (Appendix X). Many breweries have a notable focus on quality, and want to maintain their Cornish credentials for marketing purposes (Lobley et al. 2011).

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[111] *Source Yield per tonne: Defra 2017, State of Agriculture in the UK https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/741062/AUK-2017-18sep18.pdf Source: Gross Margins Rural Business Survey, Defra June Survey, AHDC, Environmental Valuation Lookup Tool Defra Av gross margins per ha: Redman (2018)*

[112] ***Cornwall** -; Improved grassland CUA = 169406.1 ha, SNGI: 14874 ha; Total number of cattle = 323,146; Total number of sheep = 506,588.CUA Stocking rate 4.5 per ha (sheep or cattle). CUA Total livestock 829734. **Coastal Corridor,** Improved grassland = 16321 ha; SNG = 766 ha'; Total grazing areas = 17087 ha; Total estimated cattle/sheep in the coastal corridor 78,891.5. (Stocking rate 4.5 per ha * 17087 ha). Gross margin per ha after forage costs: Dairy cows average (£2231); Beef: Suckler cowers: lowland (£149); Sheep; lowland spring lamb (grass) (£158); Total CC livestock: 78,891.5 (cattle 38%) (sheep 62%); Total CC cattle: 29,978 ; Total CC sheep: 48,913; Gross margin per ha after foraging cost (Grazing land equally divided between 3 livestock types); Dairy = 5695 ha * Dairy cows average (£2231); = £12,707,032; Beef = 5695 ha* Suckler cows: lowland (£149); = £848,555; Sheep = 5695 ha * lowland spring lamb (grass) (£158) = £899,810; Total Gross Margin - Livestock = £14,455,397 per year. Alternative approach* Assume all improved grassland is dairy/beef; all SNGI spring lowland lambs; Estimated population cattle 31,009.9 (stocking rate 1.9); Estimate population sheep 26,427 (stocking rate 34.5); Gross margin per head Lowland spring lamb (£21) £554,967; Dairy (£1014) = £15,721,563; Beef (£83) = £1286,873.5; Total = £17,563,403.5. Estimate value between 14.45 million and 17.56 million per year *All gross margins from Redman (2018)*

[113] *Out of date – 2017 figures Lobley et al. 2011.*

[114] https://www.cornwall.gov.uk/media/32528517/new-frontiers-2018.pdf; https://www.cornwall.gov.uk/media/24227365/catalyst-for-change-brexit-report.pdf

[115] *Lobley et al. (2011) A review of Cornwall's Agri-Food Industry: Final report, CRPR Research Report No 32, available at: https://socialsciences.exeter.ac.uk/media/universityofexeter/research/microsites/centreforruralpolicyresearch/pdfs/researchreports/Cornish_food_economy_final_report_FINAL.pdf*

3.03.03 Forestry

- *The Forestry Sector is relatively small in Cornwall, and the coastal corridor is not thought to be particularly significant for this sector. The coastal corridor contains only a very small proportion of coniferous woodlands in Cornwall, 200-400 ha (approx. 6%). However, there is an area of 352 ha of young trees planted in the coastal corridor, which represents an estimated 23% of the total area of young trees across Cornwall.*
- *Only one timber processing site lies within the coastal corridor, Cornish Wood Fuels, however Truro Sawmills lies close to the coastal corridor close to Perranporth.*
- *Between 1997 and 2016 there were 739 applications for a felling licence in Cornwall, covering an area of 3741 ha, these felling licence applications cover an area of 568 ha within the coastal corridor (15% of total felling licence area). Felling applications in the coastal corridor were mainly concentrated along the south coast, main locations of felling within the coastal corridor include (1) Lynher river/St German, (2) R.Tamar near Tremarn, (3) Cotehele Mill, (4) Trelawn/East Looe River, (5) Charlestown, (6) Tresillian, (7) Mawgan/Trelowarren, (8) Treworder Wood.*

Forestry is often a key component of rural economies. Many areas of woodland are still valued primarily on their timber value, as a raw resource for the creation of wood-based products or in terms of wood fuel for the generation of renewable heat and electricity. Agriculture, forestry and fishing is the largest industry group (by enterprise count) in Cornwall, however commercial forestry has not historically been a key part of this sector in Cornwall. At 9.57% the woodland cover in Cornwall is slightly below the percentage coverage for England [10%] and the UK cover [13%]. Much of Cornwall's woodland is thought to be owned and managed by the Forestry Commission (10%), National Trust, Cornwall Wildlife Trust, Cornwall Council, The Woodland Trust and the Duchy of Cornwall. The commercial plantation forestry in Cornwall is not concentrated in the coastal corridor but instead in the east around Bodmin Moor and along the A38 east of Bodmin. There are five timber processing sites in Cornwall including sawmill, fencing and pellet production (St Teath Sawmills, Branston, Truro Sawmills, Rawnsley Wood Products and Cornish Wood Fuel). These sites also process wood for wood fuel for the generation of renewable heat and electricity. Only one timber processing site lies within the coastal corridor, Cornish Wood Fuel, however Truro Sawmills lies close to the coastal corridor close to Perranporth. Notably, there is only a very small proportion of coniferous plantation within the coastal corridor, some 200-400 ha (depending on the data set used), compared to the 4000-5000 ha of coniferous woodland in the whole of Cornwall. Coniferous woodland in the coastal corridor accounts for only around 4-8% of total coniferous woodland in Cornwall. However, there is around 352 ha of young trees planted in the coastal corridor, which represents an estimated 23% of the total area of young trees across Cornwall.

Over half of the woodland in the SW is not thought to be in active management. Hölzinger and Laughlin (2016[116]) suggest that total harvesting levels across the AONB, which covers much of the coastal corridor, have not changed significantly between 1995 and 2015. There is no comprehensive map of commercially managed forestry nationally or regionally. Between 1997 and 2016 there were 739 applications for felling licences in Cornwall covering an area of 3741 ha, with applications covering an area of 568 ha made within the coastal corridor (15% of total felling licence area). Felling applications in the coastal corridor were mainly concentrated along the south coast, with main locations of felling including (1) Lynher river/St German, (2) R.Tamar near Tremarn, (3) Cotehele Mill, (4) Trelawn/East Looe River, (5) Charlestown, (6) Tresillian, (7) Mawgan/Trelowarren, and (8) Treworder Wood.

NFI	Cornwall CC		Cornwall UA		CC as % of total CUA area
	Area *ha	% total area	Area	% total area	
Assumed woodland	143	2.3%	572	1.7%	25%
Broadleaved	5,107	81.5%	23,669	71.7%	22%
Conifer	403	6.4%	5,104	15.5%	8%
Coppice	-	-	3	0.0%	-
Failed	-	-	67	0.2%	-
Felled	27	1.1%	736	2.2%	4%
Ground prep	66	0.5%	144	0.4%	46%
Low density	28	0.9%	153	0.5%	18%
Mixed mainly broadleaved	56	1.3%	472	1.4%	12%
Mixed mainly conifer	79	0.0%	506	1.5%	16%
Windblow	2	5.6%	8	0.0%	25%
Young trees	352	1.1%	1,563	4.7%	23%
TOTAL	6,263		32,996		18.9%

[116] *Hölzinger and Laughlin (2016) Cornwall Area of Outstanding Natural Beauty Natural Capital Assessment, Main Report, The Cornwall AONB Unit, Truro, https://static1.squarespace.com/static/54e6ffe7e4b0663b4a777e12/t/5892fb04725e25be04c61e3d/1486027528048/CAONB+NCA+Main+Report+Final+Feb+2017.pdf.*

Table 29. National Forest Inventory: the location and extent of all forests and woodlands (0.5 hectares and over) in the coastal corridor and Cornwall (Source Forestry Commission/Forest Research[117])

3.03.04 Fisheries and Aquaculture

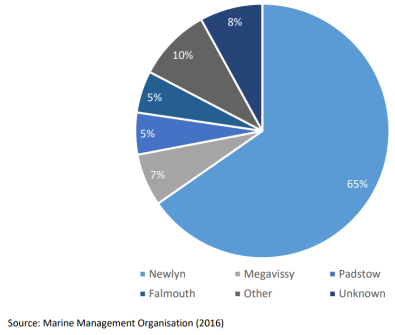
Fisheries

- *Total landed value of the fisheries sector in the Cornwall is approximately £23.5 million.*

Cornish fish stocks are diverse with a range of 40-50 commercial species, those species contributing the most value include monks or anglers, megrim, pollack, edible crab, cuttlefish and scallops (Cornwall Council 2012[118]). The commercial and recreational fishing industry plays a role in both the Cornish economy and the historic cultural identity of Cornwall's coastal villages, ports and harbour towns (**ibid*). The main commercial fishing centre in Cornwall is in Newlyn, with 581 registered boats. Recreational angling is also of increasing economic importance to Cornwall, with links to the tourism industry. Most sections of Cornwall's fishing fleet are currently economically viable. However, many of the larger vessels face difficulties. The fleet is increasingly specialised, reducing the flexibility of vessels to fish for different species or use different gear types, and this means that vessels become less able to adapt to natural fluctuations in abundance of fish stocks. As much of Cornwall's catch is exported, the fisheries sector, similar to agriculture, is likely to be significantly impacted by Brexit, with areas of concern including demand for labour and business viability, future fisheries policies and subsidies, access to fishing grounds and stock quotas, environmental legislation and trade agreements.

Landing Port	Landed Weight (Tonnes)	Most Common Species	Total Landed Value (£) (2009)
Newlyn	7,120.76	Monks, Sole, Megrim, Scallops, Crab	**£17,243,104**
Looe	774.80	Lemon Sole, Monks, Scallops, Squid	**£1,788,242**
River Fal	809.73	Scallops, Anchovy, Monks	**£1,606,896**
Mevagissey	713.39	Pollack, Scallops, Mackerel	**£1,458,926**
Padstow	473.78	Lobsters, Crab, Turbot	**£1,438,771**
		TOTAL	**£23,535,939**

Table 30. Fish stocks, species and landing value in Cornwall (Source: Ports in Cornwall with highest value catch (2009) (Marine Management Organisation 2009))



Graph 8. Spread of fishing vessels of over 10m in length across Cornwall (Source: Cornwall Council 2016/Marine Management Organisation 2016)

Aquaculture

- *The aquaculture industry has a total landed value of £4.2 million. At some locations, the development of the aquaculture industry has also been directly influenced/constrained by the coastal corridor due to the dependency of aquaculture on pristine water quality. At present only 26% of estuaries and 44% of coastal areas are assessed as being of good ecological quality which limits the capacity of aquaculture to develop close to the coastal corridor.*

Cornwall's sheltered bays and estuaries provide ideal environments for aquaculture farming of a range of species. Globally, aquaculture is the fastest growing sector of the food production industry. The aquaculture industry encompasses a range of activities, from rope grown mussels to farmed fish. The Cornish aquaculture industry is relatively undeveloped but has grown over the last decade. The main aquaculture activities in Cornwall include shellfish/bivalve farming of mussels or oysters with estuaries or nearshore coastal waters. There is also a small amount of finfish farming, and lobster stocks (e.g. the National Lobster Hatchery). Some aquaculture sites are located close to the coastal corridor, including the Duchy of Cornwall Oyster farm situated on the Helford

[117] https://www.forestresearch.gov.uk/tools-and-resources/national-forest-inventory/
[118] Cornwall Council (2012) A future for maritime Cornwall: The Cornwall Maritime Strategy 2012-2030, Annex: Background Info https://www.cornwall.gov.uk/media/3623049/Annex-background-information-2-.pdf

River, St Austell Bay and the Fal, Helford and Fowey estuaries are the main sites of a Cornish rope-grown mussel industry (Westcountry Mussels of Fowey (Shellfish breed ground)), and the National Lobster Hatchery in Padstow, while the Cornish Seawood company are trial growing plants on ropes at another one of its sites, farther west at Porthallow.

At some locations, the development of the aquaculture industry has also been directly influenced/constrained by the coastal corridor due to the dependency of aquaculture on pristine water quality. At present only 26% of estuaries and 44% of coastal areas are assessed as being of good ecological quality (Cornwall Council 2015[119]) which limits the capacity of aquaculture to develop close to the coastal corridor. Indeed, fluctuating water quality poses issues for aquaculture particularly in estuaries and harbours, and this has led to decisions to move aquaculture off-shore, as water quality is often much higher in bays than in estuaries, linked to storm events.

3.03.05 Mining or Quarrying

- *According to the GeoIndex Onshore (2019), there are 50 active mines and quarries, 26% [13] of these are sited within or very close to the coastal corridor.*

Mining or quarrying has a raw Gross Value Added (GVA) to the Cornish economy of around £30 million per year (2010-2012 average). The Cornish mining industry is a key part of the Cornwall historic landscape and Cornish identity, although many mines are inland there are several important heritage mines in coastal locations, including the Port of Hayle, the St Just and St Agnes Mining Districts and Charlestown Harbour. Although the total number of jobs in mining and quarrying across Cornwall is relatively modest (just over 1000) it is five times more than is typical across the rest of England. At present, there are approximately 50 active mines and quarries across Cornwall (GeoIndex Onshore 2019[120]). The extraction of china clay continues to be of considerable importance: the larger works are in the St Austell district. Granite of high quality has been extracted from many Cornish quarries such as De Lank and Porthoustock. In 2017, plans were reported to extract lithium reserves from beneath Cornwall by Cornish Lithium, who had signed agreements to develop potential deposits. Thirteen currently active quarries and mines lie within or very close to the coastal corridor (26% of total). However, only 0.4% of the resident population of the coastal corridor is employed in mining or quarrying industries (ONS 2011).

Active Quarries or Mines	Quarry Type	Distance from MHW	Turnover
Yelland Wharf	Crushed Rock	0.3km	Unknown
Middle Dock	Marine Sand and Gravel	0.1 km	Unknown
Appledore Wharf	Marine Sand and Gravel	0.08 km	Unknown
Beam Quarry	Sandstone	6.9 km	Unknown
Trevillet Quarry	Slate	1.75 km	Unknown
Trebarwith road Rustic	Slate	2.52 km	Unknown
Trecarne Quarry	Slate	1.82 km	Unknown
Tynes Quarry	Slate	1.41 km	Unknown
Blue Hills Tin Streams	Tin	0.51 km	Unknown
Beacon Pit	Clay and Shale	0.72 km	Unknown
Lizard Workery	Serpentine	1.46 km	Unknown
West of England Quarry	Igneous and Metamorphic Rock	0.17 km	Unknown
Porthkerris Sea Salt Plant	Sea Salt	0.02 km	Unknown

Table 31. Active quarries or mines within or near the Coastal Corridor

3.03.06 Construction and Real Estate

- *The coastal corridor is a focal point for real estate development. Cornwall Site Allocations Development Plan Document (Allocations DPD) identifies where new housing and employment uses are planned. Based on the Site Allocation Development Plan, 36.4% of all 'allocation sites' (by area) lie within or intersect the coastal corridor. Based on estimated dwelling numbers for housing based allocations, 49.5% of allocated dwellings will be in sites which intersect or lie within the coastal corridor.*

The coastal corridor is a focal point for real estate development. 32-37% of the population of Cornwall is already thought to be resident in the coastal corridor, with predicted growth in population levels of 9.15% by 2030. Residential property prices within the coastal corridor are estimated to be around 27% higher than the average for the whole of Cornwall. Cornwall's Site Allocations Development Plan Document (Allocations DPD), published in 2017/early 2018, identifies where new real estate (housing development) and employment uses will be delivered in Cornwall. Planned site allocation shows that 36.4% of allocation sites lie

[119] *Cornwall Council (2015) Environmental Growth Strategy.*
[120] *GeoIndex Onshore (2019) http://mapapps2.bgs.ac.uk/geoindex/home.html?layer=BGSMinAM*

within or intersect the coastal corridor. Based on estimated dwelling numbers per site 49.5% of allocated dwellings will be in sites which intersect or lie within the coastal corridor.

Allocations	Coastal Corridor	Cornwall	CC % of total allocation
Estimated Site Area (ha)	*296*	*814*	*36.4%*
Estimated Dwelling numbers	*6,101*	*12,315*	*49.5%*

Table 32. Cornwall Site Allocation Spatial Plan and the coastal corridor (Source: Cornwall Council[121])

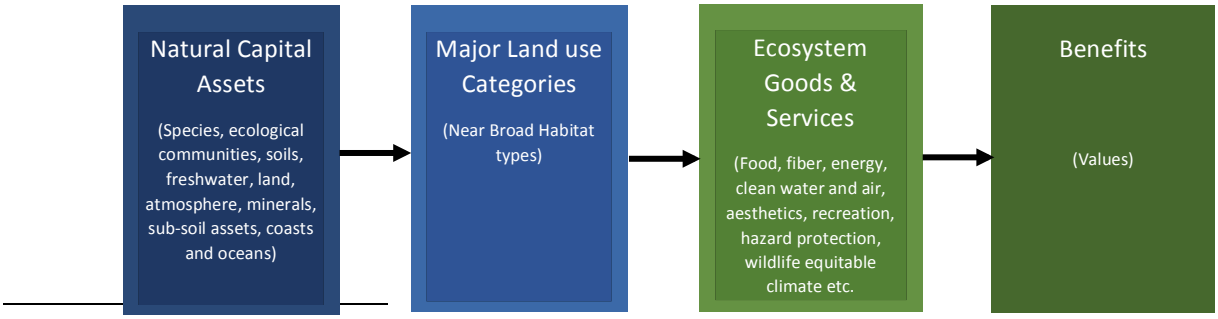
4. ENVIRONMENT CHARACTERISTICS

4.01 NATURAL CAPITAL

Natural Capital Assets are the elements of the natural environment which provide valuable ecosystem goods and services to people (see figure 1), including species, ecological communities, soils, freshwater, land, atmosphere, minerals, sub-soil assets, coasts and oceans (Natural Capital Committee 2013, 2014, 2019[122]). A natural capital asset register, or portfolio, provides an inventory of all of the natural capital assets present in an area, a means to understand the potential of an area to deliver flows of ecosystem goods and services and a baseline to inform the possible trade-offs (Natural Capital Committee 2015[123]).

Natural capital asset registers can be compiled using broad habitat types (land use categories) as proxies for ecosystems (Natural Capital Committee 2015[124]). Although using broad habitat types is a practical approach it must be acknowledged that it is also limited, as it does not measure the actually delivery of ecosystem goods and services (e.g. Burkhard et al., 2012[125]). The capacity of natural capital assets to deliver ecosystem goods and services is thought to be influenced by three key factors: (1) the extent or quantity (geographic area) of the asset, (2) its condition or quality, and (3) its spatial configuration (Natural Capital Committee 2015; Mace et a 2015[126]; See table 33).

To assess the natural capital assets present in the coastal corridor, the extent and type of broad habitats present has been estimated using the National Landscape Cover Map (CEH 2015[127]) (Table 34). Spatial data on the condition of broad habitat types is not widely available. Instead, monitoring data on the condition of Sites of Special Scientific Interest (SSSI) has been used as a proxy to provide some estimate of the condition of broad habitat types (Natural England 2019[128]). This use of SSSI condition data was justified by Mace et al. (2015) "*on the basis that, although targets for SSSIs are likely to be more stringent, equally their protected status should mean that there is greater emphasis on securing the right management. Overall, we would expect SSSI land to be in a better state than non-SSSI land in a similar habitat category, and hence, our assumption is likely to be conservative*" (Mace et al. 2015). Spatial configuration has been estimated from local and national reporting where available. Information on the extent, condition and spatial configuration has been assessed using the RAG (red, amber, green) criteria (see Table 34) in relation to national and local targets, and national and local trends (Mace et al. 2015).



[121] https://www.cornwall.gov.uk/media/21956015/dpd-whole-document-v2.pdf; https://www.cornwall.gov.uk/environment-and-planning/planning/planning-policy/examinations-201718/cornwall-site-allocations-dpd/cornwall-site-allocations-dpd-examination-position-statements/

[122] Natural Capital Committee https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/516698/ncc-state-natural-capital-second-report.pdf; https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774218/ncc-annual-report-2019.pdf

[123] Natural Capital Committee (2015) How to do it: a natural capital workbook, Version 1, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/608852/ncc-natural-capital-workbook.pdf

[124] Natural Capital Committee (2015) How to do it: a natural capital workbook, Version 1, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/608852/ncc-natural-capital-workbook.pdf

[125] Burkhard et al. (2012) Mapping ecosystem service supply, demand and budgets. Ecological Indicators 21: 17-29

[126] Mace et al. (2015) Towards a risk register for natural capital, Journal of Applied Ecology 52: 641-653. https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.12431

[127] CEH (2015) https://www.ceh.ac.uk/services/land-cover-map-2015

[128] Natural England (2019) Sites of Special Scientific Interest Units (England) Attribution statement: © Natural England copyright. Contains Ordnance Survey data © Crown copyright and database right [year]. Attribution statement: Attribution statement: © Natural England copyright. Contains Ordnance Survey data © Crown copyright and database right [year] https://data.gov.uk/dataset/c52ead19-47c2-473b-b087-0842157e00b6/sites-of-special-scientific-interest-units-england

Figure 1. A framework linking natural capital and benefits to people (Source: Natural Capital Committee, 2014, 34).

Type of Asset		What is it?	How will it be assessed
Stock of assets	Extent	How much?	GIS data (polygon/polyline). National Land Cover Map (CEH 2015). Expanding or decreasing
	Condition	What state is it in?	Categories and national or local targets (1) Biodiversity Strategy 2020 (2) 25-year Environment Plan. Improving or declining
	Spatial configuration	Where is it?	Local or national reporting on spatial configures of broad habitat types. Improving or declining

Table 33 Natural Capital Asset Assessment

		STATUS		
TREND		*Above, at or just below target*	*Below target (>10%<30%)*	*Substantially below target (>30%)*
	Positive or not discernible	*A*	*B*	*B*
	Negative	*B*	*B*	*C*
	Strongly negative	*C*	*C*	*C*

Table 34. Red, Amber, Green Key (A = Above at or just below target <10%; B = below target >10% to 40%; C = Substantially below target 40%) (Mace et al. 2015)

Natural Capital Assets in the coastal corridor

A wide range of semi-natural habitats, natural capital assets, are present across the coastal corridor. The coastline itself ranges from an extensive network of indented coves, long river estuaries and creeks, to exposed headlands, sheer cliffs and large sandy beaches. The nature of the coastline differs significantly between the north and south section of the peninsula. The northern Atlantic coastline is exposed to prevailing SW and NW winds, with sheer cliffs, steep valleys and extensive dunes, while the more sheltered southern coast, facing the English Channel, comprises of a series of tree-lined estuaries intersected with headlands, cliffs and sheltered beaches. Habitats along the Cornish coastline range from sand dunes to vegetated shines, beaches, saline lagoons, and salt-marshes. The coastline already forms an essential ecological network, with particular importance for migrant birds and shorebirds, and a significant area designated as Sites of Special Scientific Interest (SSSIs) and as an Area of Outstanding Natural Beauty (AONB). Moving inland from the coastline, the coastal corridor contains a range of habitats, from sheltered broadleaved wooded estuaries, to exposed coastal heathlands and semi-natural grassland, often with abrupt transitions into agriculturally improved grasslands, horticultural and arable areas, urban and suburban settlements.

In total, natural capital assets are estimated to cover 87% of the coastal corridor [56,300 ha]. Looking at the coastal corridor as a whole indicates that, in terms of percentage area, the vast majority of the corridor consists of enclosed grasslands, much like the rest of Cornwall. These enclosed agricultural grasslands, including arable and horticultural areas and improved grasslands, cover some 73% of all natural capital assets in the corridor and some 64% of the total area of the corridor. Only two other major natural capital assets groups cover significant percentage areas of the coastal corridor, woodlands (13%) and coastal margins (9%). All other habitats, including moors and heaths, semi-natural grasslands, fens, marshes and swamps, and freshwater habitats, have a percentage area under 5% of the coastal corridor. Comparing the coastal corridor to the rest of Cornwall shows that it has a notably lower proportion of enclosed grassland (agricultural areas) (-5%), and semi-natural grasslands (-4%), and a notably higher percentage are of woodlands (+3%) and, as to be expected, coastal margin habitats (+6%).

By area, 95% of natural capital assets in the coastal corridor consist of enclosed grasslands, woodlands and coastal margin habitats, these habitats are associated with the delivery of certain priority ecosystem goods and services. Woodlands have the potential to deliver the largest range of ecosystem services, however, coastal margins may provide the most valuable services through leisure and hazard and climate regulation, while by virtue of their extent enclosed grasslands have significant potential for improvement in ecosystem service delivery. In terms of condition, based on SSSI data for the SW, moors, heath and bog and enclosed grasslands have the lowest percentage area in favourable condition, closely followed by semi-natural grasslands (SNG) and fen, marsh and swamp, while freshwater habitats and coastal margins have the highest percentage area in favourable condition (Natural England

2019). Both moors and heaths and enclosed grassland habitats have suffered from both short and long term decrease in extent, while woodlands and freshwater habitats have seen gains in the short term (since 1995). A risk rating approach (assessed in Table 36 and sections 4.01.01 to 4.01.07) shows that enclosed grasslands are most at risk in terms of extent and condition, while woodlands, moors and heaths and coastal margins have performed the best. However, this assessment was performed with limited data on local and national extent changes and quantity targets which could change this assessment in the future, along with updated Natural England SSSI data expected in 2019/2020.

