File Name: 1029.pdf **UNESCO Region:** EUROPE AND THE NORTH AMERICA

SITE NAME: **Dorset and East Devon Coast**

DATE OF INSCRIPTION: 16th December 2001

STATE PARTY: UNITED KINGDOM

CRITERIA: N (i)

DECISION OF THE WORLD HERITAGE COMMITTEE:
Excerpt from the Report of the 25th Session of the World Heritage Committee

The Committee inscribed the Dorset and East Devon Coast on the World Heritage List under criterion (i):

> ***Criterion (i)*** *:* The Dorset and East Devon Coast provides an almost continuous sequence of Triassic, Jurassic and Cretaceous rock formations spanning the Mesozoic Era, documenting approximately 185 million years of Earth history. It also includes a range of internationally important fossil localities - vertebrate and invertebrate, marine and terrestrial - which have produced well-preserved and diverse evidence of life during Mesozoic times.

BRIEF DESCRIPTIONS

The cliff exposures along the Dorset and East Devon coast provide an almost continuous sequence of rock formations spanning the Mesozoic Era, or some 185 million years of the earth's history. The area's important fossil sites and classic coastal geomorphologic features have contributed to the study of earth sciences for over 300 years.

1.b State, Province or Region: Dorset and East Devon, England.

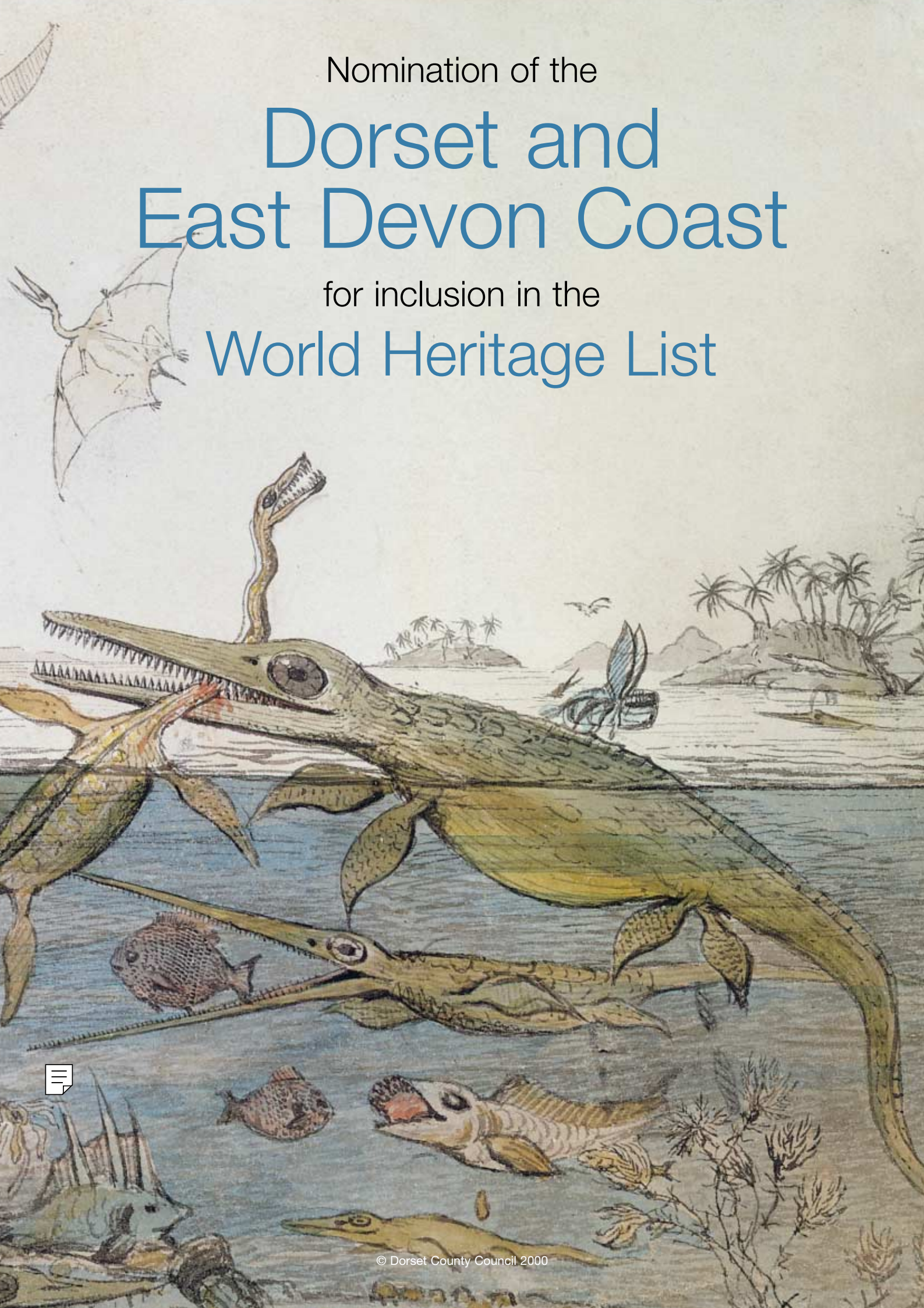
1.d Exact location: 50°42'20" N, 2°59'23" W