Broad Habitat Type	Coastal Corridor Area (Ha)	Coastal Corridor %	Rest of Cornwall %
Woodland	7,119	13%	10%
Enclosed Grassland	41,377	73%	79%
Semi-Natural Grassland	766	1%	5%
Moors or Heaths	1,826	3%	3%
Fen, Marsh or Swamp	27	0.01%	0.02%
Coastal Margins	5,124	9%	3%
Freshwater	81	0.1%	0.4%
TOTAL	**56,320**		

Table 35. Broad habitat types in the coastal corridor and the rest of Cornwall (Source: LCM CEH 2015)

	Condition		Extent	
	Favourable	Favourable and recovering	Short term (post-1995)	Long term (since the 1900s)
Moors and heath	19%	95%	Decrease	Decrease
Enclosed grasslands	20%	63%	Decrease	Decrease
Semi-Natural Grassland	38%	89%	Minor loss	Decrease
Fen, marsh or swamp	39%	75%	Minor Loss	Decrease
Woodlands	46%	92%	Gain	Increase
Freshwater	55%	68%	Gain	Decrease
Coastal margins	82%	95%	Stable/minor loss	Decrease

Table 36. Broad habitat types by condition and extent for the coastal corridor

Broad Habitat Type			
	Quantity	Quality	Spatial Configuration
Woodland	A	B	B
Enclosed Grassland	C	C	B
Semi-Natural Grassland	B	B	B
Moors or Heaths	B	A	B
Fen, Marsh or Swamp	B	C	B
Coastal Margins	B	A	B
Freshwater	B	C	B

Table 37. Broad habitats by risk rating for the coastal corridor (spatial configuration is largely unassessed)

4.01.01 Enclosed Farmlands and Grasslands

Enclosed farmlands and grasslands, including arable and horticultural areas and improved grassland, account for an estimated 73% of the area of natural capital assets in the coastal corridor [41377 ha], and 64% of the coastal corridor. The coastal corridor has a notably higher percentage area of arable and horticultural land than the rest of Cornwall (Table 35). Across Cornwall, the extent of enclosed farmlands and grasslands is thought to have declined between 1995 and 2005 by 1900 ha (ERCCIS 2009[129]). However, the Cornwall AONB (CAONB) Natural Capital Report (2015), which covers 65% of the coastal corridor, highlights a loss in the area of enclosed grassland of 365 ha between 1995 and 2005 (-0.7%) mainly due to afforestation.

The condition of enclosed grasslands across the SW is thought to be relatively poor with only just 63% in favourable or unfavourable but recovering condition, -55% departure from the 25-year environment plan target for 75% of enclosed grassland habitats to be in favourable condition by 2030 (Natural England 2019). Nationally, species indicators suggest that the capacity of enclosed farmland and grassland to support biodiversity has fallen considerably since the 1970s, with a 48% drop in the 19 specialist farmland birds recorded by the RSPB between 1970 and 2018 (RSPB 2019[130]). The NEA (2011) also records a national decline in the diversity of enclosed farmlands, including a reduction in the number of ponds, length of hedgerows and area of farm woodlands. However, there are 253 active AES agreements within or close to the coastal corridor, designed to improve the condition of 13,914 ha of enclosed grasslands in the coastal corridor (32.9%) for biodiversity and related ecosystem services benefits, with annual value to farmers of £115 per ha (See Section 3.04.02).

Enclosed grasslands and farmlands are linked to the provision of ecosystem services including food production. Across Cornwall, 6% of GVA is linked to the agri-food sector, while the coastal corridor contains one-third of Cornwall's best and most versatile (grade 1 or 2) agricultural land, with particular importance for arable and horticultural farm types. Enclosed grasslands not only deliver economic returns via agricultural production but also cultural services, including heritage, recreation and sense-of-place. However, focusing solely on the delivery of provisioning services has the potential negatively to affect a number of other ecosystem services, including the provision of clean water, habitat for wildlife, climate regulation and hazard protection (NEA 2011). Certain food production practices have also resulted in soil erosion and carbon loss, biodiversity loss and greenhouse gas emissions. Recent agricultural practices have also seen major declines in specialist farmland species[131]. Enclosed grasslands and farmlands already help to manage water quantity but this capacity could be further enhanced through changes in land-management practice and habitat creation. Changes in agricultural land management practices could also be used to enhance the potential to deliver services, including climate regulation, clean water, hazard regulation and supporting biodiversity.

Characteristic	Current Status	Target	Trend
Quantity	41,377 ha *60% arable and horticultural areas, 40% improved grassland (CEH 2015).*	No target	Between 1995 and 2005, the area of enclosed grassland in Cornwall declined by 1900 ha (ERCCIS 2009). The decline in enclosed grassland areas represents the largest land cover change across Cornwall recorded by the ERCCIS land cover change project (2009). The Cornwall AONB (CAONB) Natural Capital Report (2015), which covers 65% of the coastal corridor, highlights a loss in the area of enclosed grassland of 365 ha between 1995 and 2005 (-0.7%) mainly due to afforestation.
	B (Unknown)		C (Strongly Negative)
Quality	By area, 63% SSSI in this broad habitat type are classed as favourable/ unfavourable recovering (NE 2019). *43% unfavourable recovering; 20% favourable*	≥95% SSSI favourable/ recovering by 2020 (Biodiversity Strategy 2020) ≥75% of terrestrial and freshwater protected sites to favourable condition (25 Year Environment Plan 2018)	63% of enclosed grassland SSSI in the SW are in favourable or unfavourable recovering condition, -32% from the 2020 biodiversity strategy target. 20% are in favourable condition, -55% from the 25-year environment plan target. Nationally there has been an increase in agri-environment scheme (AES) and payments under CAP, AES payments per ha in the coastal corridor are estimated to be similar to other SW counties (Cumulus Consulting 2017). Nationally the numbers of specialist farmland birds had fallen to 40% of their 1970 levels in 2000, and they have fallen a further 4% since then (UK NEA, 2011). The arable farmland bird indicator shows that overall average change for the 19 species is a 48% decline since 1970 (RSPB 2019[132]).
	B (substantially below target)		C (strongly negative)

[129] *ERCCIS (2009) Land cover report*
https://www.google.com/search?q=ERCCIS+2009+land+cover+change&oq=ERCCIS+2009+land+cover+change&aqs=chrome..69i57.2973j0j4&sourceid=chrome&ie=UTF-8
[130] *RSPB Farmland Bird Indicator: https://www.rspb.org.uk/our-work/conservation/conservation-and-sustainability/farming/near-you/farmland-bird-indicator/*
[131] *The State of nature report highlighting that 60% of farmland species are now in decline*
[132] *RSPB Farmland Bird Indicator: https://www.rspb.org.uk/our-work/conservation/conservation-and-sustainability/farming/near-you/farmland-bird-indicator/*

Spatial Configuration	No quantitative evidence	No target	Some improvements in landscape diversity are likely to have been made by AES and set aside schemes. However, the area of enclosed grassland showed a decline which will have reduced overall spatial configuration.
	B (unknown)		A (not discernible)

Table 38 Enclosed Grassland and Farmland – risk assessment (Mace et al. 2015)

	Cornwall Coastal Corridor		Rest of Cornwall UA		Cornwall UA		CC % Cornwall
	Ha	% of total	Ha	% of total	Ha	% of total	
Enclosed farmland	**41377**	**64%**	**226649**	**76%**	**268026**	**74%**	**15%**
Arable and horticulture	25056	39%	73564	25%	98620	27%	25%
Improved Grassland	16321	25%	153085	51%	169406	47%	10%

Table 39 Enclosed grassland and Farmland Extent (CEH 2017)

	Destroyed	Favourable	Partially Destroyed	Unfavourable Declining	Unfavourable – No change	Unfavourable recovering	
Enclosed Grassland	0	85.9	0	124.7	35.2	185.9	
Arable and horticulture	0	58.5				109.5	167.9
Improved Grassland	0	27.4		124.7	35.2	76.4	263.6
%		20%	0%	29%	8%	43%	**431.5**
						Favourable/Unfavourable Recovering:	**63%**
						Unfavourable, Declining, Partially Destroyed or destroyed	**37%**

Table 40. Enclosed Grassland and Farmland Condition Assessment (Natural England 2019)

Enclosed grassland			
	Quantity	Quality	Spatial Configuration
Food	☑	☑	
Fibre			
Energy			
Clean Water	☑	☑	
Clean Air			
Recreation			
Aesthetics			
Hazard Protection		☑	
Wildlife	☑	☑	☑
Equable climate		☑	

Table 41. Priority Ecosystem services for enclosed grassland and farmlands (NEA 2011; Mace et al 2015)

4.01.02 Woodlands

An estimated 9.6% of Cornwall is covered by woodlands, slightly below the percentage coverage for England [10%] and the UK [13%]. In comparison, 11% of the coastal corridor is classed as woodland, a notably higher percentage cover than the rest of Cornwall [9.2%] (see section 3.04.02). As shown in Table 43, the vast majority of this woodland is broadleaved [97%], reflecting wider trends in the rest of Cornwall where 83.5% of woodlands are broadleaved. Woodlands in the coastal corridor comprise an estimated 1,472 ha of ancient and semi-natural woodlands, 21% of the total amount in Cornwall. Furthermore, 4,529ha are classed as priority habitats - deciduous woodlands. ERCCIS (2009) records a gain of approximately 1000ha of broadleaved and coniferous woodlands in Cornwall between 1995 and 2005. Furthermore, the National Forest Inventory (NFI) indicates a significant percentage of 'ground prep' in the coastal corridor, some 66ha prepared for woodland planting in the coastal corridor, along with 352 ha of 'young trees', suggesting that the area of woodland in the coastal corridor is likely to expand in the future. The majority of the coniferous woodland in Cornwall is in the east, including east of Bodmin, along the A38, on Bodmin Moor. Within the coastal corridor, there is a clear clustering of woodland occurring around the south coast of Cornwall, with concentrations in the Fowey, Tamar, Fal and Helford estuaries.

By area, 92% of woodland SSSIs in the SW are classed as 'favourable' or 'unfavourable-recovering', just 8% are 'unfavourable', 'partially destroyed' or 'destroyed' (Natural England 2019). Woodland SSSI in the SW are close to meeting national targets to achieve ≥95% in favourable/recovering condition by 2020 (Biodiversity Strategy 2020, 2010), but considerable progress still needs to be made to meet the 25-year environment plan (2018) targets of ≥75% in favourable condition (Table 44). Nationally, there was no significant change in species richness in broadleaved or coniferous woodland between 1998 and 2007 (Countryside Survey 2007). The State of Nature report shows a major decline in butterflies (SoNE, 2008[133]), while nationally ~10% of vascular woodland plants are threatened.

Of all the natural capital assets present in the coastal corridor, woodlands have the potential to deliver the widest range of ecosystem goods and services. Mace et al. (2015) identify functional priority relationships between woodlands and eight ecosystem services, including fibre, clean water, clean air, recreation, aesthetics, hazard protection, wildlife and equable climate.

Woodlands			
Characteristic	**Current Status**	**Target**	**Trend**
Quantity	11% of the coastal corridor is wooded (CEH 2015)	12% woodland cover by 2060 (Defra Forestry and Woodlands Policy Statement, 2013) 12% woodland cover by 2060 (25-year Environment Plan)	The coastal corridor has a greater percentage cover of woodlands than the rest of Cornwall. ERCCIS records a gain of approximately 1000ha of broadleaved and coniferous woodlands between 1995 and 2005. Locally there has been an increased in the total extent of woodlands across the CAONB area, and a recorded shift from coniferous to mixed and broadleaved woodland (-13% coniferous woodlands) between 1995 and 2005. Since 1945, the area of woodland has doubled to cover 12% of the UK (UK NEA, 2011). Total area of the UK covered by woodland increased by 0.3% 2010 -2011 (ONS, 2012). There has also been an increase in UK woodland BAP habitats.
	A (just below target)		A (positive)
Quality	By area, 92% of woodland SSSI in the SW are in favourable/favourable recovering condition. *46% favourable* *46% unfavourable recovering* (NE 2019)	≥95% SSSI favourable/ recovering by 2020 (Biodiversity Strategy 2020) 75% of terrestrial and freshwater protected sites to favourable condition (25 Year Environment Plan 2018)	92% of woodland are in favourable/recovering condition in the SW, close to achieving national targets to achieve 95% in favourable/recovering condition by 2020. Nationally, there was no significant change in species richness in broadleaved or coniferous woodland between 1998 and 2007 (Countryside Survey 2007). The Woodland Bird Survey – mixed (1980s-2003/4) and major declines in butterflies (SoNE, 2008). Nationally ~10% vascular woodland plants threatened (SoNE, 2008).
	A (just below target)		B (negative)

[133] http://publications.naturalengland.org.uk/publication/31043

Spatial Configuration	Low connectivity across landscape (UK NEA, 2011). Our woodland resource is highly fragmented (Biodiversity Strategy 2020). For CUA mostly concentrated along the south coast estuaries.	No target	Little or no overall change in the degree of connectivity for broadleaved, mixed and yew woodland nationally between 1990 and 2007. Over the same period there has been an increase in the area of broad-leaved woodland, which would tend to increase connectivity (JNCC Biodiversity Indicators, 2013).
	B (unknown)		A (positive or not discernible)

Table 42. Woodlands – risk assessment (Mace et al. 2015)

	Coastal Corridor		Rest of Cornwall		Cornwall		CC % of total Cornwall
	Ha	% of total	Ha	% of total	Ha	% of total	
Woodland	7119.7	11%	27547.5	9.20%	34667.2	9.5%	**10.4%**
Broadleaved	6954.2	10.73%	23101.8	7.71%	30056.0	8.2%	**8.2%**
Coniferous	165.5	0.26%	4445.8	1.48%	4611.3	1.3%	**2.1%**

Table 43. Woodland extent in the coastal corridor (CEH 2017)

	Destroyed	Partially Destroyed	Unfavourable Declining	Unfavourable – No change	Unfavourable recovering	Favourable	
Woodland							
Broadleaved, mixed and yew woodlands - Lowlands	0	2.2	334.9	674.1	5724.1	5025.3	**11760.6**
Broadleaved, mixed and yew woodlands - Uplands	0		50.7	201.2	2165.1	2051.5	**4468.4**
Coniferous woodlands	0		40.1		52.6	912.8	**1005.3**
%	**0%**	**0%**	**2%**	**5%**	**46%**	**46%**	
Favourable/Unfavourable Recovering:							**92%**
Unfavourable, Declining, Partially Destroyed or destroyed							**8%**

Table 44. Woodland condition in the coastal corridor (Natural England 2019)

Woodlands			
	Quantity	Quality	Spatial Configuration
Food			
Fibre	☑	☑	
Energy			
Clean Water	☑		☑
Clean Air	☑		
Recreation	☑		☑
Aesthetics	☑	☑	☑
Hazard Protection	☑		☑
Wildlife	☑	☑	☑
Equable climate	☑		

Table 45. Priority Ecosystem services linked woodlands (NEA 2011; Mace et al 2015)

4.01.03 Coastal Margins

Coastal margins cover 5124 ha of the coastal corridor, approximately 8% of the total area of the corridor. The coastline boundary used for the coastal corridor is mean high water which means that a significant percentage of coastal margin habitats lie outside of the study area. However, the coastal corridor still holds 60.2% of all saltmarsh habitats in Cornwall, 74.8% of Supra littoral Rock and 87.9% of Supra Littoral Sediment. ERCCIS (2009) suggest that the extent of coastal and dune grassland habitats has remained relatively unchanged for the last decade, with a recorded loss of 2 ha of sand dunes between 1995 and 2005 (ERCCIS 2009), and a marginal change of -4.8 ha in the mapped physical extent of the coastal margins in the CAONB (Holzinger and Laughlin 2016). However, nationally, coastal margin habitats have suffered long term declines, an estimated 16% since 1952 (NEA, 2011). Furthermore, sea level rise projections leading to coastal squeeze could see continued losses of coastal margin habitats.

By area, 95.2% of coastal margin SSSI are classed as in favourable or recovering condition, just 4.8% are classed as unfavourable or declining. Notably, the quality or condition of these coastal margin habitats, and therefore their capacity and potential to deliver ecosystem services, is likely to be reduced due to coastal squeeze, arising from both sea level rise, coastal development, artificial sea defences reducing the mobility, and biological interest of these habitats. Indeed the quality of coastal margin habitats has declined since 1945 due to changes in soft sediment supply (SoNE, 2008). However, national studies have shown that the average number of water birds wintering-in, or migrating through, marine areas in the UK has doubled between the mid-1970s and mid-1990s.

Coastal margin habitats, such as sand dunes, salt marsh, shingle, sea cliffs, coastal lagoons, lie at the interface between the land and sea directly providing ecosystem services to both adjacent terrestrial and marine habitats. Nationally the value of ecosystem services provided by UK coastal margins is estimated at £48 million, equivalent to 3.46% of Gross National Income (NEA 2011[134]). For Cornwall, the ecosystem services of the greatest financial value are thought to be tourism and coastal defence. All coastal margin habitats contribute to coastal defence services provided by dissipating wave energy (e.g. saltmarsh attenuating wave energy) or regulating sediment supply (e.g. sand dunes acting as a barrier) (NEA 2011). It is estimated that nationally "*The soft coasts provide £3.1–£33.2 billion worth of capital savings in sea-defence costs*" (NEA 2011:3). Cultural ecosystem services, such as scenery, wildlife and leisure, are intrinsically linked to a national seaside tourism industry valued at £17 billion and a local industry valued are around £1.95 billion per year to the Cornish economy (NEA 2011; SWRC 2018). Due to the capacity for rapid soil development and high sediment accumulation rates, coastal margins could also act as crucial carbon sinks. Finally, coastal margin habitats provide important habitats for many rare species, particularly migrant birds, and some can act as crucial nursery grounds for many fish species and also support pollinators vital to arable and horticultural production in adjacent fields.

Coastal margins			
Characteristic	**Current Status**	**Target**	**Trend**
Quantity	5124 ha, equating to 8% of the coastal corridor. 37% of all coastal margin habitats in Cornwall	No target	ERCCIS (2009) records only a loss of 2 ha of sand dunes between 1995 and 2005 and a marginal change of -4.8 ha in the mapped physical extent of the coastal margins in the CAONB suggesting that the extent of coastal and dune grassland habitats has remained virtually unchanged. However, nationally, coastal margin habitats have suffered long terms declines, an estimated 16% since 1952 (UK NEA, 2011). Sea level rise projections leading to coastal squeeze could see continue losses of coastal margin habitats.
	B (unknown)		B (negative)
Quality	By area, 95% of SSSI coastal margins are in favourable or recovering condition. *82% favourable. 12.9% recovering*	≥95% SSSI favourable/ recovering by 2020 (Biodiversity Strategy 2020) 75% of terrestrial and freshwater protected sites to favourable condition (25 Year Environment Plan 2018)	Meets national targets under the 2020 Biodiversity strategy. Meets 25-year environment targets for 74% in favourable condition by 2020. Nationally, the average number of water birds wintering in, or migrating through, marine areas in the UK has doubled between the mid-1970s - mid-1990s. However, some species of diving duck and estuarine wader have recently declined (SoNE, 2008). The quality of coastal margin habitats has declined since 1945 due to changes in soft sediment supply (SoNE, 2008). Coastal squeeze and reduce mobility due to development is likely to reduce quality in the future.
	A (close to target)		B (not discernible)
Spatial Configuration	Unknown	No target	Unknown
	B (unknown)		B (unknown)

Table 46. Coastal margins - Natural Capital Risk Assessment (Mace et al. 2015)

[134] *NEA (2011) Coastal Margins* http://uknea.unep-wcmc.org/LinkClick.aspx?fileticket=dNI5e5W5I5Q%3D&tabid=82

	Coastal Corridor		Rest of Cornwall		Cornwall		CC % of total Cornwall
	Ha	% of total	Ha	% of total	Ha	% of total	
Coastal	**5124.0**	**8%**	8562.7	2.86%	**13686.7**	**3.8%**	37%
Saltmarsh	*657.1*	*1.01%*	*433.6*	*0.14%*	1090.7	0.3%	60.2%
Saltwater	*31.7*	*0.05%*	*2804.8*	*0.94%*	2836.5	0.8%	1.1%
Supra-littoral Rock	*1523.8*	*2.35%*	*513.1*	*0.17%*	2036.9	0.6%	74.8%
Supra-littoral Sediment	*2090.3*	*3.22%*	*286.6*	*0.10%*	2376.9	0.7%	87.9%
Littoral Rock	*483.3*	*0.75%*	*1515.6*	*0.51%*	1998.9	0.5%	24.2%
Littoral Sediment	*337.7*	*0.52%*	*3009.1*	*1.00%*	3346.8	0.9%	10.1%

Table 47. Coastal margin extent in the coastal corridor (CEH 2017)

	Destroyed	Partially Destroyed	Unfavourable Declining	Unfavourable – No change	Unfavourable recovering	Favourable	Total
	0.3	**0**	1145.9	615.5	4705.3	30102.2	**36569.2**
Supra-littoral Rock	0	0	43.3	32.1	1097.9	3705.1	**4878.5**
Supra-littoral Sediment	0.3	0	208.2	160.2	2633.6	464.6	**3466.8**
Inshore sublittoral sediment	0	0	141.2	167.3		287.6	**596.1**
Littoral Rock	0	0	37.2		68.6	877.9	**983.7**
Littoral Sediment	0	0	715.9	255.9	905.2	24767.1	**26644.1**
%			3.1%	1.7%	12.9%	82.3%	
						Favourable/Unfavourable Recovering:	**95.2%**
						Unfavourable, Declining, Partially Destroyed or destroyed:	**4.8%**

Table 48. Coastal Margin Condition in the SW (Natural England 2019)

Coastal Margins			
	Quantity	**Quality**	**Spatial Configuration**
Food			
Fibre			
Energy			
Clean Water			
Clean Air			
Recreation		☑	
Aesthetics		☑	☑
Hazard Protection	☑	☑	
Wildlife	☑	☑	
Equable climate	☑	☑	

Table 49. Functional relationships between coastal margins and ecosystem services (Mace et al 2015; NEA 2011)

4.01.04 Semi-Natural Grassland

Semi-Natural Grasslands (SNGs) account for only 1.2% of the area of natural capital assets in the coastal corridor, equating to only 5.2% of all SNGs in Cornwall. Notably, the coastal corridor is a significant reserve for neutral and calcareous SNGs in Cornwall, containing 81% of all calcareous grasslands and 53% of all neutral grasslands. Although there have only been minor recorded losses in the extent of remaining SNGs between 1995 and 2005 (ERCISS 2009), these minor losses need to be considered in relation to significant historic declines. Nationally, 47% of SNG were lost between 1960 and 2013 and this decline continues in some areas (UK NEA, 2011; Mace 2017; ONS, 2018[135]). Looking specifically at lowland SNGs, the NEA (2011) reports a 90% loss with the major driver being agricultural intensification.

As most SNGs are the product of traditional farming practices, conservation management is important to maintain condition. By area, 88.5% of Semi-Natural Grassland (SNG) SSSIs in the area are in 'favourable' or 'unfavourable but recovering' condition, whilst 11.5% are 'unfavourable', 'partially destroyed' or 'destroyed' (Natural England 2019). At 88.5% the condition of SSSI SNG is below but close to national targets aim to achieve ≥95% SSSI favourable/recovering condition by 2020 (Biodiversity Strategy 2020, 2010). However, considerable progress still needs to be made to meet the 25-year environment plan (2018) target of ≥75% of '*terrestrial and freshwater protected sites to favourable condition'*. Nationally there are further indications of widespread declines in the condition of SNGs, with significant declines in the plant species richness of SNG recorded between 1998-2007 (Countryside Survey 2007), and declines in butterflies and breeding and wintering birds associated with SNG (UK NEA, 2011).

Mace et al. (2015) identify functional priority relationships between SNG and key ecosystem services, including aesthetics, wildlife and equitable climate. SNGs are highly valued as supporting habitats for important and rare species. The NEA (2011) highlights that "*of the 1,150 species of conservation concern named in the UK Biodiversity Action Plan (UK BAP), lowland Semi-natural Grasslands are home to 206 UK BAP priority species, in comparison, upland SNGs are home to 41*" (NEA 2011:3[136]). SNG are also thought to have the potential to store more carbon than enclosed grassland and farmlands and produce less methane (NEA 2011). In terms of nectar production, they also provide crucial support for pollinators and pests with knock-on benefits for adjacent areas of arable and horticultural crops.

Semi-Natural Grassland			
Characteristic	**Current Status**	**Target**	**Trend**
Quantity	766 ha of the coastal corridor	No target	Minor loss in the extent of SNG recorded between 1995 and 2005. Loss of 150ha of neutral grassland, no loss of acid or calcareous grassland recorded (ERCISS 2009). CAONB (2015) study suggest a loss of -8.3 ha of SNG, a 0.1% loss between 1995 to 2005. These minor losses should be considered in relation to long term declines. Nationally between 1960 and 2013, 47% of SNGs were lost and this decline continues in some areas. The Countryside Survey 2007 highlights that there has been no change in the area of acid and calcareous grasslands in the UK. There was a significant increase in the area of neutral grassland (UK NEA, 2011; Mace 2017; ONS, 2018).
	B (Unknown)		B (negative)
Quality	By area, 88.5% of SW SSSI grassland (all types) are in favourable/ recovering condition. 37.5% in favourable condition. 51% recovering. (NE 2019)	≥95% SSSI favourable/ recovering by 2020 (Biodiversity Strategy 2020) 75% of terrestrial and freshwater protected sites to favourable condition (25 Year Environment Plan 2018)	88.5% of SNG SSSI in the SW are in favourable or recovering condition, -6.5% from national targets under the 2020 biodiversity strategy. The majority are recovering 51%, only 37.5% are in favourable condition. Nationally, neutral grassland is in stable condition. Calcareous grassland stable and under management to conserve, mixed improvements and declines in acid grassland (Countryside Survey 2007). Local data suggests that large areas of neutral and acid grassland are in declining condition. There has been a significant decline in plant species richness 1998-2007 (Countryside Survey 2007). Major declines in breeding and wintering birds associated with SNG, and butterflies (UK NEA, 2011).
	B (below the target)		B (negative)
Spatial Configuration	Unknown	No target	Unknown
	B (unknown)		B (unknown)

Table 50. Semi-Natural Grassland – risk assessment (Mace et al. 2015)

[135] ONS (2018) https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/uknaturalcapitaldevelopingseminaturalgrasslandecosystemaccounts
[136] http://uknea.unep-wcmc.org/LinkClick.aspx?fileticket=IfVaZJDoV8c%3D&tabid=82

	Coastal Corridor		Rest of Cornwall		Cornwall		CC % of total Cornwall
	Ha	% of total	Ha	% of total	Ha	% of total	
Semi-Natural Grassland	766.0	1.2%	14108.5	4.7%	14874.5	4.1%	**5.2%**
Calcareous	93.8	0.1%	21.4	0.01%	115.2	0.03%	**81.4%**
Acid	12.6	0.02%	10465.7	3.5%	10478.3	2.9%	**0.1%**
Neutral	47.3	0.07%	42.7	0.01%	90.0	0.0%	**52.6%**

Table 51. Semi-natural grassland extent (CEH 2017)

	Destroyed	Partially Destroyed	Unfavourable Declining	Unfavourable – No change	Unfavourable recovering	Favourable	Total
Semi-Natural Grasslands	**1.3**	**205.9**	**3461.9**	**1905.5**	**24631.9**	**18126.5**	**48332.9**
Acid grassland - Lowland			235.9	113.1	800.9	679.1	1829.1
Acid Grassland - Upland			8.1	970.6	4106.7	164.1	5249.5
Calcareous Grassland - Lowland	1.3	188.1	226.2	123.2	14138.8	13074.2	27751.7
Neutral Grassland – Lowland		17.8	2991.5	698.5	5574.8	4175.2	13457.9
Neutral Grassland - Uplands					10.8	33.9	44.7
%	0.0%	0.4%	7.2%	3.9%	51.0%	37.5%	
						Favourable/Unfavourable Recovering:	**88.5%**
						Unfavourable, Declining, Partially Destroyed or destroyed:	**11.5%**

Table 52. Semi-Natural Grassland Condition - SW SSSIs (Natural England 2019)

Semi-natural grasslands			
	Quantity	**Quality**	**Spatial Configuration**
Food			
Fibre			
Energy			
Clean Water			
Clean Air			
Recreation			
Aesthetics		☑	☑
Hazard Protection			
Wildlife	☑	☑	
Equable climate		☑	

Table 53. Semi-Natural grassland Priority functional relationship with ecosystem services (Mace et al 2015; NEA 2011)

4.01.05 Moors, heath and bog

Moors, heath and bog areas cover 3% [1846 ha] of the coastal corridor, accounting for 28% of Cornwall's moors, heath and bog habitat area. In the coastal corridor, this habitat type is dominated by heather and heather grassland areas; there is no bog habitat lying within the coastal corridor. Between 1995 and 2005, ERCCIS (2009) recorded a loss of 60 ha of inland rock and 17 ha of dwarf dry heath between 1995 and 2005.

By area, 95% of moor, heath and bog SSSIs in the SW are thought to be in 'favourable' or 'unfavourable but recovering' condition, with only 5% in 'unfavourable', 'partially destroyed' or 'destroyed', close to meeting national targets to achieve ≥95% SSSI favourable/ recovering by 2020 (Biodiversity Strategy 2020, 2010; Natural England 2019). However, just 19% of moors, heath and bog in the SW are classed as in favourable condition, and therefore considerable progress still needs to be made to meet the 25-year environment plan (2018) targets of ≥75% of '*protected sites in favourable condition'*.

Mace et al. (2015) identify functional priority relationships between moors and heathland and five priority ecosystem services: clean water, aesthetics, hazard protection, wildlife and equitable climate.

Moors, heath and bog			
Characteristic	**Current Status**	**Target**	**Trend**
Quantity	1847 ha, 3%, of the coastal corridor consists of bogs, heath and inland rocks.	The SW nature map targets a 40% increase in upland and lowland heath habitats.	Between 1995 and 2005, ERCISS (2009) records losses of 60 ha of inland rock and 17 ha of dwarf dry heath. The physical extent of heathland has slightly declined in the CAONB between 1995 and 2005 (-3.4 ha). Nationally, peatland bog areas decreased significantly over the last 60yrs, area of active peat bog declining by <1% per annum, 1990 to 1998 (UK NEA, 2011).
	B (Unknown)		B (negative)
Quality	By area, 94.8% of Moors, heath or bog SSSI are in favourable or recovering condition *19% Favourable* *75% Recovering*	≥95% SSSI favourable/ recovering by 2020 (Biodiversity Strategy 2020) 75% of terrestrial and freshwater protected sites to favourable condition (25 Year Environment Plan 2018)	Very close to achieving the 2020 biodiversity strategy for 95% of SSSI in favourable or recovering condition. However, only 19% are in favourable condition a significant departure from the 75% target for the 25-year environment plan. Nationally lowland heath birds recovering, upland wetland birds declining (SoNE, 2008) Vegetation richness stable 1998-2007 (Countryside Survey 2007)
	A (At or close to target)		A (positive or not discernible)
Spatial Configuration	Unknown	No target	Unknown
	B (Unknown)		B (Unknown)

Table 54. Moors, heather and bog assessment (Mace et al. 2015)

	Coastal Corridor		Rest of Cornwall		Cornwall		CC % of total Cornwall
	Ha	% of total	Ha	% of total	Ha	% of total	
Moors, heather and bog	1846.9	3%	4727.6	1.58%	6574.5	1.8%	28%
Bog	*0*	*0*	*376.6*	*0.13%*	376.6	0.1%	
Heather	*1819.7*	*2.81%*	*4305.1*	*1.44%*	6124.8	1.7%	*29.7%*
Heather grassland	*612.3*	*0.94%*	*3578.8*	*1.19%*	4191.1	1.2%	*14.6%*
Inland Rock	*6.0*	*0.01%*	*2636.7*	*0.88%*	*2642.7*	*0.7%*	*0.2%*

Table 55. Moors, heather and bog habitat extent (CEH 2017)

	Destroyed	Partially Destroyed	Unfavourable Declining	Unfavourable – No change	Unfavourable recovering	Favourable	Total
	1.3825	**16.5**	**1201.9**	**1744.4**	**43001.4**	**11061.6**	**57027.3**
BOGS - Lowland		15.9	13.9	53.0	296.4	121.9	501.3
BOGS - Upland			272.7		15295.5	1042.9	16611.3
DWARF SHRUB HEATH - Lowland	1.3825	0.6	565.9	1105.5	7349.8	6225.6	15248.8
DWARF SHRUB HEATH - Upland			336.1	585.9	19957.4	3671.1	24550.4
BRACKEN			13.3		102.3		115.57
	0%	0%	2%	3%	75%	19%	
Favourable/Unfavourable Recovering:							**94.8%**
Unfavourable, Declining, Partially Destroyed or destroyed:							**5%**

Table 56. Moors, heather and bog condition assessment SW SSSIs (Natural England 2019)

Moors and heath			
	Quantity	Quality	Spatial Configuration
Food			
Fibre			
Energy			
Clean Water		☑	
Clean Air			
Recreation			
Aesthetics		☑	☑
Hazard Protection	☑	☑	
Wildlife	☑	☑	
Equable climate		☑	

Table 57. Moors, heather and bog priority ecosystem services (Mace et al. 2015; NEA 2011)

4.01.06 Fen, Marsh and Swamp

There are only an estimated 27 ha of fen, marsh and swamp habitat in the coastal corridor, equating to only 0.04% of the total area of the corridor, and 0.1% of this habitat type in Cornwall. ERCCIS (2009) records a loss of 30ha of fen, marsh and swamp in Cornwall between 1995 and 2005. Nationally, this habitat is widely scattered across the lowlands but restricted in distribution. The condition of fen, marsh and bog habitat is thought to be relatively poor with a 20% increase in condition, by area, needed to reach 2020 targets, and 36% increase needed to reach 25-year environment plan targets.

Fen, Marsh or Swamp			
Characteristic	**Current Status**	**Target**	**Trend**
Quantity	25 ha in the coastal corridor, 0.2% of the total extent of this habitat across Cornwall.	No target	ERCCIS records a loss of 30ha of fen, marsh and swamp in Cornwall between 1995 and 2005.
	B (unknown)		B (negative)
Quality	By area, 75% are in favourable or recovering condition. *39% favourable.* *36% recovering.*	≥95% SSSI favourable/ recovering by 2020 (Biodiversity Strategy 2020) 75% of terrestrial and freshwater protected sites to favourable condition (25 Year Environment Plan 2018)	By area, a 20% improvement in condition is needed to reach 2020 targets, 36% increase needed to reach 25-year environment plan targets. Bird data is mixed - wet meadows declined, reed beds increased, slow/standing water increased, wetland birds declined with increasing severity in recent years (UK NEA, 2011). Impacted by the decline of traditional management practices and drainage.
	B (below target)		B (negative)
Spatial Configuration	Unknown	No known target	Nationally, widely scattered across the lowlands but restricted in distribution.
	B (unknown)		B (unknown)

Table 58. Fen, Marsh and Swamp – risk assessment (Mace et al. 2015)

	Coastal Corridor		**Rest of Cornwall**		**Cornwall**		CC % of total Cornwall
	Ha	% of total	Ha	% of total	Ha	% of total	
Fen, Marsh or Swamp	*27.2*	*0.04%*	*45.8*	*0.02%*	73.0	0.02%	*0.1%*

Table 59. Fen, Marsh and Swamp extent (CEH 2017)

	Destroyed	Partially Destroyed	Unfavourable Declining	Unfavourable – No change	Unfavourable recovering	Favourable	Total
Fen, marsh or swamp	**0**	12.1	1000.4	72.4	**1611.5**	**1721.0**	**4417.4**
Lowland		12.1	1000.4	72.4	1178.8	1543.9	**3807.6**
Upland					432.7	177.2	**609.89**
%		0	23%	2%	**36%**	**39%**	
						Favourable/Unfavourable Recovering:	**75%**
						Unfavourable, Declining, Partially Destroyed or destroyed:	**25%**

Table 60. Fen, Marsh and Swamp Condition – SW SSSI condition (Natural England 2019)

4.01.07 Freshwater

Freshwater habitats cover 0.12% of the coastal corridor, accounting for 5.2% of the total extent of freshwater habitats across Cornwall. BAP priority rivers[137] include all natural and near-natural running waters in the UK (i.e. with features and processes that resemble those in natural systems), and these range from upland streams to meandering lowland rivers. Notably, the coastal corridor contains 48% of all priority river, by length, in Cornwall. Twelve BAP priority rivers run through the coastal corridor, around 16.6km, 48% of the total length of priority rivers across Cornwall. Rivers are relatively evenly distributed across Cornwall, their management is divided into three river basin district catchments: West Cornwall and Fal, North Cornwall, Seaton, Looe and Fowey and the Tamar (Environment Agency, 2009). There are four major rivers in the area: the Tamar, Fowey, the Fal and the Hayle. The majority of large freshwater bodies lie outside of the coastal corridor on Bodmin Moor, with the exception of Argal and College Reservoirs near Penryn, The Loe near Porthleven and Drift Reservoir near Penzance. In terms of the coastal corridor, the majority of priority habitats include the Fowey, West Looe River, Trebank Water, River Lerryn, River Valency, Tregeseal Stream, River Gannel, River Jordan, Penpoll Creek, St Gluvian Stream and Tresillian River. 68% of SSSI are in favourable or recovering condition. Between 2009-2013 no river in Cornwall was classed as having high water quality (Cornwall Council 2015[138]). Pollution from wastewater was affecting 33% of water bodies in the SW, with physical modification affecting 22%.

Mace et al. (2015) identify functional priority relationships between freshwater habitats and the provisioning ecosystem services including clean water, recreation, aesthetics, hazard protection, wildlife and equable climate.

Freshwater			
Characteristic	**Current Status**	**Target**	**Trend**
Quantity	80 ha of freshwater habitats lie within the coastal corridor (LCM 2015), just 0.12% of total area of the coastal corridor. Including 286km of rivers and water bodies.	No national target ~ 1.1% (UK wide) of land for wetlands (lowland) is needed to deliver sustainable populations of all birds (RSPB pers. Comm. Jo Gilbert 2007) (Hume, 2008 – Wetland Vision Technical Document).	ERCCIS reports no change in the area of rivers and streams across Cornwall between 1995 and 2005 and an increase of standing open water and canal of 110ha. Notably a large percentage of this increase in freshwater was due to the creation of a large lake on Bodmin Moor which is not of relevance to the coastal corridor, however, CAONB also reports the creation of several new pond sites across the AONB. Nationally, ~90% of the national resource of wetlands has been lost since Roman times.
	B (significantly below target)		A (positive or not discernible)
Quality	27% of England's freshwater bodies are currently classified as being of 'good status' or 'good ecological potential' or better (Environment Agency) By area, 68% in favourable or recovering condition *55% favourable* *13% recovering*	All inland and coastal waters within defined river basin districts must reach at least good status by 2015 (WFD) ≥95% SSSI favourable/ recovering by 2020 (Biodiversity Strategy 2020)	68% of SSSI are in favourable or recovering condition. Between 2009-2013 no river in Cornwall was classed as having high water quality. Pollution from waste water was affecting 33% of water bodies in the SW, with physical modification affecting 22%. Nationally, between 1996-2007 plant species richness in ponds decreased by 20% and proportion of poor or very poor quality ponds increased by 17% (UK NEA, 2011). National bird data is mixed - wet meadows declined, reed beds increased, slow/standing water increased, wetland birds declined with increasing severity in recent years (UK NEA, 2011)
	B (Significantly below target)		B (decline)
Spatial Configuration	Unknown	No target	Unknown
	B (unknown)		B (Unknown)

Table 61 Freshwater – risk assessment (Mace et al. 2015)

	Coastal Corridor		Rest of Cornwall		Cornwall		CC % Cornwall
	Ha/km	% of total	Ha	% of total	Ha	% of total	

[137] *BAP Priority Rivers include (1) Rivers of high hydromorphological status under the EC Water Framework Directive (WFD); (2) Headwaters; (3) Occurrence of the EC Habitats Directive Annex I habitat H3260 'Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation'. This includes, but is not confined to, all river Special Areas of Conservation (SACs) designated for the feature. (4) Chalk rivers, as described in the pre-existing BAP definition (5) Active shingle rivers (6) Areas or Sites of Special Scientific Interest (ASSIs or SSSIs) designated for river species, riverine features or fluvial geomorphology. This also includes Geological Conservation Review (GCR) and Earth Science Conservation Review (ESCR) sites of importance for fluvial geomorphology. (6) The presence of priority or indicator species, including: Annex II Habitats Directive species; BAP priority species; and invertebrate species which are strongly indicative of river shingle.*

[138] *Environmental Growth Strategy (2015)*

Freshwater Land Cover (ha) *(LCM 2015)*	80.8	0.12%	1173.3	0.39%	1254.1	0.3%	
Rivers/ water bodies (km)	**286**		2046		2332		**CC % Cornwall**
Canal	*1.7*	1%	0.4	0.02%	2.1	0.09%	81%
Inland Rivers	*269.3*	94%	1805.4	88.24%	2074.7	88.97%	13%
Lake	*6.7*	2%	30.1	1.47%	36.8	1.58%	18%
Coastal Rivers	*8.4*	3%	211	10.31%	219.4	9.41%	4%

Table 62. Freshwater habitat extent (CEH 2017)

	Destroyed	Partially Destroyed	Unfavourable Declining	Unfavourable – No change	Unfavourable recovering	Favourable	Total
Freshwater	**0**	**0**	**307.9**	**579.9**	**343.7**	1477.8	**2709**
Rivers and Streams	0	0	53.2	420.3	98.8	137.0	
Standing Open Water	0	0	254.8	159.6	244.8	1340.9	
%	**0%**	0%	11%	21%	13%	55%	
Favourable/Unfavourable Recovering:							**68%**
Unfavourable, Declining, Partially Destroyed or destroyed:							**32%**

Table 63. Freshwater habitat condition assessment SSSI in the SW (Natural England 2019)

Freshwater			
	Quantity	**Quality**	**Spatial Configuration**
Food			
Fibre			
Energy			
Clean Water	☑	☑	
Clean Air			
Recreation		☑	
Aesthetics		☑	
Hazard Protection		☑	☑
Wildlife	☑	☑	☑
Equable climate	☑	☑	

Table 64. Freshwater habitat priority ecosystem services (Mace et al 2015; NEA 2011)

4.02 PHYSICAL FLOW ACCOUNTS

The asset register provides a catalogue of the natural capital assets present within the coastal corridor and an initial outline of the ecosystem services that these assets are thought to be functionally important for. The register shows that the corridor is dominated by enclosed grasslands, focused on provisioning services (food), with smaller but still significant amounts of woodlands and coastal margin habitats delivering multiple services including carbon sequestration, hazard regulation, aesthetics, recreation, water quantity and quality. This section aims to provide a more detailed impression of the potential of habitats in the coastal corridor to deliver ecosystem goods and services.

A range of methodologies have been used to attempt to quantify flows of ecosystem services, and where it has not been possible to quantify these an attempt has been made to instead highlight whether the corridor is important for the delivery of a certain ecosystem good or service. Where feasible, comparisons have been made to the rest of Cornwall. It has not been possible to include all ecosystem goods and services in the physical flow accounts, but only those with sufficient available data and established methodologies to enable measurement within the project timescale. The flows of ecosystem goods and services reported here should be treated as potential flows or capacity to deliver, rather than reporting specific flows of goods and services that the corridor currently delivers, as this would in many cases require detailed analysis of beneficiaries. The methodology used for each good or service is set out in each individual section.

4.02.01 Regulating Ecosystem Services

Climate regulation – Carbon Storage and Sequestration

- *Soils (150cm depth) and vegetation in the coastal corridor are estimated to store approximately 9 million tonnes of carbon, equating to around 14.3% of Cornwall's total stored carbon.*
    - *Soils (estimated down to 150cm in depth) store an estimated 15 times the amount of carbon compared with above-ground vegetation.*
    - *The coastal corridor stores 20% of Cornwall's total above-ground carbon storage. The high level of above-ground carbon storage potential in the coastal corridor is a result of the large woodland area.*
- *A rudimentary assessment of the value of stored carbon, based on non-traded value, suggests that the stock value of carbon stored in the coastal corridor is around £603 million (not a flow value of ecosystem services).*
- *Based on the habitat types with available carbon sequestration data, the coastal corridor is estimated to have the potential capacity to sequester around 55 thousand tonnes of CO_{2e} per yr. This equates to around 17% of the total amount sequestered in Cornwall.*
- *A rudimentary assessment of the value of sequestered carbon, based on non-traded value, by habitats in the coastal corridor, has an estimated value of £3 million per year (2019 prices). Notably, this figure does not take into account future rises in the price of carbon.*

Vegetation and soils in the coastal corridor can help to regulate climate by sequestering and storing carbon. The potential capacity of the coastal corridor to help regulate climate change has been estimated in terms of carbon storage capacity and carbon sequestration potential of the broad habitat types present in the corridor, no attempt has been made to measure carbon emission. Carbon storage capacity refers to the approximate amount of carbon that can be sequestered or stored naturally in soil and vegetation. Natural capital assets that store carbon include soils and above-ground vegetation, which take in carbon dioxide through photosynthesis and act as a carbon sink. Different habitat types have differing capacity to store carbon, while the restoration of some degraded habitats can lead to increased capacity for carbon storage. Carbon sequestration refers to the additional carbon drawn down by certain vegetation types annually.

Estimates of the amount of carbon stored and sequestered in the coastal corridor are made based on existing literature on the average amount (tonnes) of carbon stored in different broad habitat types and for the top 150cm of soil using the LandIS, NATMAPcarbon, Soil Organic Carbon map (Cranfield University 2019[139]). Carbon storage and sequestration estimates are limited as they do not attempt to take into account the habitat condition, age or management regime of each habitat, which are all likely to cause variation in the capacity of different habitats to store carbon, particularly woodlands. Furthermore, these estimates do not

[139] *LandIS (2019) NATMAP CARBON: Soil Organic Carbon Map, Available At: http://www.landis.org.uk/data/nmcarbon.cfm*

capture carbon stored in any deeper soils below 150cm. Additional work could be undertaken to estimate the carbon emission from the coastal corridor, linked to livestock present in the corridor and arable farming.

Carbon Storage: Above and below ground

Above-ground

Estimates of mean carbon stocks, in tonnes of carbon per ha, stored in above ground vegetation have been developed through a number of research projects (e.g. Read et al 2009[140]; Alonso et al. 2012[141]). The total amount of carbon storage was calculated by multiplying average tonnes per ha by the area of each habitat type present within the coastal corridor. Mean carbon tonnes stored per ha per habitat are shown in Table 74.

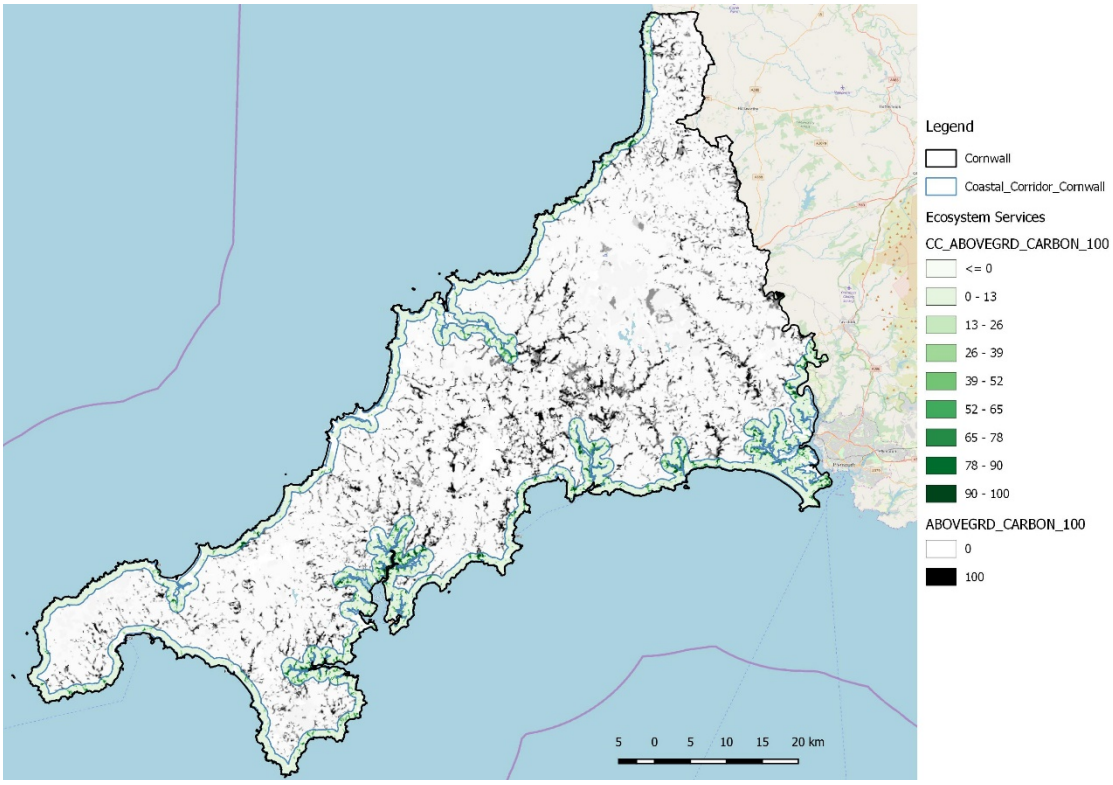
Based on mean carbon stored (ha/annum) per broad habitat type, it is estimated that the coastal corridor holds around 547,197 tonnes in above-ground carbon (Table 74). Carbon stored in the coastal corridor equates to approximately 20% of the total above-ground carbon stored in Cornwall. In using these figures, it must be acknowledged that these calculations are limited. As shown in Table 74, data on carbon stored per ha is not available for every habitat type. Furthermore, existing research literature highlights that carbon density for woodlands should be based on species and age-specific estimates which have not been taken into account here. Map 7 show levels of above ground carbon in vegetation across the coastal corridor (National Soil Maps 2019) which closely follows the geographical distribution of woodlands across the coastal corridor, with high densities mainly concentrated around wooded valleys and estuaries in the southern section of the coastal corridor.

Broad Habitat Group	Net Carbon Storage (t/ha)	Source	Coastal Corridor Area (Ha)	Coastal Corridor Stock of Carbon (Tonnes)	Cornwall Area (ha)	Cornwall Stock of Carbon (tonnes)	CC as % of Cornwall carbon Stock
Broadleaved Woodland	70	Alonso et al (2012)	6954.2	486794	30056	2103920	23%
Coniferous Woodland	70	Alonso et al (2012)	165.5	11585	4611.3	322791	4%
Arable and Horticultural	1	Henrys et al (2007)	25055.6	25055.6	98619.9	98619.9	25%
Improved Grassland	1	Henrys et al (2007)	16321.2	16321.2	169406.1	169406.1	10%
Neutral grassland	1	Henrys et al (2007); Alonso et al (2012)	47.3	47.3	90	90	53%
Calcareous Grassland	1	Henrys et al (2007)	93.8	93.8	115.2	115.2	81%
Acid Grassland	1	Henrys et al (2007); Alonso et al (2012)	12.6	12.6	10478.3	10478.3	0%
Dwarf Shrub Heath	2	Henrys et al (2007); Alonso et al (2012); Ostle et al (2009)	2432	4864	10315.9	20631.8	24%
Fen, Marsh and Swamp	2	Henrys et al (2007)	27.2	54.4	73	146	37%
Bog	2	Henrys et al (2007); Alonso et al (2012)	0		376.6	753.2	0%
Sand dunes	0.65	Cannell and others (1999)	2090.3	1358.7	2376.9	1544.9	88%
Saltmarsh	1.415	Cannell and others (1999)	657.1	929.8	1090.7	1543.3	60%
Other coastal habitats	Unknown		2376.5		10219.1		
Other habitats (inland rock)	Unknown		6		2642.7		
Urban or suburban	Unknown		8519.9		22644.1		
Freshwater	1		80.8	80.8	1254.1	1254.1	6%
TOTAL				547,197		2,731,294	20%

Table 74. Carbon storage by broad habitat group in the coastal corridor (multiple sources as stated)

[140] *Read et al.(eds) (2009) Combating climate change – a role for UK forests. An assessment of the potential of the UK"s trees and woodlands to mitigate and adapt to climate change. The Stationery Office, Edinburgh.*

[141] *Alonso et al. (2012) Carbon storage by habitat: Review of the evidence of the impact of management decisions and condition of carbon stores and sources. Natural England Research Reports.Natural England. Sheffield.*



Map 7. Above-ground carbon storage (National Soil Maps 2019; Mosedale In press)

Below-ground

Below-ground carbon storage has been estimated using the LandIS National Soil Map (Cranfield University 2019[142]) which provides estimates of the average stock of organic carbon in soils at three depths, 0-30cm, 30-100cm and 100-150cm, per unit area. The National Soil Map NATMAP carbon dataset has been used to estimate the expected carbon stock in soils across Cornwall to 150cm in depth and takes into account the variation of organic carbon (OC) in relation to different land uses. Based on mean carbon stored (ha/annum) for all three soil depths, it is estimated that the coastal corridor holds around 8,464,081 tonnes of below-ground carbon (Cranfield University 2019).

	Coastal Corridor (tCO2e)	Cornwall (tCO2e)
0 to 30cm	5,585,174 (66%)	36,546,210 (61%)
30 to 100cm	2,564,813 (30%)	19,395,666 (32%)
100 to 150cm	314,031 (4%)	3,984,093 (7%)
Total soil organic carbon stock (tonnes)	8,464,018	59,925,968 (14%)

Table 75. Stored soil carbon, estimated to 150cm in depth (Source: NSRI soils data

Total Stored Carbon: Above- and Below-ground Carbon Stocks

The coastal corridor has the potential to store an estimated 9 million tonnes of carbon, equating to around 14.3% of Cornwall's total stored carbon. A rudimentary estimate of the stock value of carbon stored in the coastal corridor, following BEIS guidance on valuing non-traded carbon at £67/tCO2e, is £603m (not a flow value of ecosystem services). This approach to valuing stored carbon is acknowledged to be limited. In terms of distribution, the lowest carbon stores were found to be in enclosed grassland habitats, and carbon storage was (as expected) much higher in soils than above-ground vegetation. Notably, there are particularly high levels of potential carbon storage around West Cornwall and Bodmin Moor, west of Falmouth and to the north of St Austell (except for China Clay district). The highest areas of potential carbon storage in above ground vegetation are found close to Bodmin Moor and East Cornwall, along the River Tamar, reflecting the high-density woodlands in these areas.

[142] *LandIS (2019) NATMAP CARBON: Soil Organic Carbon Map, Available At: http://www.landis.org.uk/data/nmcarbon.cfm*

	Coastal Corridor (tCO2e)	Cornwall (tCO2e)
Above-ground	547,197	2,731,294
Below-ground (<150cm)	8,464,018	59,925,968
Total Carbon Stored	9,011,215 (14.3%)	62,657,262

Table 76. Total stored carbon (NSRI NATMAP Carbon 2019)

Carbon Sequestration

In addition to the stock of stored carbon in the natural environment, vegetation also sequesters additional carbon each year as it grows. Carbon sequestration is the annual flow or intake of carbon by vegetation each year. Different vegetation types sequester carbon at different rates, active peat bogs and woodlands are known to be particularly effective. Table 77 below outlines the available carbon sequestration rates for different broad habitat types based on available academic data (see Christie et al. 2010; Beaumont et al. 2014; Broadmeadow and Matthews 2003; White et al. 2015; Alonso et al. 2012; Carnell et al. 1999; Jones et al. 2008). Carbon is also emitted at different levels each year depending on the mix of livestock and arable farming in place, as this mix of farming cannot be estimated for the coastal corridor carbon emissions have not been calculated, only capacity for sequestration.

The coastal corridor is estimated to have the capacity to sequester around 55 thousand tonnes of CO_{2e} per yr, 17% of the total amount sequestered in Cornwall (in using this figure it must be acknowledged that emissions by land cover have not been included). A crude estimate of the value of these carbon sequestration services, using BEIS guidance on valuing non-traded carbon at £67/tCO2e the value per year, is approximately £3 million per year. Improved estimates of the value of sequestered carbon could be made using estimates of carbon price fluctuations over the next 50 years.

Broad Habitat	tCO2 per year/ha	Range	Source	Coastal Corridor		Cornwall		% CC of total
				Area	tonnes CO2e per yr	Area	tonnes CO2e per yr	
Broadleaved Woodland	4.970		Christie et al. (2010)[143] assumes values for beech trees	6954.2	34562.3	30056	149378.3	23%
Coniferous Woodland	12.66		Assumes values for sitka spruce	165.5	2095.2	4611.3	58379.1	4%
Arable and horticulture	0.107		Christie et al (2010) Assumes values for cropland	25055.6	2680.9	98619.9	10552.3	25%
Improved Grassland	0.397		Christie et al. (2010)	16321.2	6479.5	169406.1	67254.2	10%
SNGL	0.397		Christie et al. (2010)	153.7	61	10683.5	4241.3	1%
Heather (lowland and upland heath)	0.7	Assuming average values for bogs and heath	Christie et al. (2010)	1819.7	1273.8	6124.8	4287.4	30%
Heather grassland	0.7	Assuming average values for bogs and heath	Christie et al. (2010)	612.3	428.61	4191.1	2933.77	15%
Bog (lowland raised bog)	0.675	(0.45-0.9)	Christie et al. (2010)	0	0	376.6	254.205	0%
Blanket bog/ Bog uplands	0.7		Broadmeadow and Matthews (2003)[144] Christie et al. (2010)		0		0	
Fen, marsh and swamp	0.7	Assuming average values for bogs and heath	Christie et al. (2010)	27.2	19.04	73	51.1	37%
Montane habitats	0.7		Christie et al. (2010) Assuming average values for bogs and heath		0		0	
Saltmarsh	5.188	2.35 to 8.04	Beaumont et al. (2014)[145]; Carnell et al. (1999)	657.1	3409.0348	1090.7	5658.5516	60%
Supralittoral sediment: Sand Dune	2.182		Beaumont et al. (2014); Jones et al. (2008)[146]	2090.3	4561.0346	2376.9	5186.3958	88%
Intertidal mud	0.59		Andrews et al. (2006)[147]	31.7	18.703	2836.5	1673.535	1%
Subtidal coarse and sandy sediments	0.37		Painting et al. (2010)[148]	337.7	124.949	3346.8	1238.316	10%
Supra littoral rock	0	Assumes no veg	White et al. (2015)[149]	n/a	n/a	n/a	n/a	

[143] *Christie et al. (2010) Economic Valuation of the Benefits of Ecosystem Services delivered by the UK Biodiversity Action Plan, Defra Project: NE0112, Final report. Available at: http://users.aber.ac.uk/mec/Publications/Reports/Value%20UK%20BAP%20FINAL%20published%20report%20v2.pdf*

[144] *Broadmeadow and Matthews (2003) Forest, carbon and climate change: the UK contribution. Forestry Commission Information Note 48.*

[145] *Beaumont et al. (2014) The value of carbon sequestration and storage in coastal habitats. Estuarine, Coastal and Shelf Science, 137. 32-40. https://doi.org/10.1016/j.ecss.2013.11.022*

[146] *Jones et al. (2008) Factors controlling soil development in sand dunes: evidence from a coastal dune soil chronosequence. Plant Soil, 307: 219-234.*

[147] *Andrews et al. (2006) Biogeochemical value of managed realignment, Humber estuary, UK. Science of The Total Environment, 371: 19-30*

[148] *Painting et al. (2010) Defra report MEC3205. Results of fieldwork to quantify key process affecting the flow of C, N, O and Si at key sites in the North Sea. 65pp.*

[149] *White et al. (2015) Ecosystem accounts for protected areas in England and Scotland: technical appendix, report to Defra, Available at: http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=19271*

Inland Rock	0	Assumes no veg	White et al. (2015)	n/a	n/a	n/a	n/a	
Freshwater	No data		White et al. (2015)	n/a	n/a	n/a	n/a	
TOTAL					55,714.2		311,088.5	17%

Table 77. Carbon sequestration in the coastal corridor (multiple sources)

Soil Erosion Mitigation and Land Loss

- *The coastal corridor experiences an average estimated loss of around 180,182 tonnes of soil per year through water erosion, and an estimated 27,870 tonnes of soil per year through wind erosion. Notably, predicted mean tonnes of soil eroded by wind in the coastal corridor is almost four times higher than for the rest of Cornwall.*
- *There is considerable potential to enhance natural capital assets and change land management practice to reduce wind and water erosion across the coastal corridor, with particular needs to mitigate the effect of water erosion around Falmouth, Tamar estuary, Looe, St Martin, Saltash, Fowey, Megavisey and Gorran Haven, Truro and in the north around Bude, Camel Estuary, and Wadebridge; and wind erosion around Newquay airport, Padstow, Crackington Haven to Bude areas.*
- *In terms of sea level rise predictions there are suggestions that over the long term (100 years) the coastal corridor will lose an area of some 258 ha along the coastline, in the medium term (the next 50 years) a loss of 144 ha, and in the short term (next 20 years) a loss of 74 ha.*

Soils perform a variety of key ecosystem services such as '*nutrient cycling, regulating water and nutrient flows, filtering toxic compounds, providing a medium for plant roots and supporting the growth of a variety of animals and soil micro-organisms by providing a diverse physical, chemical and biological habitat*'. The erosion of soils has major implications not only for farm productivity and crop production but also by reduced water quality by entering freshwater systems and causing eutrophication with implications for drinking water treatment. Eroded soils often need to be removed from roads, reservoirs and estuaries, while the loss of soils has also reduced below-ground carbon stocks (as set out in the previous section). Soil erosion has a variety of causes, including animal and crop production on inappropriate land, overstocking, bad timing of agricultural practices, degradation of riverbanks by stock, and lack of ground cover in winter months (wind, water, crop production etc).

High levels of soil erosion is a particular issue for Cornwall. In 1991 the Tamar catchment had an estimated gross erosion rate of 5.3 tonnes/ha/year (Quine and Walling 1991[150]), more than double the mean soil loss rate for the European Union (2.46 t/ha/yr). Since the 1990s, a number of projects have worked to try to reduce soil erosion to improve water quality, including the Cornwall's rivers project working in the Fal and Tresillian area 2002-2006 and the South Cornwall River Improvement Project (SCRIP) (2012-2015). Climatic warming could exacerbate soil erosion problems in Cornwall, as drier soils are predicted to lead to carbon loss and wetter soils to be more vulnerable to structural damage. A soil vulnerability map produced by the EA (2012) suggested that the majority of soil types in Cornwall are at medium to high risk.

Enhancing natural capital assets and changes to land management practice have considerable potential to mitigate for soil erosion by acting as a physical barrier (vegetation) to erosion and absorbing some of the energy of wind or water causing soil erosion. The potential of the coastal corridor to mitigate for soil loss was therefore estimated based on understanding of the current level of potential erosion by water and wind. Assessment of soil erosion by water using the European Soil Data Centre data (Panagos et al. 2015[151]) suggests that the mean amount of erosion by water is slightly lower in the coastal corridor compared to the rest of Cornwall, however the coastal corridor is still losing some 180,182 tonnes of soil per year, 17.6% of the total estimated amount of soil eroded across Cornwall. There are particularly high levels of erosion by water along the south coast, around Falmouth, Tamar estuary, Looe, St Martin, Saltash, Fowey, Megavisey and Gorran Haven, Truro and in the north around Bude, Camel Estuary, and Wadebridge. Enhancing natural capital assets and changing land management practice in this area could help significantly to reduce soil erosion by water. Using European Soil Data Centre data on the potential for soil erosion by wind (Borrelli et al 2017[152]), indicates that mean soil erosion by wind (t/ha/yr) is predicted to be almost four times higher in the coastal corridor than the whole of Cornwall. Notably, the highest levels of predicted erosion of soil erosion by wind are around Newquay airport, Padstow, Crackington Haven to Bude areas. Estimates of potential soil loss by wind for the whole of the coastal corridor, using mean t/ha/yr, suggest that there is a potential loss of around 27,870 tonnes of soil per year, 45% of the total estimated amount of erosion by wind for the whole of Cornwall.

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[150] *Quine and Walling (1991) Rates of soil erosion on arable fields in Britain: quantitative data from caesium-137 measurements, Soil Use and Management,7 (4): 169-176, https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1475-2743.1991.tb00870.x*

[151] *Panagos et al. (2015) The new assessment of soil loss by water erosion in Europe. Environmental Science & Policy. 54: 438-447. DOI: 10.1016/j.envsci.2015.08.012*

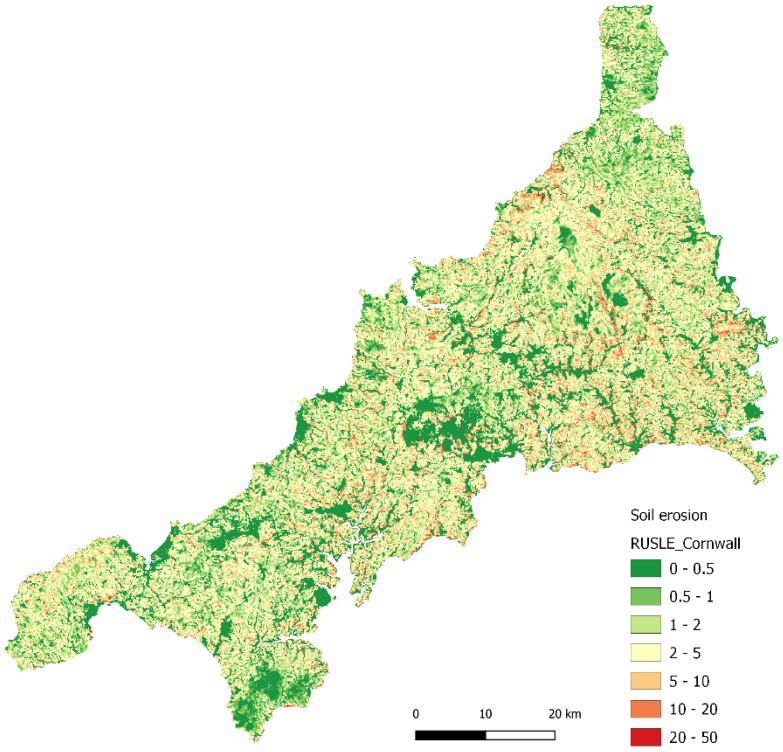
[152] *Borrelli et al. (2017) A new assessment of soil loss due to wind erosion in European agricultural soils using a quantitative spatially distributed modelling approach. Land Degradation & Development 28: 335–344, DOI: 10.1002/ldr.2*

Soil erosion by water

Once exposed through overgrazing, poaching or lack of ground cover in winter months, soil erosion by water is one of the major pathways to soil loss. The European Soil Data Centre[153] mapped the estimated tonnes of soil eroded by water per ha per year for every 100m^2 across the EU. EU Maps of soil erosion by water use the Revised Universal Soil Loss Equation combining factors such as rainfall, soil, topography, land use and management to estimate levels of soil erosion (Panagos et al 2015a[154]; European Soil Data Centre[155]). Using the European Soil Data Centre predicted 'erosion by water' dataset suggests that average soil erosion by water was 2.78 t/ha/yr for the coastal corridor, slightly lower than that for Cornwall as a whole (2.73 t/ha/yr). However, as shown by Map 8, large areas of the coast still experience predicted erosion rates of over 5 t/ha/yr (double the average for Europe) particularly along the south coast, around Falmouth, Tamar estuary, Looe, St Martin, Saltash, Fowey, Megavisey and Gorran Haven, Truro and in the north around Bude, Camel Estuary, and Wadebridge. These areas have the highest potential to benefit from changes to land management to reduce soil loss. Using average soil loss by water per ha suggests that the coastal corridor could be seeing a total average soil loss by water of around 180,182 tonnes per year, and Cornwall 1,018,990.08 tonnes per year on average.

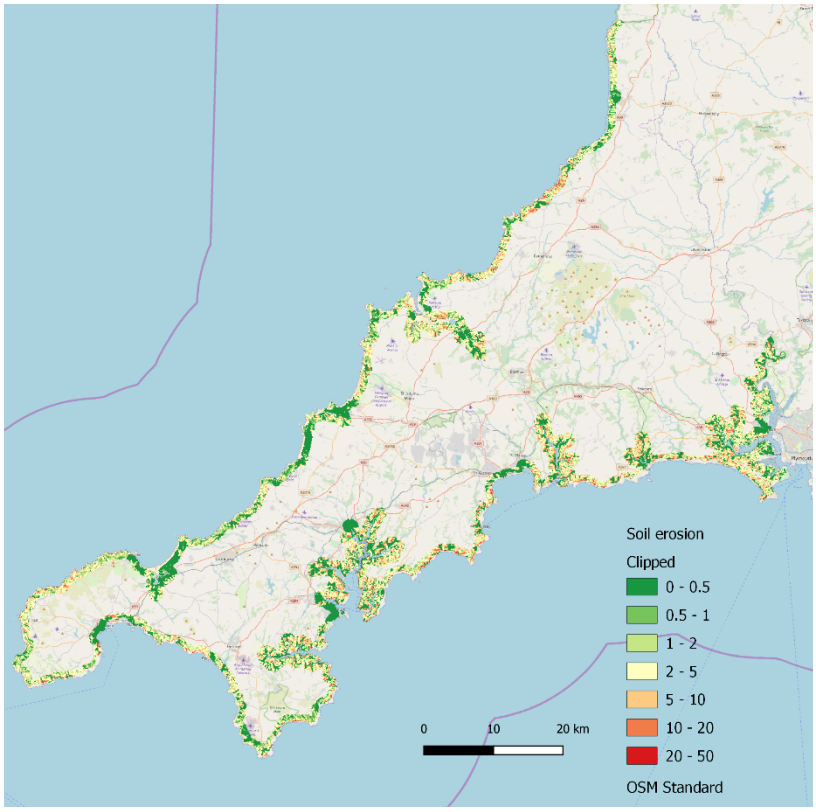
Statistics	Coastal Corridor	Cornwall
Min	0	0
Max	28.44	31.78
Average	2.78	2.82
St.dv	3.12	2.73

Table 78. Soil erosion by water (European Soil Data Centre, esdac.jrc.ec.europa.eu, European Commission, Joint Research Centre)

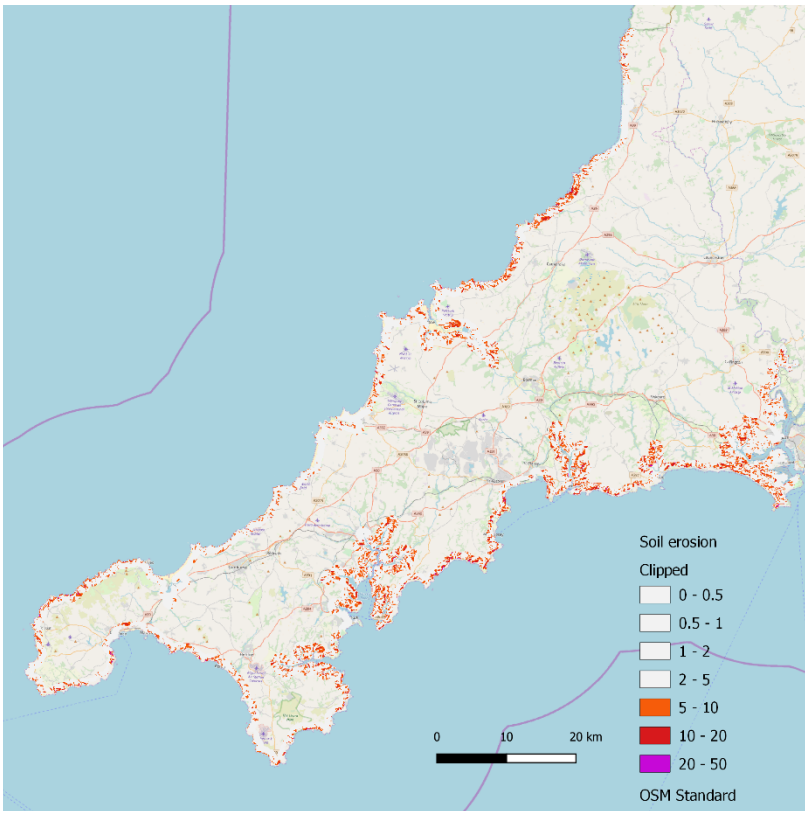


Map 8. Soil erosion by water (t/ha/yr) (Source RUSLE 2016 European Soil Data Centre (ESDAC), esdac.jrc.ec.europa.eu, European Commission, Joint Research Centre)

[153] https://esdac.jrc.ec.europa.eu/content/soil-erosion-water-rusle2015#tabs-0-description=0
[154] Panagos et al. (2015) The new assessment of soil loss by water erosion in Europe. Environmental Science & Policy 54: 438-447. DOI: 10.1016/j.envsci.2015.08.012
[155] https://esdac.jrc.ec.europa.eu/



Map 9. Soil erosion by water (t/ha/year) in the coastal corridor (Source RUSLE 2016 European Soil Data Centre (ESDAC), esdac.jrc.ec.europa.eu, European Commission, Joint Research Centre)



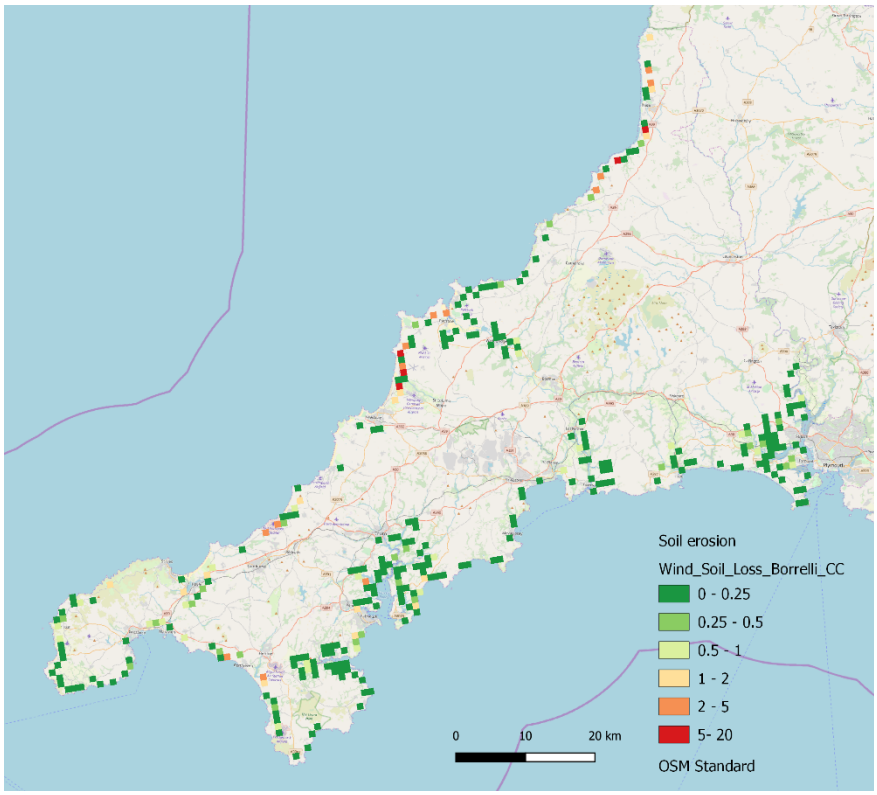
Map 10. Highest rates of soil erosion by water (purple, red, orange): Areas of the coastal corridor with high levels of soil erosion by water (t/ha/year) (Source RUSLE 2016 European Soil Data Centre (ESDAC), esdac.jrc.ec.europa.eu, European Commission, Joint Research Centre; OS Map)

Soil erosion by wind

Soil erosion by wind is a particular issue for arable lands and more arid areas. The European Soil Data Centre provides data on the susceptibility of soil to erosion by wind across Europe, to help increase understanding of when, where and how heavily wind erosion is affecting European arable lands. The dynamics of soil erosion by wind are complex, the European Soil Data Centre's soil loss by wind erosion dataset is based on the Revised Wind Erosion Equation, which employs large scale, wind erosion modelling to evaluate soil loss potential at a 1km^2 resolution (Borelli et al 2017). A complete description of the methodology and the application in Europe is described in Borrelli et al (2017[156]). Using the European Soil Data Centre's dataset, the coastal corridor has a mean soil erosion by wind rate almost four times that of the Cornwall as a whole. Notably, the highest levels of predicted erosion of soil erosion by wind in the coastal corridor are around Newquay airport, Padstow, Crackington Haven to Bude areas. Estimates of potential soil loss by wind for the whole of the coastal corridor, using mean t/ha/yr, suggest that there is a potential loss of around 27,870 tonnes of soil per year in the coastal corridor, some 45% of total estimates of erosion by wind for the whole of Cornwall.

Statistics	Coastal Corridor	Cornwall
Min	0	0
Max	16.38	16.38
Mean	0.43	0.168
St.dv	1.33	0.63

Table 79. Soil erosion by wind (t/ha/yr) (Borelli et al 2017)



Map 11. Potential soil erosion by wind in the coastal corridor (Borrelli et al. 2017)

Air quality mitigation

- *Cornwall has one of the highest amounts of air pollutant (66kg/ha/yr) removal by vegetation in England (ONS 2019[157]).*

[156] Borrelli et al. (2017). A new assessment of soil loss due to wind erosion in European agricultural soils using a quantitative spatially distributed modelling approach. Land Degradation & Development 28: 335-344, DOI: 10.1002/ldr.2

[157] https://www.ons.gov.uk/economy/environmentalaccounts/articles/ukairpollutionremovalhowmuchpollutiondoesvegetationremoveinyourarea/2018-07-30

- *In 2015 the coastal corridor and its immediately surrounding area potentially removed an estimated 6,279,357 kg of air pollutants (including ammonia, nitrogen dioxide, ozone, PM10, PM2.5, sulphur dioxide). The average kg removed per km² is however lower in the coastal corridor than in the rest of Cornwall.*
- *The coastal corridor and its immediately surrounding areas are responsible for the removal of an estimated 25% of all air pollutants removed by vegetation in Cornwall (this is not restricted to the 1km strip).*
- *The highest performing areas for air pollution removal by vegetation in the coastal corridor are close to Wadebridge, Tehidy, Mylor Bridge, Looe, Helford Passage, St Germans and Seaton.*

Poor air quality can have a number of adverse health impacts for usual residents. Although air quality is generally good across Cornwall, there are a number of hotspots where air standards fail to meet national air quality objectives. Poor air quality in Cornwall is thought to be due to the volume of traffic congestion, the street canyon effects, or a combination of these factors (Cornwall Council 2018[158]). Nine air quality management areas have been declared across Cornwall, including Camborne, Pool and Redruth (AQMA declared in 2005), Bodmin (AQMA declared 2008), Tideford (AQMA declared 2011), Gunnislake (AQMA declared 2014), St Austell (AQMA declared 2014), Truro (AQMA declared in 2015), Camelford (AQMA declared in 2017), Grampound (declared 2017) and Launceston (declared 2018).

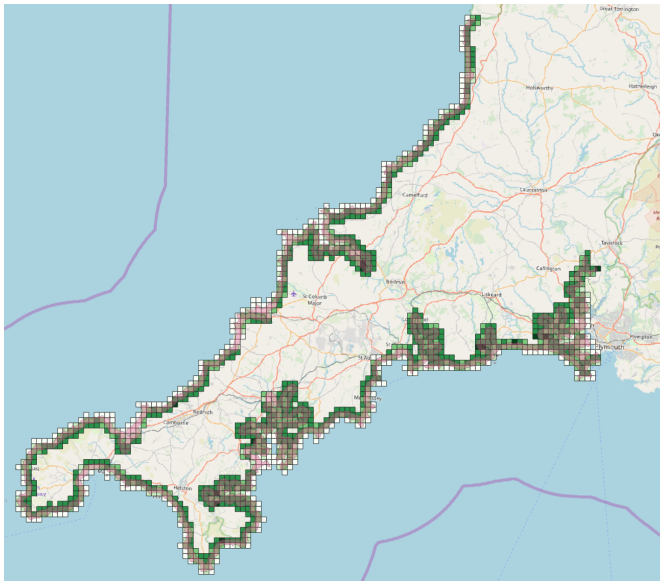
Plants and trees can play a central, and often unrecognised, role in the regulation of key pollutants, including particulate matter (≤10µm in diameter) (PM10) and sulphur dioxide (SO2) (Jones et al 2019[159]). Vegetation helps remove pollutants from the air primarily by intercepting airborne particulates (especially PM10), which are then deposited on surfaces such as leaves and bark, and also by absorbing ozone, SO2 and NOX via stomatal uptake (Bignal et al. 2004[160]). Different amounts of pollutants can be absorbed by different vegetation types and extrapolated to different habitats. Air purification capacity estimates are based on the relative ability of vegetation to trap airborne pollutants or ameliorate air pollution. The highest rates of PM_{10} absorption are by woodland ecosystems, particularly coniferous woodland (ONS 2019). For the UK as a whole, woodlands are estimated to account for over 80% of all PM2.5 removed from the air by vegetation (ONS 2019).

Estimates of the capacity of vegetation in the coastal corridor to contribute to air quality improvements were made based on the ONS and the CEH's national map of pollution removal by vegetation (ONS 2019[161]). On average 66kg of pollutants are potentially removed by vegetation per ha/yr in Cornwall, this is one of the highest amounts of all UK regions (ONS 2019). In 2015, the coastal corridor and its immediate surrounding area are estimated to have potentially removed some 6,279,000kg of pollutants from the air (Table 80), this equates to 25% all pollutants removed from the air by vegetation in 2015 in Cornwall. The highest performing areas were close to Wadebridge, Tehidy, Mylor Bridge, Looe, Helford Passage, St Germans and Seaton.

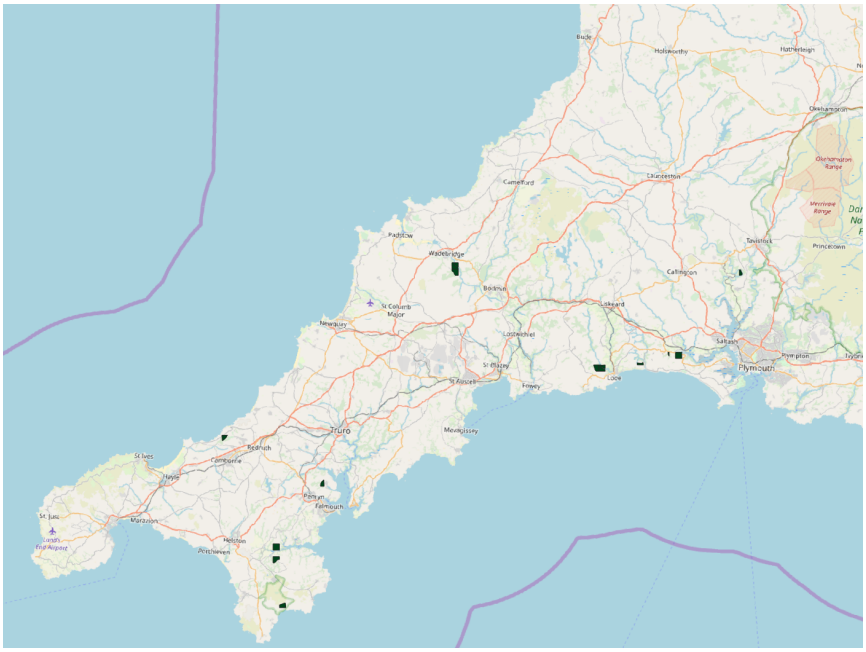
Kilograms of pollutants removed by vegetation in 2015	Coastal Corridor	Rest of Cornwall	Cornwall
Ammonia (NH3)	138665	552104.4	690769.4
Nitrogen Dioxide (NO2)	67964.72	184253.4	252218.1
Ozone (O3)	5602988	16267362	21870350
Particulate Matter (PM10)	225474.4	580382.1	805856.5
Fine Particulate Matter (PM2.5)	96521.62	270183.3	366704.9
Sulphur Dioxide (SO2)	147742.8	455978.8	603721.7
Total (All pollutants)	**6,279,357**	**18,310,264**	**24,589,621**
Average kg removed per ha	51	66	62

Table 80. Air pollution removal by vegetation in the coastal corridor (ONS 2019)

[158] *Cornwall Council 2018* https://www.cornwall.gov.uk/media/35432115/cornwall-council-asr_2018-final.pdf
[159] *Jones et al. (2019) Natural capital accounting and air quality removal;* https://www.charteredforesters.org/wp-content/uploads/2019/01/Jones-et-al-Natural-capital-accounting-of-the-air-quality-regulating-....pdf
[160] *Bignal et al. (2004) The ecological effects of diffuse air pollution from road transport. English Nature Research Report 580.*
[161] *ONS and CEH (2019)*
https://www.ons.gov.uk/economy/environmentalaccounts/articles/ukairpollutionremovalhowmuchpollutiondoesvegetationremoveinyourarea/2018-07-30



Map 12. Areas included in the coastal corridor analysis of potential for air pollution removed by vegetation (Source: ONS 2019, UK Air Pollution Removal Geopackage[162])



Map 13. Highest performing areas for air pollution removal by vegetation in the coastal corridor (Source: ONS 2019, UK Air Pollution Removal)

Noise regulation

- *Given the concentration of urban areas and high human population density it is anticipated that natural capital assets in the coastal corridor (particularly broadleaved woodlands and scrub habitats) perform significant noise regulation services for usual residents, however, it has not been possible to quantify these benefits.*

Noise associated with traffic, centres of human population and urbanisation, is a recognised public health issue (Berglund et al 1999[163]; HPA 2010[164]), which can have negative effects on human welfare in terms of health and wellbeing. Physiological symptoms

[162] https://www.ons.gov.uk/economy/environmentalaccounts/articles/ukairpollutionremovalhowmuchpollutiondoesvegetationremoveinyourarea/2018-07-30

of noise can manifest in different kinds of stress reactions, increased blood pressure, increased risk of coronary artery disease and disturbances in the immune system. The World Health Organisation estimated that over 50% of the UK population lives in dwellings exposed to noise levels exceeding guideline values, with a health cost of some £2 billion, alongside additional costs associated with 'annoyance' and lost productivity. The UK Health Protection Agency (HPA 2010[165]) estimates that 10% of the population lives in areas of excessive daytime sound levels, and found that up to 30% of the population expresses dissatisfaction in surveys of their local noise environment. Noise pollution can also have negative ecological consequences for wildlife (Tennessen et al 2014[166]).

The capacity of vegetation to regulate or attenuate noise is a recognised ecosystem service (Bolmund and Hunhammar 1999[167]) and is particularly significant in vegetation occurring around towns and cities. Natural vegetation can regulate noise pollution through intercepting noise and reducing the reflection of noise. Different habitat types vary in their effectiveness in attenuating noise, relating to the structure, size and density of vegetation they contain (Fang and Ling 2005[168]) (e.g. Table 80). Wide, complex, dense and high vegetation (trees and shrubs) is particularly effective, for example, every 30m of woodland has been found to reduce noise by 5-10 decibels (Cook & Haverbeke 1972), while evergreen vegetation provides more enhanced noise reduction year-round. As shown in Table 80, coniferous woodland, broadleaved woodland, scattered trees and scrub habitats all have a high potential to regulate noise.

Under the time constraints of this project, it has not been possible to produce detailed noise reduction potential maps for the coastal corridor. However, given the concentration of urban areas and high population density, it is anticipated that natural capital assets in the coastal corridor (particularly broadleaved woodlands and scrub habitats) perform significant regulation of noise pollution for usual residents.

Habitats	Noise Regulation Value
Coniferous Woodland	100
Woodland Broadleaved	80
Scrub (all)	40
Scattered trees all	40
All other green spaces	10
Hedges and Walls	5
All manmade	0

Table 80. Noise regulation potential scored for different habitat types as used in the ECoServGIS model[169]. Habitat age and management is not considered.

Freshwater Quality

- *Cornwall faces a number of significant water quality issues as a result of historic mining actives, industry, development and agricultural practices.*
- *Wetland areas in the coastal corridor are also likely to play a significant role in water quality regulation through denitrification, nitrification and mineralisation of pollutants (e.g. Maltby et al. 2011[170]). There is also an increasing body of evidence that sand dunes and shingle can help to reduce diffuse pollution in the marine environment with positive outcomes on bathing water quality.*
- *The potential of natural capital assets in the coastal corridor to regulate water quality is relatively low, just 2332 ha are scored as having any capacity to deliver water quality benefits, equating to just 3.5% of the coastal corridor (Mosedale et al. 2019 in prep). Furthermore, the majority (49%) of this area only has a low capacity to deliver benefits (Mosedale et al. 2019 in prep).*
- *Areas with concentrated potential to provide improvements in water quality capacity include Marazion, St Ives, Porthleven, Treen, Lamorna, Hayle to Porthreath, Truro, Devoran, Perranaworthal, Ruan Lanihorne, St Austell to Par, Seaton, Hatt, Boscastle, Coombe (Bude), Marsland wood, Perran beach.*

Water quality refers to the biological, chemical and physical makeup of water resources. Good water quality is critical to human and ecosystem health, whilst poor water quality will alter ecosystems, endanger human health and can cause economic damage. A wide

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[163] *Berglund et al. (1999) Guidelines for community noise. World Health Organization. https://apps.who.int/iris/handle/10665/66217*
[164] *Health Protection Agency (2010) Health protection legislation guidance 2010*
[165] *HPA (2010)*
https://webarchive.nationalarchives.gov.uk/20100716121707/http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1246433634856
[166] *Tennessen et al. (2014) Traffic noise causes physiological stress and impairs breeding migration behaviour in frogs. Conservation Physiology 2: cou132. doi: 10.1093/conphys/cou032*
[167] *Bolund, P. & Hunhammar, S. 1999. Ecosystem services in urban areas. Ecological Economics 29: 293-301.*
[168] *Fang and Ling (2003) Investigation of the noise reduction provided by tree belts. Landscape and Urban Planning 63:187-195*
[169] *Winn, et al. (2015)* EcoServ-GIS Version 3.3 (Great Britain): A toolkit for mapping ecosystem services. *User Guide. The Wildlife Trusts.*
[170] *Maltby and Acreman (2011) Ecosystem services of wetlands: pathfinder for a new paradigm. Hydrological Sciences Journal, 56 (8): 1341-1359.*

range of factors influence water quality, including pollutants released through industrialisation, climate change, manufacturing and agricultural production, and '*the complex interactions of climate, topography and geology, land cover and management, and other anthropogenic modification of the landscape*'. Water quality is not an ecosystem service in itself (Braunman et al 2007[171]), however, natural capital assets have the capacity to deliver water purification services by absorbing or filtering pollutants or by a physical process such as vegetation preventing or reducing erosion (Lautenbach et al 2012[172]). For example, the targeted planting of woodland close to pollutant sources and pollution delivery pathways have been shown to reduce diffuse pollution (Nesbet et al 2011[173]). These water purification services delivered by natural capital assets can take place during overland flow, infiltration, leaching, groundwater passage or in wetlands or water bodies (Lautenbach et al 2012). There are a wide range of knock-on benefits of delivering improved water quality, including aesthetic and recreation benefits, decreasing water treatment costs, and supporting fish stocks for commercial or recreational purposes (Loomis 2000[174]).

Cornwall faces a number of significant water quality issues. One of the most significant for surface and groundwater quality is the history of mining in Cornwall, and discharges from abandoned mines impact heavily on the quality of rivers, such as the Red River, River Carnon and River Cober, and also on the quality of the groundwater. Commercial farming in Cornwall also causes diffuse pollution (mainly Phosphorous and Nitrate) from agricultural run-off which has a major impact on water quality. Cornwall has designated shellfish areas in the Fal, Fowey, Camel, Helford and Tamar estuaries likely to be impacted by changes in water quality. Substantial areas of Cornwall are designated as Nitrogen Vulnerable Zones.

Research on ecosystem services mapping by Natural England indicates that the habitats, and associated underlying soils, which contribute most to the regulation of water quality include freshwater, broadleaf, mixed and yew woodland, coniferous woodland and supra-littoral sediment (Dales et al 2014[175]). Woodland, scrub and bracken have been found to help to regulate diffuse pollution. Agricultural assets are more likely to have negative effects on water quality. There is an increasing body of evidence that sand dunes and shingle also help to reduce diffuse pollution in the marine environment with positive outcomes on bathing water quality. UK specific research is however lacking. Notably, wetland areas in the coastal corridor are also likely to play a significant role in water quality regulation through denitrification, nitrification and mineralisation of pollutants (Maltby et al. 2011; Van der Wal et al. 2011[176]).

Sub habitat type	Score
Littoral rock	3
Littoral sediment	3
Supra-littoral rock	3
Supra-littoral sediment	3
Arable and horticulture	1
Improved grassland	1
Neutral grassland	1
Freshwater	3
Fen, Marsh & Swamp	2
Bog	2
Dwarf shrub heath	2
Inland rock	2
Montane habitats	2
Acid grassland	2
Calcareous grassland	2
Rough low-productivity grassland	2
Built up areas and gardens	1
Broad leaved, mixed, & yew woodland	3
Coniferous woodland	3

Table 81. Water Quality Scores for Habitat Types (Source: CEH Assessing potential to map ecosystem services Dales et al. 2014)

Water quality is monitored by the EA under the Water Framework Directive (WFD). Between 2009 and 2013 no river in Cornwall was classed as having high water quality under the WFD (Environmental Growth Strategy 2016). Looking at the three river management catchments in Cornwall reveals differences in water quality issues across Cornwall (EA 2011[177]).

West Cornwall and the Fal

There are 127 river water bodies, with a combined length of almost 740km, and eight lakes in the West Cornwall and Fal catchment. 27% of these waters (154km or 21% of river length and three or 38% of the lakes) achieve good or better ecological status/potential (EA 2011). Rivers at good ecological status include the Newlyn River and the Zelah Brook. 44% of waters assessed for biology are at good or high biological status (EA 2011). The main reasons for less than good status are, in order, high levels of copper and zinc, physical modifications, impacted invertebrate and fish communities and high levels of phosphate. These are caused by mining and quarrying, agricultural and rural land management

[171] *Braunman et al (2007) The nature and value of ecosystem services: an overview highlighting hydrologic services. Annu Rev Environ Resour, 32: 67-98.[Crossref], [Web of Science ®], , [Google Scholar]*
[172] *Lautenbach et al (2012) https://www.tandfonline.com/doi/full/10.1080/21513732.2011.631940*
[173] *Nisbet et al. (2011) Woodland for Water: Woodland measures for meeting Water Framework Directive objectives. Forest Research Monograph, 4, Forest Research, Surrey, 156pp.*
[174] *Loomis (2000) Measuring the total economic value of restoring ecosystem services in an impaired river basin: results from a contingent valuation survey. Ecol Econ, 33(1): 103-117.*
[175] *Dales et al. (2014) Assessing the potential for mapping ecosystem services in England based on existing habitats. Natural England Research Reports, Number 056*
[176] *Van der Wal et al. (2011) Mountains, Moorlands and Heaths. UK National Ecosystem Assessment. The UK National Ecosystem Assessment Technical Report. UNEP-WCMN, Cambridge, pp. 105–159.*
[177] *EA (2011) Water for life and livelihoods: River basin management plan SW River Basis District, EA report, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/292791/gesw0910bstp-e-e.pdf*

challenges, industry, domestic and general public issues, water utility issues, urban and transport issues. Water bodies which have bad or poor ecological status include the Loe, Poltesco River, Porthleven Stream, Carminowe Creek and Cury River (EA 2019).

North Cornwall, Seaton, Looe and Fowey Catchment

There are 99 river water bodies in the North Cornwall, Seaton, Looe and Fowey catchment, with a combined length of almost 600 km, and four lakes. There are significant abstractions in the area for hydroelectric generation, aquaculture and agriculture as well as public water supply. The Colliford Reservoir is an important source of public water supply. An estimated 44% of these waters (219 km or 37% of river length, but none of the lakes) achieve good or better ecological status/potential. Rivers at good status include the upper Fowey and large parts of the River Camel. The main reasons for less than good status are impacted fish communities, physical modifications, and high levels of copper, phosphate and zinc. Water bodies which have bad or poor ecological status include sections of Lower River Strat, Lower River, Benny Stream, Fowey, Crackington Stream, Valency, Gannel (Upper). Colliford Lake, Siblyback Lake, Dozmary Pool, Lerryn River, Warleggan River, Menalhyl, Polmorla Stream, Amble, Issey Brook, Camel, Polperro River, Seaton, West Looe River and many more.

Tamar Catchment

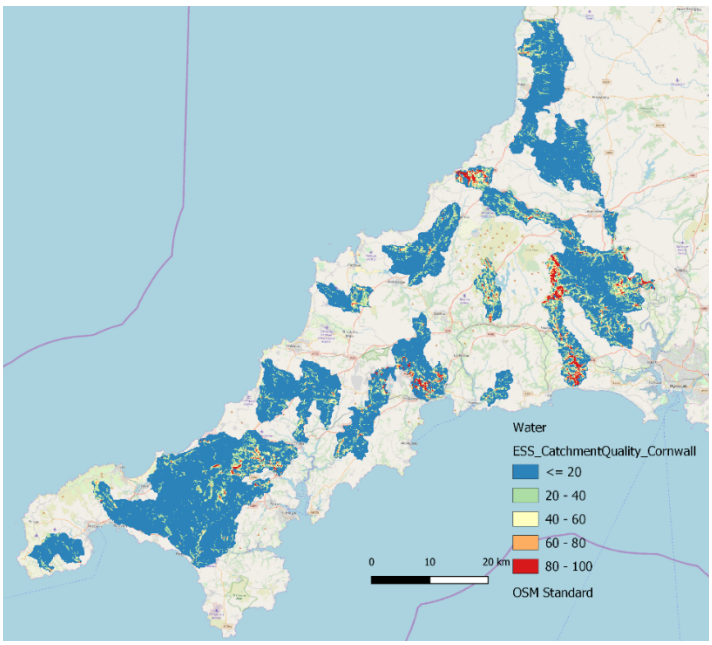
There are 96 river water bodies in the Tamar catchment, with a combined length of just over 800 km, and four lakes. An estimated 39% of water bodies are in good ecological status (EA, 2011). Rivers at good ecological status include most of the river Ottery, Caudworthy Water and the Kensey. The main reasons for less than good status are impacted fish communities, physical modification, high levels of copper, phosphate and an impacted diatom community. Water bodies which have bad or poor ecological status include sections of Upper Tamar Lake, river Deer, Tala Water, Upper River Tamar, Derril Water, Lower Tmar Lake, Lamberal Water, Tala Water, Caudworthy Water, Withey Brook, Tory Brook, River Yealm, River Inny, Tamar (Kelly Brook)

Capacity of natural capital assets to deliver water quality benefits

The potential of natural capital assets to regulate water pollution have been mapped for Cornwall through the SWEEP Mainstreaming Environmental Growth Project (Mosedale et al 2019 in press). Water quality ecosystem service capacity mapping combines factors which cause pollution (such as soil erosion and agricultural surface water runoff), with factors known to reduce pollution through minimising bank erosion, soil loss, slow flow, such as land cover type and vegetation characteristics, to provide a score for every 100m^2 cell across Cornwall related to their capacity to improve water quality (See Map 14 and Map 15, Mosedale et al 2019 in press). The maps also take into account beneficiaries of these ecosystem services by identifying potentially vulnerable activities and areas, such as drinking water abstraction zones, bathing waters, aquaculture sites, tourism and recreation sites, water bodies and catchment areas known to be in 'not good' ecological status under the WFD, and existing land designation associated with threats to watercourses such as nitrate and phosphate sensitive areas. As shown in Map 15 and Table 82, the potential of natural capital assets in the coastal corridor to regulate water quality is relatively low, just 2332 ha are scored as having some capacity to deliver water quality benefits or 3.5% of the coastal corridor. Furthermore, the majority of this area has only a low potential to deliver improvement in water quality (49%) however some 22% does have a medium-high or high potential, equating to 288 ha. Areas with potential to provide improvements are near to Marazion, St Ives, Porthleven, Treen, Lamorna, Hayle to Porthreath, Truro, Devoran, Perranaworthal, Ruan Lanihorne, St Austell to Par, Seaton, Hatt, Boscastle, Coombe (Bude), Marsland wood, Perran Beach.

Water Quality Capacity Score	Score range	Area (ha)	%
Low	1 – 20	**1,150**	49%
Low – Medium	20 – 40	**655**	28%
Medium	40 – 60	**239**	10%
Medium- High	60 – 80	**126**	5%
High	80 - 100	**162**	7%
Total		**2,332**	

Table 82. Area of the coastal corridor with the capacity to regulate water quality (Mosedale et al 2019 in press)



Map 14. Capacity of land to aid water quality improvements (blue low, red high) (Mosedale et al 2019 in press)

Map 15. Capacity of land to aid water quality improvements (blue low, red high) (Mosedale et al 2019 in press)

Bathing water quality

- *Bathing water quality influences the potential for recreational use. Much like freshwater quality, natural capital assets can help to improve bathing water quality by reducing pollution from surface and ground waters.*
- *19% of the coastal corridor was found to have some capacity to deliver benefits for bathing water quality through land use or management changes, equating to around 12,662 ha. The majority of this area (50%) only had a low potential to deliver benefits with just 11% having the potential to deliver medium-high to high benefits, some 1382 ha.*

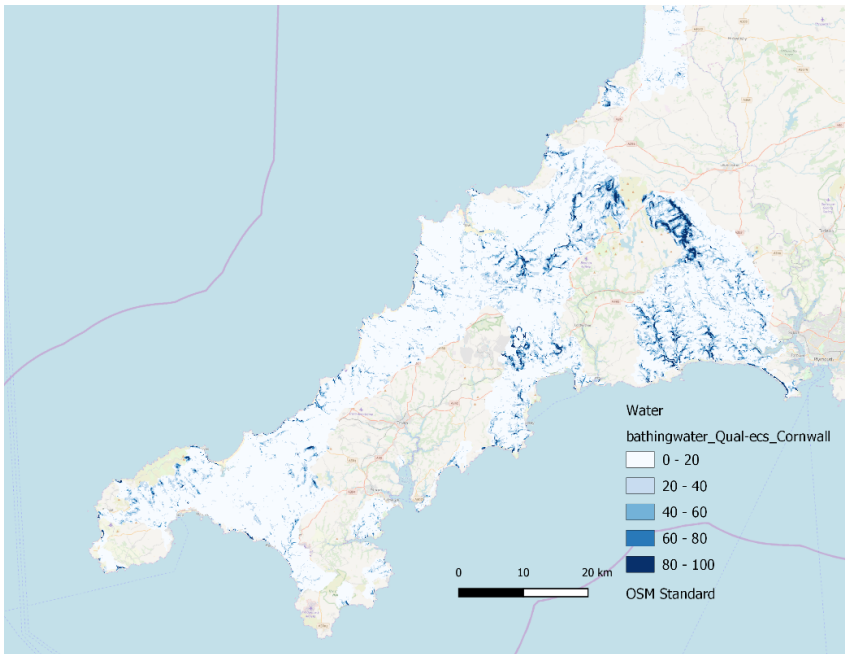
People visiting a beach use the water for a variety of activities including bathing and marine recreation. Bathing water quality influences the potential for recreational use. Monitoring of bathing water quality aims to safeguard public health and ecosystems. "*A bathing water is defined as a beach (or inland site) used by a large number of bathers or where bathing is promoted or associated*

facilities are provided" (Marine Conservation Society 2019[178]). Not all waters are classed as bathing waters, and in Cornwall there are around 90 designated bathing waters. Water quality is only monitored at popular beaches which are called '*designated bathing waters'*. The major sources of bathing water pollution are sewage and water draining from farms and farmland. These sources of pollution generally increase during heavy rains and floods due to sewage overflow and polluted drainage water being washed into rivers and seas. The EU's revised Bathing Water Directive specifies if bathing water quality can be classified as 'excellent', 'good', 'sufficient' or 'poor' depending on the levels of faecal bacteria detected.

Much like freshwater quality, natural capital assets can help to improve bathing water quality by reducing pollution from surface and ground waters. The potential of natural capital assets to regulate bathing water pollution have been mapped for Cornwall through the SWEEP Mainstreaming Environmental Growth Project (Mosedale et al 2019 in press). 19% of the coastal corridor was found to have some capacity to deliver benefits for bathing water quality through land use or management changes, equating to around 12,662 ha. The majority of this area (50%) only had a low potential to deliver benefits with just 11% having the potential to deliver medium-high to high benefits, some 1382 ha. Areas with the greatest potential are close to Looe, Saltash, Fowey to St Blazey, Gorren Haven, Castle wood, Carne Beach, St Anthony Head, Mawana Smith/Helford/passage, Helford, Parthhallow, Manacle point and Dean Quarries, Kennack Sands, Mullion, Rinsey, Treen, Sennan, Portheras Cover, St Ives, Hells mouth to Perranporth, Wadebridge and Crackington Haven.

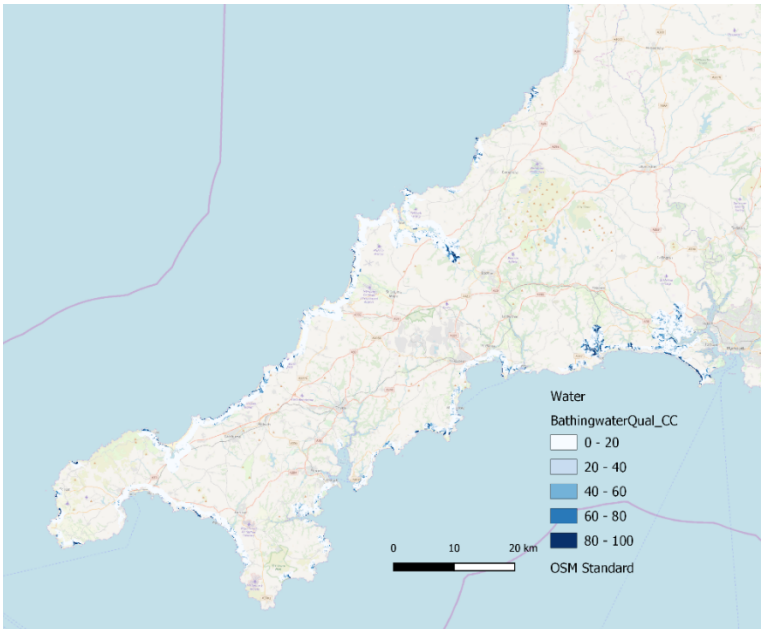
Bathing water Capacity Score	Score range	Area (ha)	%
Low	1 – 20	6268	50%
Low – Medium	20 – 40	3549	28%
Medium	40 – 60	1463	12%
Medium- High	60 – 80	778	6%
High	80 - 100	604	5%
Total		**12662**	

Table 83. Area of the coastal corridor with capacity to regulate bathing water quality (Mosedale et al 2019 in press)



Map 16. Capacity to influence bathing water quality (Mosedale et al. 2019 in press)

[178] https://www.mcsuk.org/clean-seas/bathing-water-facts



Map 17. Coastal corridor capacity to influence bathing water quality (Mosedale et al. 2019 in press)

Water Flow Capacity

- *The UK NEA (2011) identifies coastal margins as playing an important role in storing and slowing the flow of surface water runoff.*
- *The capacity of the land to mitigate flood risk is much less in the coastal corridor than in other areas in Cornwall. The majority of natural capital assets with high flood mitigation potential are around NW and central Cornwall (Mosedale et al 2019 in press).*
- *Some 29,808 ha of the coastal corridor has some potential capacity to deliver flood mitigation benefits, almost 45% of the coastal corridor. 132 ha of the coastal corridor has 'high' potential to deliver flood mitigation benefits. However, the vast majority of this area (93%) only has a low potential to deliver flood mitigation benefits (Mosedale et al 2019 in press).*
- *Spatially some of the highest scoring areas in the coastal corridor for flood mitigation potential are immediately upstream from Wadebridge, close to Mousehole, Porthreath, between Penryn and Falmouth, and at Looe (Mosedale et al 2019 in press).*

Water flow capacity is the capacity of natural capital assets to slow water runoff and thereby contribute to flood alleviation. The extent and severity of flood events depend on the rate at which rainfall accumulates on the ground's surface and is transferred to rivers. There is an increasing body of evidence supporting the role of natural vegetation, topography, soil structure and land use in the mitigation of downstream flood risk (EA 2019[179]). Land cover and vegetation affect surface runoff rates by intercepting rainfall, evapotranspiration, and improved soil infiltration. By slowing and intercepting overland surface flow, natural capital assets can act to moderate extreme events by increasing the runoff time and reducing the magnitude of downstream peak flows. More impervious surfaces and certain agricultural land uses (including overgrazing, ploughing and crop production) lead to soil compaction and reduced rates of water infiltration. Natural capital assets with a higher capacity to slow water transfer include those with high vegetation cover, such as woodlands, scrub, grasslands and wetland. The UK NEA also identifies coastal margins as playing an important role in storing and slowing the flow of surface water runoff (NEA 2011). Higher amounts of vegetation are particularly important for the interception of water flow and increasing the infiltration properties of soils. The location of natural capital assets also affects their capacity to deliver flood mitigation benefits, in particular benefits can be maximised by increasing vegetation in upper catchments, and reducing grazing in other areas, or the creation of buffer strips close to watercourses and field boundaries. In particular, the expansion of wetland and woodlands are seen as crucial to increasing the capacity of the landscape to attenuate surface runoff and increase infiltration.

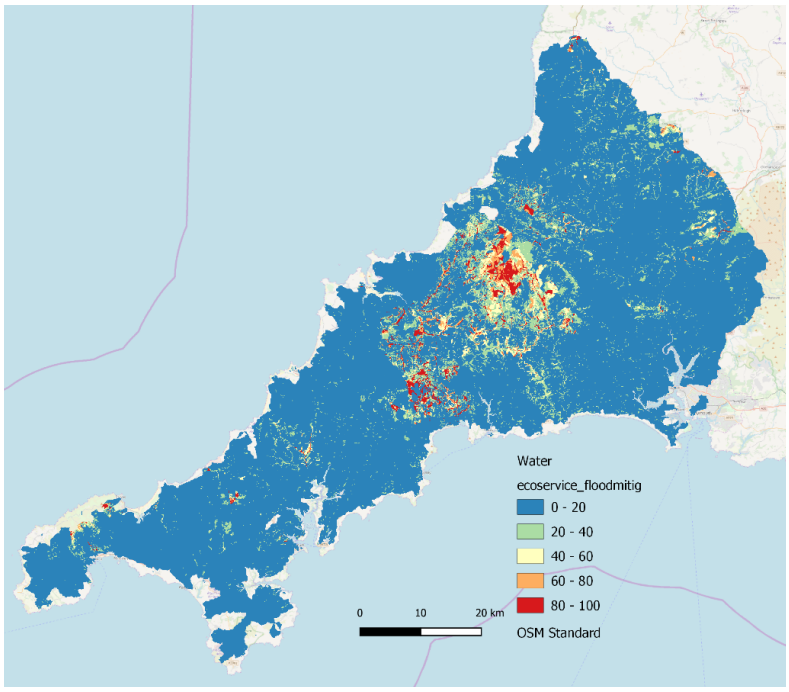
[179] *EA (2019) Evidence Directory - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/654440/Working_with_natural_processes_one_page_summaries.pdf*

The potential of natural capital assets to mitigate flood risk has been mapped for Cornwall through the SWEEP Mainstreaming Environmental Growth Project (Mosedale et al. 2019 in prep). Maps 18 and 19 (Mosedale et al. 2019 in prep) combine estimates of potentially vulnerable areas (i.e. buildings at risk of flooding downstream) with flood mitigation potential (i.e. the potential of land cover to mitigate the risk of flooding). The location of areas potentially vulnerable to flooding (beneficiary areas) has been derived for each grid cell based on where existing built-up areas, or areas assigned to an allocation zone, fall within EA flood risk zones for surface water or rivers/seas flooding with a risk greater than 0.1% per annum (Mosedale et al. 2019 in prep). To map the potential flood mitigation capacity of habitats, Mosedale et al. (2019 in press) score areas based on the potential of different land cover types to intercept surface water runoff, the resistance of land cover to water flow, soil loss and transportation, combined with rainfall erosivity and peak flow velocity. There are number of acknowledged limitations to the flood mitigation capacity map, the main ones include that (i) it does not take account of areas which are already benefitting from flood protection or flood storage areas, (ii) the effects of land management practices are excluded, (iii) the interdependence of landcover effects (or changes) across a catchment area are excluded, (iv) the importance of hedgerows to reduce overland flow is excluded, and (v) watercourse characteristics that could affect flow velocity are not included.

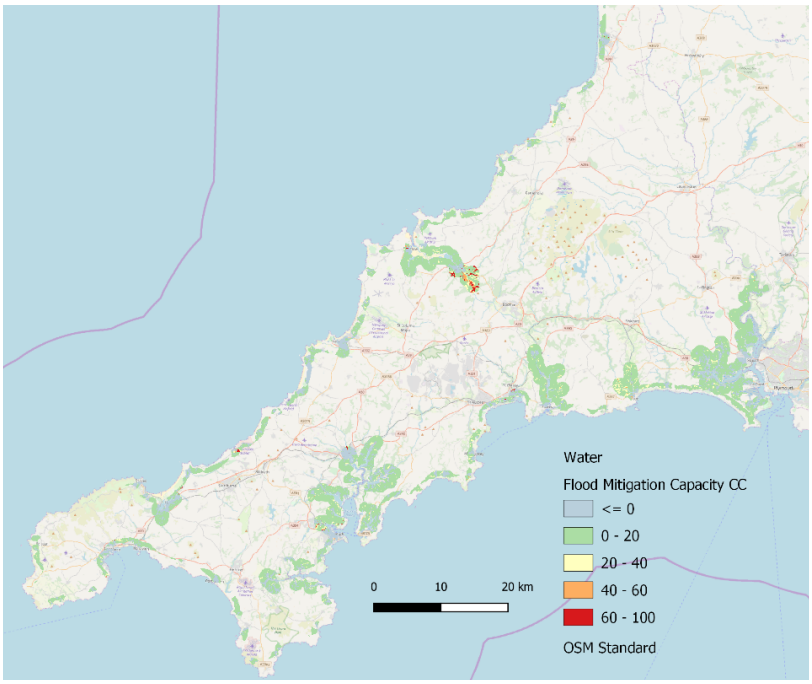
The capacity of the land to mitigate flood risk is much less in the coastal corridor than in other areas in Cornwall. As shown in map 19, the majority of flood mitigation potential is around NE and central Cornwall. Some 29,808 ha of the coastal corridor does have some potential capacity to deliver flood mitigation benefits, almost 45% of the coastal corridor, however the vast majority of this area (93%) only has low such potential. Notably, 132 ha of the coastal corridor has high potential to deliver flood mitigation benefits. Spatially some of the highest scoring areas in the coastal corridor are immediately upstream from Wadebridge, close to Mousehole, Porthreath, between Penryn and Falmouth, and at Looe.

	Scores	Coastal Corridor Area (ha)	%
Low	1 – 20	27,640	*93%*
Low – Medium	20 – 40	1,787	*6%*
Medium	40 – 60	154	*1%*
Medium- High	60 – 80	95	*0.3%*
High	80 - 100	132	0.4%
Total		**29,808**	

Table 84. Flood mitigation potential in the Coastal Corridor (Mosedale et al. 2019 in prep)



Map 18. Flood mitigation potential in Cornwall (Mosedale et al. 2019 in prep)



Map 19. Flood mitigation potential in the coastal corridor (Mosedale et al. 2019 in prep).

4.02.02 Provisioning Ecosystem Services

Fibre (timber production)

- *Woodlands in the coastal corridor contain an estimated 1,782,212 m³ standing volume of timber, equating to 20.7% of the total standing stock timber volume in Cornwall.*
- *Under prescribed management conditions, woodlands in the coastal corridor have the potential to generate an estimated 38.5 thousand m³ per year in annual growth in timber volume (17% of Cornwall's total).*

11.4% (7,400 ha) of the coastal corridor is covered by woodlands (see sections 3.04.04; and 4.01.02). The majority of these woodlands, some 85%, are over 0.5ha in size (NFI 2017[180]). Within the coastal corridor, broadleaved woodlands represent 97% of the resource. Many of these woodlands are privately owned and their management and condition is unknown. Major woodland owners in Cornwall include the Forestry Commission (10%), National Trust, Cornwall Wildlife Trust, The Woodland Trust and the Duchy of Cornwall. Woodlands provide a range of ecosystem services including the provision of fibre or timber, for use in construction, wood chip for board and wood fuel. Other provisioning services from woodlands include non-timber forest products, e.g. tree fruit, foliage, wild deer or livestock raised in woodland, water supply, and biodiversity (Sing et al. 2015[181]). This section estimates the volume of timber (standing timber stock) present in the coastal corridor and estimated annual increases.

Standing Timber Stock Volume

Wood stock volume, or standing stock volume (m³), of broadleaved and coniferous woodlands, has been estimated for all areas mapped by the Forestry Commission (FC) through the National Forest Inventory (NFI, 2011, 2013) in the coastal corridor and Cornwall. To calculate standing volume in the coastal corridor, NFI standing stock volume estimates for Devon, Cornwall and the Isles of Scilly (FC 2017/6) were applied to the extent of woodland in these two counties to provide an estimated average standing volume (m³) per ha, following the methodology outlined by Eftec (2015[182]). Average standing volume (m³) per ha was then summed

[180] *NFI (2017) https://www.forestresearch.gov.uk/tools-and-resources/national-forest-inventory/about-the-nfi/*
[181] *Sing et al. (2015) https://www.forestry.gov.uk/PDF/FCRN020.pdf/$FILE/FCRN020.pdf*
[182] *Methodological approach as outlined in Eftec (2015) Developing UK Natural Capital Accounts: Woodland Ecosystem Accounts, Report to Defra, Available at: http://sciencesearch.defra.gov.uk/Document.aspx?Document=12480_DevelopingUKNCAccounts_WoodlandEcosystemAccount_FINAL_March2015.pdf*

by the total species (broadleaved/coniferous) areas for both Cornwall and the coastal corridor[183], to give a broad estimate of total standing timber volume. Based on average standing volume per ha, woodlands in the coastal corridor contain an estimated physical stock of 1,782,212 m^3 in standing volume of timber. The volume of standing timber in the coastal corridor equates to 20.7% of the total volume in Cornwall.

Species	AVER Standing Volume m^3 per ha	CC total standing vol m^3	Cornwall total standing vol m^3
Coniferous	318.5	69,847.5	1,465,225.9
Broadleaved	238.4	1,712,365.2	7,147,370.3
	TOTAL	1,782,212 **m^3**[20.7%]	8,612,596 **m^3**

Table 85. Standing Stock volume estimates for woodlands in the coastal corridor (Source: Forestry Commission 2017)

Annual Yield

There is no available spatial data on the distribution of timber provision across UK woodlands at a subnational level (eftec 2015[184]). In the absence of detailed figures on local timber harvesting, the standing stock of woodlands combined with average annual yield figures (m3 per ha per yr) can be used to provide a crude estimate of how much timber will be produced annually in the coastal corridor, and its approximate value (Eftec 2015). Yields (m3 per ha/yr) are estimated by the FC based on patterns of tree growth and predicted potential productivity which should be expected for forestry stands of different tree species, with varying growth rates, when managed in different ways (FC 2016[185]). Yield classes, calculated by the FC, provide an estimate of the potential productivity of a woodland, in terms of maximum mean annual increment of cumulative timber volume achieved. The FC publishes mean yields for all broadleaved and coniferous woodlands at subregional levels, including for Devon, Cornwall and the Isles of Scilly (FC 2017[186]). Yield estimates are limited as they are designed to be applied to even-aged stands of trees, and have limited application to woodland stands with more complex structure and management, for example, uneven-aged stands of trees. Any deviation from management prescriptions will result in different stand characteristics and yields. It is unclear how much woodland in Cornwall is under active management, but there are suggestions that up to 50% of woodland in the SW is unmanaged. Therefore, yield classes are likely to provide only a crude estimate of annual yield volume in the coastal corridor.

Using local yield estimates suggests that woodlands in the coastal corridor could potentially generate an additional 38.5 thousand m^3 in timber volume growth per year (17% of Cornwall's total). As outlined above, this figure is acknowledged only to be an estimate. As highlighted above it is not understood how much of this woodland is harvested per year and average yield data has been used without knowledge of stand densities and management. However, the CAONB suggests that the total harvesting level across the CAONB (which covers some 60+% of the coastal corridor) has not changed significantly between 1995 and 2015, but the use of harvested resources has changed from chipboard towards wood fuel production (Holzinger and Laughlin 2016). A rudimentary value for the present asset value can be assigned to the annual incremental growth of timber volume in woodlands by combining the annual volume of timber produced (m^3 per year) by the unit value of timber (£ per m^3) (eftec 2015). This suggests a yield value of around £658 thousand per year. To improve this figure, more information on the annual volume of timber removed or harvested each year is needed, along with management. No attempt has been made to project the capacity of woodland to provide timber into the future.

	FC Devon, Cornwall and the Isles of Scilly	Coastal Corridor		Cornwall	
	Average annual yield	Area (ha)	Annual Yield potential m3 per yr	Area (ha)	Annual Yield m3 per yr
Coniferous	15.4 m^3 ha yr	219.3	3,377.1	4,600.2	70,842.3
Broadleaved	4.9 m^3 ha yr	7,182.7	35,195.4	29,980.6	146,904.8
		TOTAL	38,572.5		217,747.1

Table 86. Estimates of timber volume growth per year for the coastal corridor.

[183] *Based on the NFI stats for Devon, Cornwall and the Isles of Scilly, FC 2017/6 estimates of the total stocked area of woodland (coniferous and broadleaved) and total standing volume m^3. Coniferous woodland stocked area: 25,900 ha (mapped area); Standing volume 8,251,000m^3 obs. Broadleaved woodland 73,200 (mapped area); Standing volume 17,451,000 m^3 obs*

[184] *Eftec (2015) Developing UK Natural Capital Accounts: Woodland Ecosystem Accounts, Report to Defra, Available at: http://sciencesearch.defra.gov.uk/Document.aspx?Document=12480_DevelopingUKNCAccounts_WoodlandEcosystemAccount_FINAL_March2015.pdf*

[185] *FC (2016) https://www.forestry.gov.uk/pdf/FCBK048.pdf/$FILE/FCBK048.pdf*

[186] *FC (2017) National Forest Inventory Statistics for Devon, Cornwall and the Isles of Scilly: https://www.forestresearch.gov.uk/documents/3000/FR_NFI_statistics_report_DCS_2017.pdf*

	Coastal Corridor	Cornwall
	Annual yield value	Annual yield value
Coniferous	£ 102,188[187]	£ 2,143,687
Broadleaved	£ 556,087[188]	£ 2,321,095.8
Total	£658,275	£4,464,782

Table 87. Estimates of the value of timber volume growth per year for the coastal corridor.

Water supply

- *The coastal corridor does not contain any areas likely to influence sensitive surface drinking water supply zones.*
- *The coastal corridor has some significance for groundwater source protection; 328ha of the coastal corridor is classed as a groundwater source protection zone (SPZ) which equates to 16% of Cornwall's total groundwater SPZ.*
- *Three water bodies classed as 'restricted water available' and 'water not available for licencing' intersect with the coastal corridor, including at: Newlyn Commbe River, St Levan Stream, River Kennal, Argal Stream and Bodkiddick stream.*

Natural capital assets are vital for the provision and storage of freshwater resources, for drinking and domestic uses, recreation, power generation, agricultural irrigation and some manufacturing processes. Water supply is the provision of volumes of water independent of its quality (Dales et al 2014[189]). In Cornwall, water abstraction takes place largely for public water supply, but also for mine water treatment, particularly the china clay industry, agriculture, aquaculture, and hydroelectric power generation.

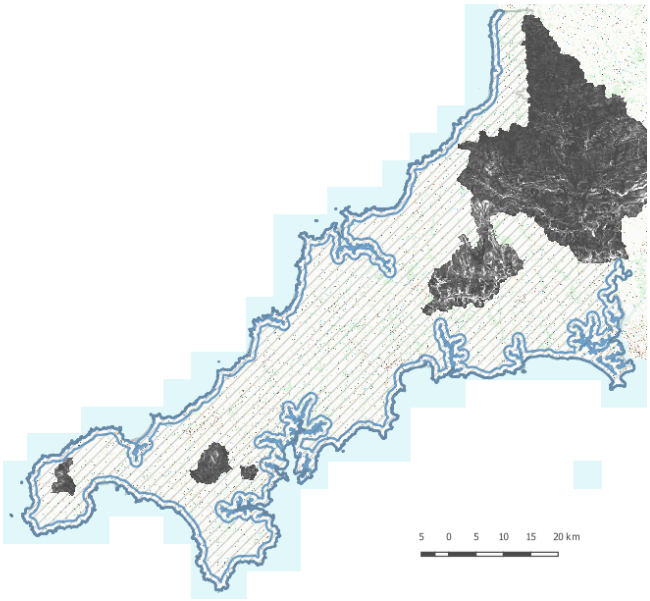
The WWF Water Risk Filter (2019) suggests that some parts of Cornwall are under greater levels of water stress than others, with particularly high risk areas highlighted around Helston and Falmouth, North Tamar, Bodmin, East Cornwall and North of Saltash (WWF 2019[190]). The EA provides further detail on levels of water stress through maps of the availability for additional water for consumptive abstraction for certain water bodies. 89% of the water bodies in Cornwall are classed as '*water available for licencing'*, only 9% is classed as '*restricted water available'* and '*water not available for licencing'.* Three water bodies classed as restricted water available' and 'water not available for licencing' intersect with the coastal corridor, including at Newlyn Commbe River, St Levan Stream, River Kennal, Argal Stream and Bodkiddick stream. Drinking Water Surface Water Safeguarded Zones cover some 62,760 ha of Cornwall. However, there are no drinking surface water sensitive zones (i.e. reservoir catchments) within the coastal corridor (Mosedale et al 2019 in press). Some important areas do however lie close to the corridor, at Treen, North River Tamar Estuary and North of Falmouth and Helston.

[187] *Coniferous woodland areas are more likely to be managed for timber. Average price for softwood in 2017 (Forestry Commission Coniferous Standing Sales price Index (Forestry Commission 2017) inflated for 2018 prices (£30.26). Timber Price Indices - Might be best to take the 5 year average. https://www.forestresearch.gov.uk/tools-and-resources/statistics/statistics-by-topic/timber-statistics/timber-price-indices/*

[188] **The price for broadleaved timber in 2015 ranged from £15 to high quality timber reaching £250 per m3 standing (ABC 2015). For woodlands in Cornwall, broadleaved woodland is assumed to not be managed for commercial forestry and any income would be in the form of woodfuel. The value of woodfuel was estimated using an approximate resource rent based on the market price of woodfuel minus the harvesting, extraction, processing, and transportation costs. (AECOM Dorset) - In 2018 woodfuel price per m3 was £15.80.*

[189] *Dales et al. (2014) Assessing the potential for mapping ecosystem services in England based on existing habitats. Natural England Research Reports, Number 056.*

[190] *WWF (2019) - http://waterriskfilter.panda.org/en/Explore/Map*



Map 20. Important areas for the provision of drinking water (Mosedale et al 2019 in press)

In addition to surface water abstraction, groundwater provides an estimated third of our drinking water in England, and maintains critical water levels in many rivers. Groundwater Source Protection Zones (SPZs) are defined by the Environment Agency (EA) for groundwater sources, such as wells, boreholes and springs, used for public drinking water supply. Groundwater from these SPZ ends up in a public drinking water supply at some point, and therefore it is essential to protect it from contamination by any activities that might cause pollution in the area. SPZs indicate where the risk of contamination from any activities that might cause pollution in the area, in terms of three main zones (inner, outer and total catchment). Mapping of groundwater SPZs in Cornwall indicates that 329ha of the coastal corridor is classed as a groundwater SPZ, equating to 16% of the total groundwater SPZ in Cornwall. Groundwater SPZ are widely distributed across the coastal corridor with sites north of Saltash, near Mylor, Trewithick, St Ives, Upton Towan, Holywell, Boscastle, Budge and Great Winson.

Groundwater Source Protection Zone	CC area (ha)	Count	Cornwall (ha)	Count
Inner Zone	9.6	12	167.9	71
Outer Zone	267.0	11	1357.7	60
TOTAL CATCHMENT	52.1	1	466.4	5
Total Area	328.8	24	1992.0	136

Table 88. Groundwater Source Protection Zones by area in the coastal corridor (EA 2019[191]).

4.02.03 Supporting Ecosystem Services

Pollination

- *The CEH Nectar plant diversity map for bees (Maskell et al 2016[192]) suggests that the coastal corridor has a slightly higher mean value of nectar plant diversity for bees than the average for the whole of Cornwall. Casalegno et al. (2014[193]) also show that the coastal corridor has a slightly higher average habitat availability for pollinators than the rest of Cornwall, with a 5% lower amount of habitat with 'low potential' to provide pollinator habitats and 5% greater coverage of habitats with 'medium potential' to provide pollinator habitats.*
- *The distribution of habitat availability for pollinators shows high concentration around the NW coast of Cornwall particularly around West Penwith, Godrevy and Holywell (Casalegno et al. 2014).*

[191] https://data.gov.uk/dataset/09889a48-0439-4bbe-8f2a-87bba26fbbf5/source-protection-zones-merged

[192] Maskell et al. (2016) Bee nectar plant diversity of Great Britain. NERC Environmental Information Data Centre. http://doi.org/10.5285/623a38dd66e8-42e2-b49f-65a15d63beb5

[193] Casalegno et al. (2014) Regional Scale Prioritisation for Key Ecosystem Services, Renewable Energy Production and Urban Development. PLoS ONE 9(9): e107822. https://doi.org/10.1371/journal.pone.0107822

- *Notably, the coastal corridor contains 81.4% of the highest nectar productivity habitat, calcareous grassland, which is concentrated in one site in the coastal corridor – Holywell.*
- *Estimates of mean nectar productivity per ha (kg of sugars/ha/year) summed by the area of different habitat types suggests that habitats in the coastal corridor have the capacity to produce around 3.94 million kg of sugars per year for pollinators, with a mean nectar productivity of 77.2 kg per ha (Baude et al 2016).*

Pollination services provide crucial support for both food production and for biodiversity, as a range of crop and wild species depend upon insect-mediated pollen transfer. Pollination services contribute to improvements in the quantity and quality of crops, lower costs of crop production, and support successful reproduction of flowers and vegetation in a variety of different habitats (Klein et al. 2007[194]). Some crops are pollinated by managed imported bumblebee populations (e.g. strawberries, tomatoes), while others are much more dependent on wild pollinators (e.g. apples, field beans) (Smith et al 2011[195]; Maskell et al 2016[196]). In the UK, it is estimated that around 20% of crop production is dependent on pollinators and this dependency is increasing with a reported average growth of 54% since 1984 (Breeze et al. 2011[197]). Wild pollinated flowers also make a significant contribution to cultural ecosystem services including aesthetic value, and support biodiversity (Maskell et al 2016).

Pollinator abundance, and visitation rates are higher in certain habitats, e.g. flower-rich grasslands and forest edges (Maskell et al 2016), consequently, habitats can be classified in terms of their potential capacity to provide pollination services. A number of different methodologies have been used to provide an estimation of the potential importance of different habitats/land cover types in the coastal corridor for pollinator species, including the CEH national nectar plant diversity index (Maskell et al 2016). Casalegno et al. (2014) also provide a local assessment of the availability of habitats for pollinators in Cornwall. Nectar productivity, the capacity of habitats to provide nectar for pollinators, has been estimated by broad habitat type by Baude et al. (2016).

CEH Nectar Plant Diversity Index

The CEH nectar plant diversity index (CEH 2014[198]; Maskell et al 2016) estimates the mean bee nectar plant species richness for different habitats, based on a list of important plant species for bumblebees and solitary bees (Maskell et al. 2016) combined with plant survey data from the Countryside Survey 2007[199]. Nectar plant species richness data was then extrapolated across the whole of England, using broad habitat types, combined with data on additional variables such as air temperature, nitrogen deposition, precipitation and altitude, to produce the nectar plant diversity index (CEH 2014; Maskell et al 2016). Using this approach, the CEH nectar plant diversity index was mapped nationally and used to predict distribution and abundance of nectar plants important for bees (Maskell et al 2016). In using the nectar plant diversity index there are a number of acknowledged limitations, for example, urban and littoral rock habitats were not sampled and have no associated data, furthermore, the map resolution was limited at 1km^2. For the coastal corridor, the CEH Nectar plant diversity map indicates that grid squares intersecting or within the coastal corridor have slightly higher means value for nectar plant diversity for bees than the average for the whole of Cornwall.

	Coastal Corridor	Cornwall
Min	2.601	2.47
Mean	6.092	5.923
Max	10.96	10.96
Stand deviation	0.58	0.59

*Table 89. CEH nectar plant diversity for bees (species per 2m x 2m plot) (1km square averages) (*For the coastal corridor this is the approximate value for raster pixels within or intersecting the corridor) (Source CEH 2015)*

Habitat availability for pollinators

Casalegno et al. (2014) produced a 100m x 100m resolution map of habitat availability for pollinators for Cornwall based on Free (1993), Chan (2006), Sharp et al (2014) and Shlup et al. (2014). Casalegno et al. (2014) weighted different habitats for their potential

[194] *Klein et al. (2006) Importance of pollinators in changing landscapes for world Crops, Proc. R. Soc. B 274: 1608. Available at: https://royalsocietypublishing.org/doi/full/10.1098/rspb.2006.3721*

[195] *Smith. et al. (2011). Regulating services. In: The UK National Ecosystem Assessment Technical Report. UK National Ecosystem Assessment, UNEP-WCMC, Cambridge.*

[196] *Center for Ecology and Hydrology (2015) Nectar plant diversity for bees, https://eip.ceh.ac.uk/naturalengland-ncmaps/reports/pollinators.pdf; Maskell et al. (2016). Bee nectar plant diversity of Great Britain. NERC Environmental Information Data Centre. http://doi.org/10.5285/623a38dd66e8-42e2-b49f-65a15d63beb5*

[197] *Breeze et a.l (2011) Pollination services in the UK: How important are honeybees? Agriculture Ecosystems and Environment 142 (3): 137-143, available at: https://www.researchgate.net/publication/251520349_Pollination_services_in_the_UK_How_important_are_honeybees*

[198] *CEH (2014) – Pollinator map - https://eip.ceh.ac.uk/naturalengland-ncmaps/reports/pollinators.pdf*

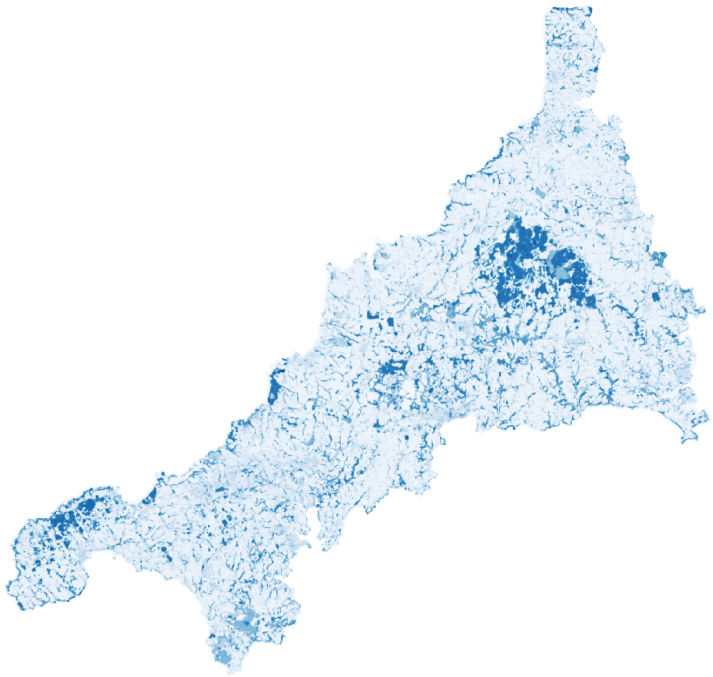
[199] *Counts of the bee nectar plants per 2m x 2m vegetation plot were extrapolated based on relationships between nectar plant species richness, broad habitat type, air temperature, nitrogen deposition, precipitation and altitude (as key variables affecting nectar plant richness).*

to provide pollinator habitat, rescaled to 100m resolution, to provide an indication of location with greater or lower habitat availability for pollinators, weightings were based on available academic literature. Using the maps produced by Casalegno et al. (2014) shows that the coastal corridor has a slightly higher mean score of habitat availability for pollinators than the rest of Cornwall, with a 5% lower amount of habitat with 'low' potential to provide pollinator habitats and a 5% greater amount of habitat with medium potential to provide pollinator habitats.

Using the maps of the distribution of habitat availability for pollinators shows high concentration around the NW coast of Cornwall, particularly surrounding West Penwith, Godrevy and Holywell (Casalegno et al. 2014). Notably, looking at the Cornwall wide distribution of habitats for pollinators shows that the most suitable habitats are potentially around the Bodmin Moor area, near Pendeen and Zennor, in the Penwith district and near Gwendreath in the Lizard area.

Habitat availability for pollinators	Coastal Corridor	Cornwall
Mean (Score for all habitat)	16.8	15.46
Standard deviation	15.02	15.32
Low	69%	74%
Medium	22%	17%
High	8%	7%
Very High	1%	2%

Table 90. Habitat with potential to provide pollinator habitat (Source: Casalegno et al. 2014)

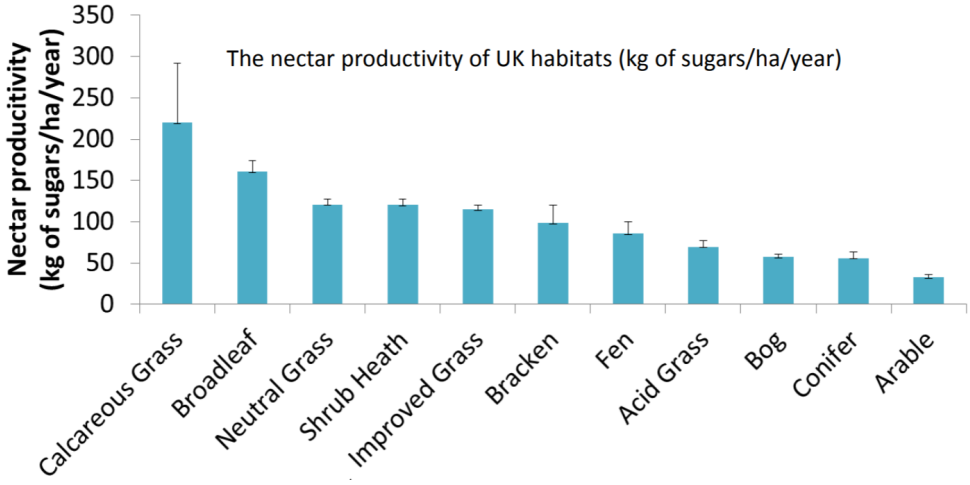


Map 21. Habitat availability for pollinators (100m resolution) (Darker colours equal higher availability) (Source: Casalegno et al 2014)

Map 22. Habitat availability for pollinators (100m resolution) (Darker colours equal higher availability) (Source: Casalegno et al 2014)

Nectar Productivity

Lack of food, nectar and pollen, is believed to be one of the major causes of pollinator decline in the UK (Baude et al. 2016; Hicks et al. 2016[200]). To calculate nectar productivity variation nationally, Baude et al. (2016) estimated the nectar productivity per flower and then scaled up their findings to estimate the nectar productivity of different vegetation units and then broad habitat types (kg of sugars/ha/year)[201]. They found that certain habitats, e.g. calcareous grasslands, broadleaved woodlands and neutral grasslands, produce much higher levels of nectar productivity (and diversity) than others, such as arable (Graph 9).



Graph 9. Nectar productivity of UK habitats (kg of sugars/ha/year) (Source: Baude et al. 2016; Memmott 2016[202])

Using the estimates of mean nectar productivity per ha (kg of sugars/ha/year) summed by the area of different habitat types suggests that habitats in the coastal corridor have the capacity to produce around 3.94 million kg of sugars per year, with a mean nectar productivity of 77.2 kg per ha. The largest total contributors are improved grassland, broadleaf woodland, and shrub heath. Calcareous grassland has the highest mean nectar productivity per ha per year. Baude et al. (2016) advise that calcareous grassland should be a priority habitat for conservation dedicated to pollinators. Within the coastal corridor, calcareous grassland is concentrated around one site at Holywell with high potential to be of importance to be enhanced to encourage greater nectar provision.

[200] *Hicks et al. (2016) Food for pollinators: quantifying the nectar and pollen resources of urban flower meadows. PLoS ONE 11(6): e0158117. https://doi.org/10.1371/journal.pone.0158117*
[201] *Baude et al. (2016) https://www.nature.com/articles/nature16532*
[202] *Memmott (2016) https://www.agriland.leeds.ac.uk/news/documents/4_JaneMemmottnectarresources.pdf*

Habitat	Mean Nectar productivity (kg of sugar per ha per year)	Coastal Corridor		Rest of Cornwall		Cornwall	
		Area (ha)	Nectar productivity (kg of sugar per year)	Area (ha)	Nectar productivity (kg of sugar per year)	Area (ha)	Nectar productivity (kg of sugar per year)
Acid grassland	65	12.6	819	10465.7	680270.5	10478.3	681089.5
Arable	25	25055.6	626,390	73564.3	1839107.5	98619.9	2465497.5
Bog	50	0	0	376.6	18830	376.6	18830
Broadleaf	160	6954.2	1,112,672	23101.8	3696288	30056	4808960
Calcareous Grass	220	93.8	20,636	21.4	4708	115.2	25344
Conifer	50	165.5	8275	4445.8	222290	4611.3	230565
Fen	80	27.2	2176	45.8	3664	73	5840
Improved Grassland	115	16321.2	1,876,938	153084.9	17604763.5	169406.1	19481701.5
Neutral Grass	120	47.3	5676	42.7	5124	90	10800
Shrub Heath	120	2432	291,840	7883.9	946068	10315.9	1237908
Estimated Total Nectar produced by above habitats (kg of sugar per year)			**3,945,422**		**25,021,113**		**28,966,536**
Mean nectar productivity kg/ha			77.2		91.6		89.4

Table 91. Nectar productivity in the coastal corridor (kg of sugars per ha per year), (Source: Baude et al 2016; Memmott 2016)

Biological diversity

- *The coastal corridor is a significant reserve of some of our most protected sites for biodiversity and contains 74 Sites of Special Scientific Interest (SSSI), which cover some 8.2% of the area of the coastal corridor [5927 ha] and 29.4% of the total area of designated SSSI in Cornwall.*
- *Approximately, 13,566 ha of the Cornwall Coastal Corridor is covered by UK BAP priority habitats, 21% of the total area of the corridor. In comparison, BAP habitats cover only 14% of the total area of Cornwall. Despite equating to only 18% of the area of Cornwall the coastal corridor contains 27% of the total BAP habitat area in Cornwall.*
- *The coastal corridor is particularly important for the following priority habitats: saltmarsh (82% of total area in Cornwall): sand dunes (85%), maritime cliffs and slopes (98%), reedbeds (91%), saline lagoons (90%), good quality semi-improved grassland habitats (69%), lowland calcareous grassland habitat (78%), lowland dry acid grassland (59%), lowland meadows habitat (45%), and traditional orchard habitat (37%).*

Decades of research have shown that biodiversity plays a vital role in ecosystem functioning and that processes such as capturing essential resources, producing biomass and recycling nutrients, are all impaired as biodiversity declines. A growing body of research also shows that biodiversity plays a significant role in underpinning and supporting the stable provision of multiple ecosystem goods and services. The exact relationship between biodiversity and each individual ecosystem service varies and there are ongoing debates as to whether biodiversity should be understood as an ecosystem service itself (e.g. Mace et al., 2012[203]) or is the underlying concept providing ES.

The coastal corridor is a significant reserve of some of our most protected sites for biodiversity and contains 74 Sites of Special Scientific Interest (SSSI), which cover some 8.2% of the area of the coastal corridor [5927 ha] and 29.4% of the total area of designated SSSI in Cornwall. UK BAP priority habitats are those semi-natural habitats identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (UK BAP). In essence, priority habitats are a focus for conservation action in England. There are 65 BAP habitats on the UK BAP priority habitats list under Section 41 of the Natural Environment and Communities Act (2006). Priority habitats can be designated SSSI, they also fall outside SSSI and can occur with stewardship agreement, or fall outside the protection of all schemes. Approximately, 13,566 ha of the Cornwall Coastal Corridor is covered by UK BAP priority habitats, 21% of the total area of the corridor. In comparison, BAP habitats cover only 14% of the total area of Cornwall. Despite equating to only 18% of the area of the Cornwall the coastal corridor contains 27% of the total BAP habitat area in Cornwall.

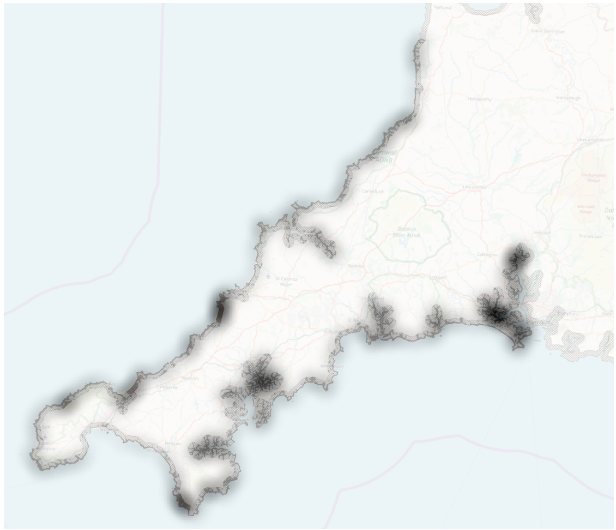
The coastal corridor is particularly important for the following priority habitats: saltmarsh (82% of total area in Cornwall): sand dunes (85%), maritime cliffs and slopes (98%), reedbeds (91%), saline lagoons (90%), good quality semi-improved grassland habitats (69%), lowland calcareous grassland habitat (78%), lowland dry acid grassland (59%), lowland meadows habitat (45%), and traditional orchard habitat (37%). Looking at this in terms of the SW regional scale, the coastal corridor contains 11% of the SW coastal salt marsh, 39% of the region's coastal sand dunes, and 42% of the region's maritime cliffs and slopes. In terms of

[203] *Mace et al. (2012) Biodiversity and ecosystem services: A multilayered relationship. Trends in Ecology and Evolution. 27 (1): 19-25.*

percentage area of the coastal corridor, the major BAP habitats include deciduous woodland (33%), maritime cliffs and slopes (30.8%) and lowland heathland (10%), coastal sand dunes (7.9%), good quality semi-improved grassland (5.3%). BAP priority habitats are relatively evenly distributed, occurring throughout the coastal corridor, apart from the major urban conurbations. Very little of the coastal corridor is without any BAP habitats. Map 23 shows a heatmap of the clusters of BAP priority habitats which shows strong clustering around: Lyther River Estuary, River Tamar Upper Estuary, River Fal Estuary, Lizard Point, Treen, St Ives Bay, and Perranporth.

Main Habitat	Coastal Corridor		Cornwall		SW		CC as % of total in Cornwall
	Ha	% of total	Ha	% of total	Ha	% of total	
Blanket bog	0	0.0%	477	1.0%	19203	4.4%	
Calaminarian grassland	2	0.0%	94	0.2%	94	0.0%	2%
Coastal and floodplain grazing marsh	91	0.7%	454	0.9%	70175	16.2%	20%
Coastal Saltmarsh	281	2.1%	343	0.7%	2452	0.6%	82%
Coastal sand dunes	1065	7.9%	1254	2.5%	2718	0.6%	85%
Coastal vegetated shingle	0	0.0%	0	0.0%	350	0.1%	
Deciduous Woodland	4550	33.5%	21103	42.1%	149466	34.5%	22%
Fragmented heath	0	0.0%	483	1.0%	1511	0.3%	
Good quality semi-improved grassland	721	5.3%	1053	2.1%	14099	3.3%	69%
Grass moorland	17	0.1%	3456	6.9%	17556	4.1%	
Lowland calcareous grassland	105	0.8%	135	0.3%	35969	8.3%	78%
Lowland dry acid grassland	29	0.2%	49	0.1%	2404	0.6%	59%
Lowland Fen	116	0.9%	637	1.3%	3913	0.9%	18%
Lowland heathland	1353	10.0%	7009	14.0%	18934	4.4%	19%
Lowland meadows	35	0.3%	76	0.2%	7336	1.7%	45%
Lowland raised bog	0	0.0%	0	0.0%	354	0.1%	
Maritime cliff and slope	4181	30.8%	4249	8.5%	9957	2.3%	98%
Mud flats	77	0.6%	1952	3.9%	11855	2.7%	4%
Purple moor grass and rush pasture	14	0.1%	621	1.2%	5927	1.4%	2%
Reed-beds	23	0.2%	25	0.0%	313	0.1%	91%
Saline lagoons	35	0.3%	39	0.1%	417	0.1%	90%
Traditional orchard	87	0.6%	235	0.5%	5330	1.2%	37%
Upland flushes, fens and swamps	0	0.0%	287	0.6%	1217	0.3%	
Upland hay meadow	0	0.0%	14	0.0%	31	0.0%	
Upland heathland	0	0.0%	3171	6.3%	25815	6.0%	
Upland calcareous grassland	0	0.0%		0.0%	3	0.0%	
No main habitat, but additional habitats present	781.99	5.8%	2931	5.8%	25914	6.0%	

Table 92. UK BAP habitats in the coastal corridor



Map 23. Heat map of BAP priority habitats within the coastal corridor.

4.02.04 Cultural Ecosystem Services

Recreation

- *Greenspaces, paths and beaches (see footnotes for full list[204]) within the coastal corridor are predicted to receive approximately 18.64 million recreational day visits by English adult residents per year, with an associated annual welfare benefit to residents of £74 million (Day and Smith 2018[205]).*
- *If this is extended to include the 500m area immediately surrounding the Coastal Corridor it rises to 26.26 million predicted greenspace visits, with an associated welfare benefit to residents £110 million (*isbd).*
- *The coastal corridor alone accounts for 49% of the total predicted recreational visits by adults to greenspace in Cornwall, and 51% of the total welfare benefit to residents in Cornwall (*isbd).*
- *The coastal corridor extended by 500m accounts for 70% of the total predicted recreational day visits by adults to greenspaces, and 76% of the total welfare benefit to residents provided by greenspace visits across Cornwall (*isbd).*
- *Visits to the SWCP in Cornwall account for 41.7% of the predicted visits to the entire network of the SWCP per year across the SW (day trips by resident English adults only) (*isbd).*
- *Filtering the results of the OrVAL model (Day and Smith 2018) to explore only the value of coastal sites (including visits to beach, coastal, saltmarsh, seaside or estuary) suggest that these coastal habitats alone receive 11.26 million recreational visits per year with a derived total welfare value of £61,0404,352 per year (*isbd).*
- *Looking at the breakdown between the broad habitat types shows that within the corridor the proportions of visits are relatively evenly split between beaches, parks and paths. Once extended by 500m 43% of visits are to beaches compared to 24% to parks and 33% to paths.*

The recreation importance of green spaces in the coastal corridor has been estimated using the ORVal model (Day and Smith 2018). The ORVal[206] model is a statistical recreational demand model which can be used to predict the likely number of visits to existing green spaces and the associated welfare values of those visits in monetary terms (See technical report[207]) (Day and Smith 2018). ORVal is based on an econometric model of recreation demand using data from the Monitor of Engagement with the Natural Environment (MENE) Survey (Natural England, 2010). It is important to emphasise that the value and visits predicted by ORVal represent only a broad estimate of the likely current benefits (Day and Smith 2018), and provides only an indication of the value that can be preserved or achieved.

The model estimates a '*welfare value'* for greenspace visits which describes the monetary equivalent of the welfare enjoyed by an individual as a result of having access to green space**,** or in this case access to sites within the Coastal Corridor (Day and Smith, 2018). Welfare refers to the sense of well-being or utility that an individual feels from their experiences (Day and Smith 2018). Welfare value is predicted based on the extra welfare enjoyed by adult residents from the beneficial attributes of a green space, and therefore how much each individual's welfare would fall if they were no longer able to access that site. Monetary values are calculated using travel-cost methods by examining how many trips individuals living at different distances, and hence with different travel costs, choose to make to a recreational green space. The valuation approach is based on the assumption that the value individuals derive from that visit is worth at least the costs incurred in travelling to the site (time and travel costs). ORVal predicts visits from a person-level choice model, or discrete choice model, which tries to predict how likely it is that an adult (over 16) with particular characteristics living in a particular location will choose to visit a particular green space from a set of green spaces available. The model is based on data reported in the MENE and tries to take into account the following factors (1) the size, qualities and characteristics of a green space (i.e land covers), (2) the proximity and socio-economic composition of nearby populations, (3) the availability of alternative sites, and (4) the day of the week/year.

The fundamental assumption of the model is that the choice to visit different greenspaces is somehow '*welfare maximising'* (Day and Smith 2018), i.e. this assumes that the welfare of visiting a greenspace exceeds the welfare of doing something different. Furthermore, the values and visitor number generated by ORVAL are based on the assumption that accessible green space is in

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[204] *ORVal Includes country parks, amenity parks, recreation grounds, village greens, golf courses, gardens, woods, amenity woods, allotments, cemeteries, grave yards.*

[205] *Day and Smith (2018) Outdoor Recreation Valuation (ORVal) User Guide: Version 2.0, Land, Environment, Economics and Policy (LEEP) Institute, Business School, University of Exeter.*

[206] *Day, and Smith (2018) Outdoor Recreation Valuation (ORVal) User Guide: Version 2.0, Land, Environment, Economics and Policy (LEEP) Institute, Business School, University of Exeter.*

[207] *ORVAL technical report: : https://www.leep.exeter.ac.uk/orval/documents*

average condition for its type (Day and Smith 2018). The model is also restricted by the parameters of the MENE survey which only collects data on recreational day trips, for residents of England and adults (over 16). For full details on the ORVal model and methodology please refer to the full technical report[208] or Day and Smith (2018). While the ORVal model can provide insight into the number, welfare value and distribution of visits across Cornwall's Coastal Corridor, it does not tell us anything about their activities in these green spaces.

	Cornwall Coastal Corridor		Cornwall Coastal Corridor+ 500 m		Cornwall	
	Visits	Value	Visits	Value	Visits	Value
Beaches & Harbours	5,504,863	£ 29,909,536	11,264,354	£ 61,040,352		
Parks	5,782,970	£ 19,514,383	6,417,171	£ 21,541,461	37,716,818	£ 145,205,131
Paths	7,348,461	£ 24,578,279	8,582,353	£ 28,302,325		
Total	**18,636,295**	**£ 74,002,198**	**26,263,878**	**£ 110,884,138**	**37,716,818**	**£ 145,205,131**
	% CUA total	% CUA total	% CUA total	% CUA total		
	49%	**51%**	**70%**	**76%**		
Beaches	30%	40%	43%	55%		
Parks	31%	26%	24%	19%		
Paths	39%	33%	33%	26%		

Table 93. Recreational visits and value for the coastal corridor (Day and Smith 2018)

Tranquillity

- *The coastal corridor has a lower than average relative tranquillity score compared to the rest of Cornwall.*
- *Large areas of the north coastline contain long unbroken stretches of relatively high tranquillity. Notably, the NE section of the coast and around the west of the Lizard peninsular contain some of the largest stretches of high tranquillity in the coastal corridor.*

Tranquillity is a widely used term that is generally taken to refer to a state of calm, peace and quietude associated with wellbeing (Jackson et al. 2008[209]). Feeling tranquil is thought to induce feelings of calm and is thought to be linked with positive effects on health and quality of life for individuals (Jackson et al. 2008). Psychological research has repeatedly highlighted that being in tranquil places allows people to relax, escape stress and '*recharge their batteries*'. Therefore, tranquillity is also a perceptual quality of the landscape. A tranquil area is described by Jackson et al. (2008:4) as an "*area with the characteristics most likely to induce a state of tranquillity for people who are there*". There is, however, also an appreciation that in our modern world the ability to access areas which promote tranquillity is getting harder (Jackson et al. 2008).

The capacity of an area to promote tranquillity is a significant asset, and one which often appears in local policy (e.g. Cornwall Environmental Growth Strategy 2015). Many factors are thought to contribute to an individual's feeling of tranquillity, which is thought to be promoted visual, aural and to a lesser extent other sensory stimuli either as a direct response or a cue to memory (Jackson et al. 2008). Attempting to map tranquillity is by no means an easy exercise, but can help to provide an indication of the places where people are more likely to feel tranquil, and potentially, therefore, areas which needed to be valued and protected.

In 2008, CPRE mapped tranquillity nationally (Jackson 2008) to provide an estimated value of the relative tranquillity for individual 500m^2 grid squares for the whole of England in 2006. The CPRE tranquillity map was produced based on scoring areas of land in relation to 44 positive and negative factors, generated through participatory approaches. In essence, the CPRE scores an area against positive tranquillity factors (e.g. view of nature, openness, naturalness) and negative factors that are thought to detract from the tranquillity of an area (e.g. aeroplane noise, population density, noise levels). The resulting CPRE (2008) tranquillity map shows a spectrum of more or less tranquil area, determined by the combination of positive and negative scores for each grid square. In essence, the map shows areas that have more or fewer important characteristics thought to be associated with tranquillity, and therefore are more or less likely to provide users with the space and conditions to relax, achieve mental balance and a sense of distance from stress.

[208] *ORVAL technical report: : https://www.leep.exeter.ac.uk/orval/documents*

[209] *Jackson et al.. (2008) Tranquillity Mapping: developing a robust methodology for planning support, Report to the Campaign to Protect Rural England, Centre for Environmental & Spatial Analysis, Northumbria University, Bluespace environments and the University of Newcastle upon on Tyne. - file:///C:/Users/rm653/Downloads/tranquillity_mapping_developing_a_robust_methodology_for_planning_support%20(1).pdf*

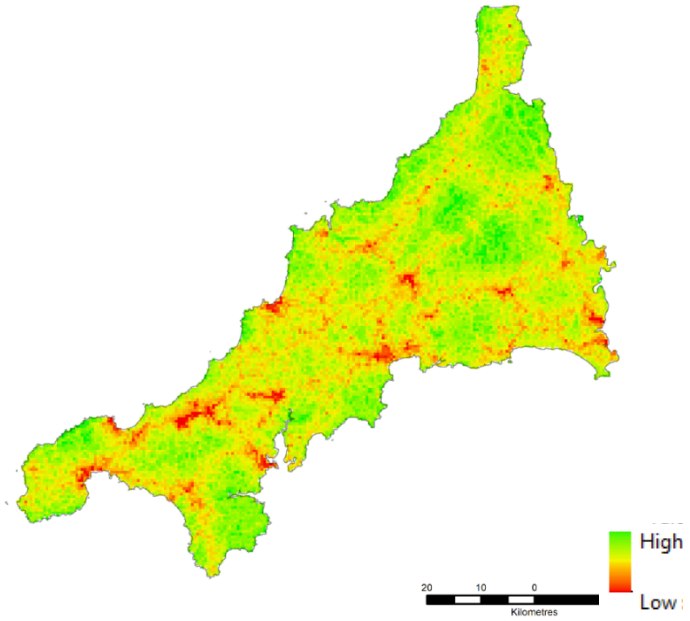
To estimate tranquillity in the coastal corridor, the CPRE tranquillity map was replotted to show the relative tranquillity scores across Cornwall to provide a basic assessment of the highest, and lowest, scoring areas the coastal corridor (Maps 24 and 25). The maps of the distribution of relative tranquillity in Cornwall show low scores along major road networks and densely populated urban areas. Large areas of the north coastline contain long unbroken stretches of relatively high tranquillity. Notably the north-east section of the coast and around the west of the lizard peninsular are some of the largest stretches of high tranquillity in the coastal corridor. However, the coastal corridor has a lower mean score for tranquillity than the rest of Cornwall with a mean value of 4.9 compared to the Cornwall mean of 5.43. The areas which score highest for tranquillity are found in the Bodmin Moor area in the central east of Cornwall. However, the coastal corridor does contain a lower minimum value for tranquillity than Cornwall as a whole. Looking at tranquillity scores by area shows that 53% of the area of the corridor has an above average score for tranquillity.

	Coastal Corridor	Cornwall	UK
MEAN	4.9	5.43	0.41
MIN	-66.6	-72.3	-140.5
MAX	52.1	130	148
ST.DEV	19.95	16.9	29.2

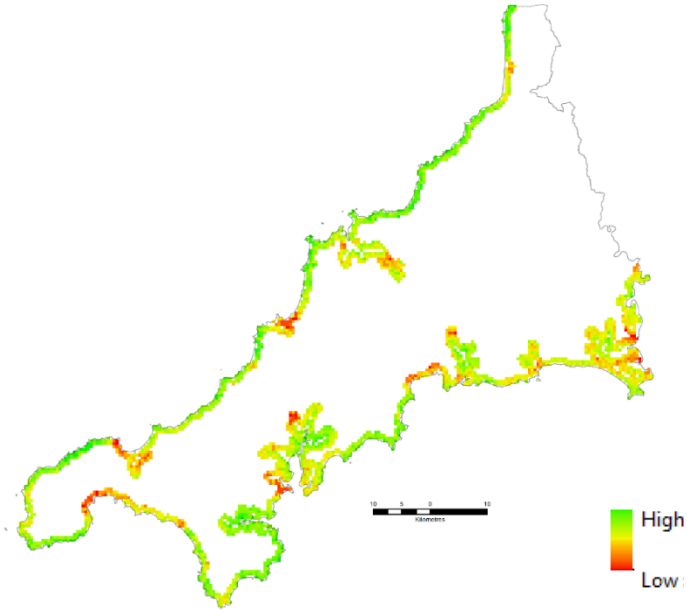
Table 94. Average tranquility scores for CUA and CC (Source: Jackson et al 2008; CPRE 2008)

Tranquillity Score Range		CC tranquillity scores by area		CUA tranquillity scores	
		Sum of area (m2)	% total area	Sum of area (m2)	% total area
Very Low	> -140.5 <-92.3	0	0%	0	0%
Low	>92.3 <-44.1	16213023	3%	39673831	1%
Med-Low	<-44.1 >4.08	287139182	44%	1679672489	47%
Medium	>4.08 to <52.7	343981221	53%	1882806450	52%
High	>52.7 <100.5	0	0%	3743523	0.1%
Very High	>100.5 <148.7	0	0%	0	0%

Table 95. Percentage area by tranquility scores (Source: Jackson et al 2008; CPRE 2008)



Map 24. Tranquillity across Cornwall (CPRE 2008)



Map 25. Tranquillity across the coastal corridor (CPRE 2008)

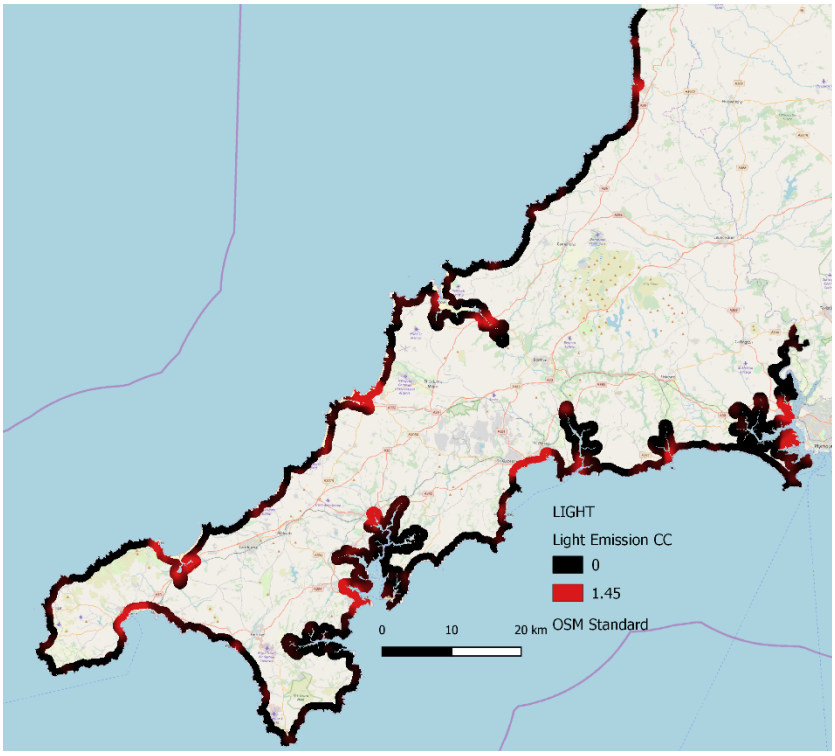
Dark Skies

"*Natural darkness is essential to a full appreciation of our surroundings, to satisfy curiosity, to appreciate our environment in all its facets, and to preserve our diverse cultural integrity*" (Dark Sky Parks 2019[210]). Among many other benefits, dark skies help to preserve the ecological integrity of natural experience, enable us to have a more '*wildness'* experience, protect the beauty of rural landscapes. Light pollution levels for the coastal corridor, including direct light emission and sky glow level, maps for Cornwall were produced by Cox et al (2019)[211]. Comparing the coastal corridor and Cornwall shows that the coastal corridor has a slightly higher mean level of both light emission and skyglow. In general, levels of high light pollution (shown in red on Map 26) correspond with urban areas, there are some notable stretches of low light pollution within the coastal corridor, including between Bude and Newquay (62km), between Truro and St Austell (44km), the Lizard and Helston and Falmouth (47km), and between Penzance and St Ives (40km). See also the Tevi Hub[212].

	Emissions		Skyglow	
	Coastal Corridor	Cornwall	Coastal Corridor	Cornwall
Maximum	**1.445**	1.445	**0.886**	**0.886**
Mean	**0.35**	**0.200**	**0.12**	**0.0997**
Minimum	0	**0**	**0.011**	**0.010**
Stddev	**0.445**	**0.36**	**0.117**	**0.07**

Table 96. Light pollution in the coastal corridor (Source: Cox et al 2019)

[210] http://darkskyparks.org/dark-skies-and-nature-conservation/
[211] Cox et al. (2019) Direct emissions from artificial light a night in Cornwall, excluding albedo and skyglow.Raster generated tiffs for Cornwall have a 0.008983153 degree resolution.
[212] https://jrmosedale.github.io/dashboard/#c-light-emissions



Map 26 Direct light emissions across the coastal corridor (Source: Cox et al. 2019).

Aesthetics

- *All 39 hotspots of highest aesthetic value, mapped by Casalegno et al. (2013[213]), are located in the coastal corridor. "Hotspots of aesthetic value (35 of 3,843 grid cells) were all located in coastal areas: seven were in coastal towns (population>3000), 17 close to sparsely populated settlements (<3000 inhabitants), and 11 in unpopulated areas (beaches or touristic coastal sites)*" (Casalegno et al 2013).
- *65% of the coastal corridor is designated for its landscape value as an Area of Outstanding Natural Beauty (AONB) (41,901 ha), which equates to 40% of the total area designated as an AONB across Cornwall.*

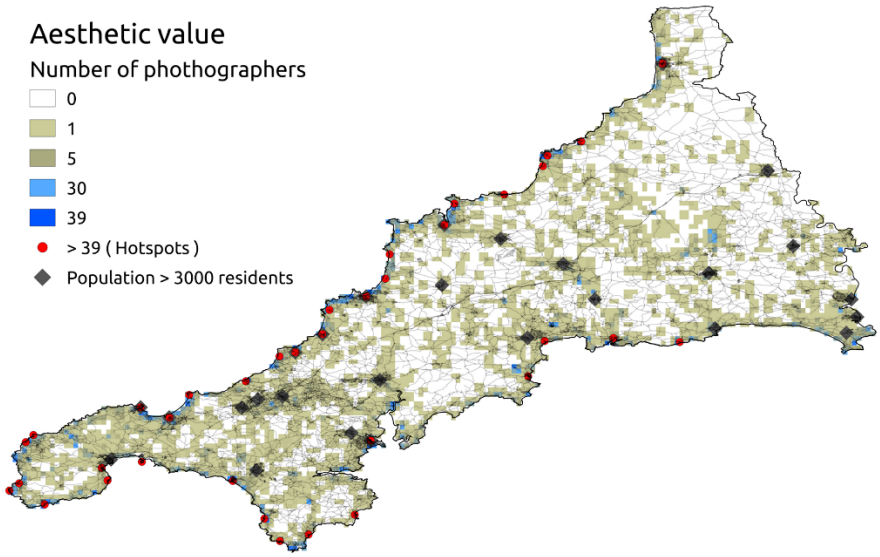
Aesthetics refers to the '*pleasure people derive from viewing or visiting the natural environment'* (Casalegno et al. 2013). Natural aesthetics have been found to correlate with higher levels of life satisfaction, and improved levels of physical and mental health. Norton et al (2012[214]) highlight that certain features of the landscape may be particularly important for the effective delivery of aesthetic services, including natural features such broadleaved woodland, water, altitude, and coasts. The Cornish coastline is renowned for the '*beauty of its natural landscape'* as well as the high-quality of its beaches. 65% of the coastal corridor is designated as an Area of Outstanding Natural Beauty (AONB) (41,901 ha), and this equates to 40% of the total area designated as an AONB in Cornwall.

Casalegno et al. (2013) quantified and mapped the perceived aesthetic value that people place on different natural capital assets across Cornwall. Casalegno et al. (2013) mapped aesthetic value using as a proxy the quantity and spatial distribution of geo-tagged digital photographs of the natural environment uploaded to the social media site Panoramio. This is based on the premise that those areas more highly valued for their aesthetic attributes will generate 'hotspots' of activity (Casalegno et al. 2013). Panoramio hosts photos of 'places of the world', with a particular focus on images of landscapes, natural features (such as woodlands) and animals in their natural environment (Casalegno et al 2013). Aesthetic value is calculated in terms of the number of individuals per unit area (1km^2) uploading photographs to Panoramio, rather than the total number of photographs uploaded in each area which reflects the level of activity of individual photographers rather than the overall value placed on a site by visitors. Casalegno et al (2013) acknowledged that this approach at capturing aesthetic value is limited and a variety of other possible approaches could have been

[213] *Casalegno et al. (2013) Spatial covariance between aesthetic value & other ecosystem services. PLoS ONE 8(6): e68437. https://doi.org/10.1371/journal.pone.0068437.*
[214] *Norton et al. (2012) Trialling a method to quantify the cultural services of the English landscape using countryside survey data. Land Use Policy 29: 449-455.*

taken, including the number of tourist attractions, tax value of summer holiday homes, number of reported sightings of rare species, tourist expenditure, accessibility to natural areas, etc (Casalegno et al. 2013).

From the 113,686 photographs mapped by Casalegno et al. (2013) (Map 27), the most highly valued areas in terms of aesthetic value were found to be concentrated around the coast. '*Hotspots of aesthetic value (35 of 3,843 grid cells; Figure 2) were all located in coastal areas: seven were in coastal towns (population>3000), 17 close to sparsely populated settlements (<3000 inhabitants), and 11 in unpopulated areas (beaches or touristic coastal sites)*' (Casalegno et al. 2013). Notably, the 39 hotspots of highest aesthetic value in Cornwall (shown on Map 27), including Kynance Cove, Port Issac, Gwithian Beach, Perranporth and Constantine Bay, were all found to be located in the coastal corridor. Casalegno et al. (2013) also found a negative correlation between population density and aesthetic value (CRH correlation = −0.56, n = 55, *p-value<0,001*).



Map 27. Aesthetic value map of Cornwall (Casalegno et al. 2013).

Heritage

- *Despite representing just 17% of the land area of Cornwall, the coastal corridor was found to contain the majority, 54%, of Cornwall's Conservation Areas. More than a third of the 145 Conservation Areas are coastal towns and villages, and 40% of Cornwall's registered parks and gardens are situated directly along the south coast.*
- *The corridor also contains an estimated 15% of all scheduled monuments and 49% of listed buildings, 16% of the Cornish World Heritage Site. Heritage coast designations cover 31%, some 20,577 ha, of the coastal corridor.*

Cultural heritage has many definitions. For the purpose of this review, it is defined as the '*immediately visible and invisible tangible human-made remnants of the past*', such as archaeological sites (invisible, subsoil remains and visible, standing structures) and historic buildings (Choay and Françoise 2001[215]; Hølleland et al. 2017 [216]). In the context of ecosystem services and natural capital, cultural heritage is often referred to as the experiential quality of the landscape, sense of place or cultural landscape. For the purpose of this report, cultural heritage has been addressed only in a limited way in terms of the immediately visible human-made remnants of the past.

Cornwall Council's Historic Environment Records (Cornwall Council 2019[217]) have been used to provide a sense of the number of cultural heritage features which lie within the coastal corridor (Table 97). No attempt has been made to differentiate between heritage features which may have greater or lesser cultural importance. Despite representing just 17% of the land area of Cornwall, the coastal corridor was found to contain the majority, 54%, of Cornwall's Conservation Areas, these are areas of special architectural or

[215] *Choay. (2001) The Invention of the Historic Monument. Allégorie du patrimoine. Cambridge: Cambridge University Press.*
[216] *Hølleland et al. (2017) Cultural heritage and ecosystem services: a literature review. Conservation and Management of Archaeological Sites 19: 210-237, DOI: 10.1080/13505033.2017.1342069*
[217] *https://www.cornwall.gov.uk/environment-and-planning/strategic-historic-environment-service/cornwall-and-scilly-historic-environment-record/*

historic interest with a character or appearance that is desirable to preserve or enhance. More than a third of the 145 Conservation Areas are coastal towns and villages, and 40% of Cornwall's Registered Parks and Gardens shelter directly along the south coast. Thousands of other sites, monuments and buildings, of local importance and maritime significance, can also be found on the coast, within estuaries and along rivers. The corridor also contains an estimated 15% of all scheduled monuments and 49% of listed buildings, and 16% of the Cornish World Heritage Site. Heritage coast designation covers 31%, some 20,577 ha, of the coastal corridor.

There are thousands of recorded shipwrecks located off the coast of Cornwall, thirteen of which are nationally important and statutorily protected, including two WWI submarine war graves. Over 100 Scheduled Monuments, ranging from Bronze Age barrows to WWII gun batteries, and 2500 Listed Buildings, including well-preserved harbours, quays and fish cellars, lighthouses and coastguard stations, also dot the coastline. Marine archaeology is also important and there are over 60 known inter-tidal and inshore sites of palaeo-environmental deposits. These include the remains of ancient land surfaces and submerged forests that provide evidence of the early prehistoric environments of Cornwall and demonstrate how climate change has contributed to sea-level rise in the past.

Feature	CC		Cornwall		CC % Cornwall
	Count	Area	Count	Area	
Conservation areas	78	2159	145	4411	54% [48% by area]
Scheduled monuments	304	348	1345		15%
Listed buildings	6159		12552		49%
Cornish world heritage site		2898		18222	16%
Archaeological sites visible on aerial photographs (Neolithic to 194)	*44,944 mapped features along the coast identified through aerial photographs.				

Table 97. Heritage features within the coastal corridor (Source: Cornwall Council 2019)

Health and well-being

- *Populations living near the coast in England are healthier than those inland (Wheeler et al., 2012) and longitudinal data suggest that individuals are healthier during periods when they live closer to the coast (White et al., 2013).*
- *The link between living near the coast and good health was also found to be strongest in the most economically deprived communities, suggesting that access to the coastal environment can have a role in reducing health inequalities between wealthiest and poorest members of society (Wheeler et al 2012, White et al. 2013).*

Although difficult to quantify, recent research has shown that there is a health benefit to living near the coast. Using Census (2001) data, Wheeler et al (2012)[218] found that populations living near the coast in England have higher self-reported health levels than those inland, and furthermore longitudinal data suggest that individuals are healthier during the period when they live close to the coast (White et al. 2013[219]). The link between living near the coast and good health was also found to be strongest in the most economically deprived communities, suggesting that access to the coastal environment can have a role in reducing health inequalities between wealthiest and poorest members of society (Wheeler et al 2012, White et al. 2013). Further research has shown that one reason for higher health levels near the coast is that people living closer to the coast are more likely to undertake physical activity than inland dwellers (Wheeler et al 2014) with consequent health benefits. The coast is not only considered to offer better opportunities for physical activity but also to have significant benefits in terms of stress reduction. White et al (2014)[220] emphasise that these findings suggest that the coast is an often under-appreciated public health resource.

[218] *Wheeler et al. (2012) Does living by the coast improve health and wellbeing? Health & Place 18: 1198-1201.*
[219] *White et al (2013) Coastal proximity, health and well-being: results from a longitudinal panel survey. Health Place 23: 97-103.*
[220] *White et al (2014) Coastal proximity and physical activity: Is the coast an under appreciated public health resource? Preventive Medicine 69: 135-140.*

5. APPENDIX

Appendix X. Agricultural Grade Land

AGRICULTURAL LAND	*Cornwall UA*		*SW Region*	
	Area (ha)	% total area	Area (ha)	% total area
Grade 1	893.42	0.3%	34,209	1%
Grade 2	28,109.13	8.0%	178,838	8%
Grade 3	215,378.68	61.2%	1,382,721	59%
Grade 4	67,227.68	19.1%	435,472	18%
Grade 5	23,303.68	6.6%	130,571	6%
Non-Agri	11,203.96	3.2%	108,661	5%
Urban	6,115.18	1.7%	84,516	4%
TOTAL	352,231.7		2,354,989	
Average value	Average Farmland Value: £6,500 (per acre) £16,055 per ha			
All Agri Grade land	£5,376,980,050			
Grade 1 or 2	£9000 *2.7	£704,748,600		
Grade 3	£6500	£3,779,883,900		
Grade 4 or 5	£4500	£1,006,240,950		
Total value	£5,490,873,450			

Appendix X. Characteristics of Farmland Areas in Cornwall (Cornwall Council)

A	West and Central Cornwall (Killas)	Often contain larger farmers, wealthier estates. Associated with productivity, sheltered land in areas of the ancient medieval enclosure
B	The Culm North Cornwall Atlantic coast and hinterland (Bude)	Open, sparsely populated, agriculturally poor, with heavy soils. Predominantly dispersed settlement and irregular field patterns of medieval origin with few small market centres. Some higher status arable farms
C	Killas – East Cornwall	Many farms of medieval origin marked by a high predominance of livestock farming, especially moorland edge farms which benefited from proximity to Bodmin Moor. Well-preserved medieval field patterns are often tree-lined, giving the impression of greater woodland cover than is actually the case.
D	Killas – North coastal plain	Higher predominance of small scale farms dating from the 17th century and often situated on less productive exposed land subject to regular enclosure. Farms tend towards the independent farmer rather than estate owned tenanted farms, although these occur in pockets of more anciently enclosed land. Includes areas of very distinctive miners' smallholdings
E	Bodmin Moor	Exposed granite uplands dominated by moorland beef and sheep farming. Mainly isolate farms.
F	Killas – South-East Cornwall	Similar in character to the west and central Cornwall with productive, sheltered land in areas of ancient medieval enclosure, strip fields and farming hamlets, but with proportionally higher numbers of relatively large farms, particularly arable based. Many of the farms are linked to just 4 or 5 dominant estates; classic Cornish Barton landscape
G	Henbarrow	Exposed granite upland landscape of dynamic change dominated by the china clay industry. Dispersed farmstead and hamlets. Relatively low levels of investment, especially in areas under threat of expanding mineral extraction.
H	Carnmenellis	Small, roughly circular granite upland. Significant ancient metalliferous production. Predominately isolate farmsteads mixed with small-nucleated mining/quarrying settlements Little inward investment since decay of the mining industry, much amalgamation of farms and re-use of agricultural buildings.
I	West Penwith	Cornwall's only major coastal granite upland. Sparsely populated; mining and fishing as dominant as agriculture in history and settlement. Heavy emphasis on pastoral farming, with extensive rough ground grazing, limited mixed arable in the fertile southern area (St Buryan) and sheltered valleys. From 19th century horticulture developed in coastal areas and Mount's Bay fringes. On the edges of the peninsula are a number of small fishing or mining villages/towns, otherwise predominantly hamlets with dispersed layouts, especially associated with town-places – one of the most distinctive aspects of the area, as are many small-scale miner-farmer linear smallholdings around St Just.
J	Lizard and Meneage	Gently undulating exposed heathland plateau cut by sheltered river valleys; complex geology. Historical distinction in landownership, land quality and use between the Lizard (south and west of the area) and the richer Meneage (north and east). Good mixed farming/grain lands set amongst extensive areas of rough grazing. Significant evidence of ancient farming and settlement in a hamlet-based settlement pattern, interspersed with occasional rural market, fishing and quarrying centres. Early farmsteads typically linear or dispersed (although noticeably less 'townplace' farmsteads than e.g. west Penwith).

Table X. Character of different farmland areas across Cornwall (Source: Cornwall Council XXXX)

Appendix. X Breweries across Cornwall in relation to the coastal corridor

Brewery	Address	Approximate Distance to MHW
Ales of Scilly	2B Porthmellon Industrial Estate, St Mary's, Isles of Scilly TR21 0JY	0.12km
All Saints	Unit 10B, Cardrew Industrial Estate, Redruth, Cornwall TR15 1SS	4.57km
Atlantic Brewery and Distillery	Treisaac Farm,Treisaac, Newquay, Cornwall TR8 4DX	3.47km
Black Flag Brewery	Unit 4D, Bridge Road Industrial Estate, Goonhavern, Cornwall TR4 9QL	3.25km
Black Rock Brewing	Unit 6C, Empire Way, Falmouth TR11 4SN	1.51km
Blue Anchor Brewery	50 Coinagehall St, Helston TR13 8EL	3.39km
Bude Brewery	Kings Hill Industrial Estate, Bude, Cornwall EX23 8QN	1.901
Castle Brewery (micro)	Unit 9A, Restormel Industrial Estate, Liddocoat Road, Lostwithiel, Cornwall PL222 0HG	5.43km
Coastal Brewery	Unit 20, Cardrew Trade Park South, Cardrew Way,	4.50km
Cornish Chough	Trethvas Farm, The Lizard, Cornwall Tr12 7AR	0.826km
Cornish Crown	1 Victoria Square, Penzance, Cornwall TR18 2EP	0.270km
Cornish Crown Brewery	Cornish Crown Brewery, Badgers Cross, Penzance TR20 8XE	2.157km
Driftwood Spars Brewery	Trevaunance Cove, St Agnes, Cornwall TR5 0RT	0.189km
Dynamite Valley Brewing Co	Viaduct Works, Frog Hill, Ponsanooth, Cornwall TR3 7JW	5.383km
Firebrand Brewing (Altarnum Brewing Limited	Inner Trenarrett, Altarnun, Cornwall PL15 7SY	16km
Fishkey Brewing Co(micro)	Unit 4, Granite Quay, Looe, Cornwall PL13 1DX	0.162km
Forge brewing	Wilderland Herb Fam, Woolley, Bude, Cornwall	1.48km
Fowey Brewery	Unit 3F, Restormel Industrial Estate, Liddicoat Road, Loswithiel, Cornwall PL22 0HG	7.3km
Harbour Brewing Co. Ltd	Trekillick, Kirland, Cornwall PL30 5BB	11.1km
Keltek Brewery	Candela House, Cardrew Way, Redruth, Cornwall TR15 1SS	4.56
Lizard Ales	Coverack, Helston TR12 6SE	0.963km
Longhill Brewery	Longhill Cottage, Whitstone, Holsworthy, Cornwall EX22 6UG	7.8km
Padstow Brewing Company	The Brewery, Padstow, Cornwall PL28 8RW	1.49km
Penpont Brewery	Inner Trenarrett, Altarnun, Launceston, Cornwall PL15 7SY	16.41
Penzance Brewing Co	Star Inn, Crowlas, near Penzance, Cornwall TR20 8DX	2.143km
Rebel Brewing Co	Century House, Parhengue Road, Kernick Industrial Estate, Penryn, Cornwall TR10 9EP	1.77km
Sharp's Brewery	Rock, Cornwall PL27 6NU	1.778km
Skinners Brewery	Riverside, Newham Road, Truro TR1 2DP	0.577km
St Austell Brewery	63 Trevarthian Road, St Austell, Cornwall PL25 4BY	2.584km
St Ives Brewery (StIvesCider)	Trewidden Road, St Ives, Cornwall TR26 2BX	0.298km
Tintagel Brewery	Condolden Farm, Tintagel, Cornwall PL34 OHJ	3.461km
Verdant Brewing Co	Unit 6, Tresidder Close, Tregoniggie Industrial Estate, Falmouth, Cornwall TR11 4SP	1.22km
Wooden Hand Brewery	Unit 3, Grampound Road Industrial Estate, Near Truro, Cornwall TR2 4TB	9.81km

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