Nomination of the

Dorset and East Devon Coast

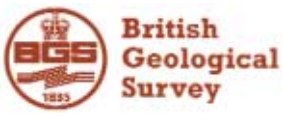
for inclusion in the

World Heritage List



Dorset County Council, Devon County Council and the Dorset Coast Forum June 2000

Published by Dorset County Council on behalf of Dorset County Council, Devon County Council and the Dorset Coast Forum. Publication of this nomination has been supported by English Nature and the Countryside Agency, and has been advised by the Joint Nature Conservation Committee and the British Geological Survey.



Design and production by Sillson Communications +44 (0)1929 552233.

Cover: *Duria antiquior* (A more ancient Dorset) by Henry De la Beche, c. 1830. The first published reconstruction of a past environment, based on the Lower Jurassic rocks and fossils of the Dorset and East Devon Coast.

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In April 1999 the Government announced that the Dorset and East Devon Coast would be one of the twenty-five cultural and natural sites to be included on the United Kingdom's new Tentative List of sites for future nomination for World Heritage status. Eighteen sites from the United Kingdom and its Overseas Territories have already been inscribed on the World Heritage List, although only two other natural sites within the UK, St Kilda and the Giant's Causeway, have been granted this status to date.

The Dorset and East Devon Coast is one of the most significant earth science sites in the world. Its coastal exposures provide a near continuous, accessible sequence of rocks that document nearly 190 million years of earth history spanning almost the entire Mesozoic Era. It includes a remarkable range of internationally important fossil localities which continue to produce superbly preserved remains, many unique or without equal elsewhere. It also displays an exceptional range of classic coastal geomorphological features. This unique combination of earth science interests has been recognised since the earliest days of geological science. Many major contributions to science, including numerous first discoveries have been made on the Dorset and East Devon Coast and it has been a crucible of earth science investigations for almost three hundred years. This importance continues to the present day inspiring leading researchers, and providing a teaching and training resource of the highest quality.

The natural beauty of the site has inspired many fine works by some the world's most prominent novelists, poets and artists, including Thomas Hardy, Jane Austen, John Fowles, John Keats, Joseph Turner and John Constable, to name but a few. The significance of this stretch of coastline in terms of its scientific value and natural beauty has already been recognised by the United Kingdom Government, through the designation of much of the site as either Sites of Special Scientific Interest or Areas of Outstanding Natural Beauty.

Since rejoining UNESCO in 1997, the Government has been pleased to affirm its support for the World Heritage Convention. In preparing the new Tentative List, we took into account UNESCO's wishes for more under-represented types of site to be nominated. This included natural sites, and we are now pleased to be able to nominate a natural site in England which helps to achieve this aim. This nomination has much support from the local bodies involved, who are committed fully to meeting the very strict management requirements which will arise from World Heritage Site status, as well as from the wider academic community, both in the UK and overseas.

We would like to thank Dorset and Devon County Councils and the Dorset Coast Forum for all the work they have put into preparing this document and we fully support this nomination for World Heritage status.

John Prescott
Deputy Prime Minister and Secretary of State for the Environment, Transport and the Regions

Chris Smith
Secretary of State for Culture, Media and Sport

‘Few parts of the World present in a small compass so instructive a series of geological phenomena as those which are displayed in the vertical cliffs of the south coast of England.’

Extract from *On the Geology of the Neighbourhood of Weymouth and the adjacent parts of the Coast of Dorset*, by W. Buckland and H. T. De La Beche, 1830.

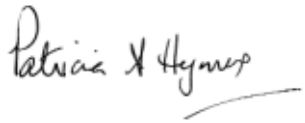
Preface

The Dorset and East Devon Coast is a special and beautiful place. This nomination document proposes that it is recognized through World Heritage Site status, in particular because of its remarkable international importance for the earth sciences. Conveying the full range of its different important features within this nomination has posed a substantial challenge. The nomination describes both the completeness of the Site as an extensive, accessible and well-studied section through almost 190 million years of earth history, but also its many important detailed features: the superb fossil localities, the array of classic landforms, the immense historical value to the study of the Earth and the continued importance for science and teaching. The time which many experts, from both the UK and overseas, have taken to advise on the scientific text is greatly appreciated.

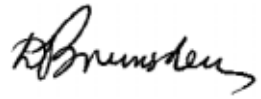
The achievement of long-term protection and positive management for the nominated Site is a central concern of the proposal. Work towards this nomination has taken over five years of active local, national and international consultation. Over this time a very strong groundswell of public and professional support has been achieved, and the principles and priorities for management have been established through thorough debate. A site management plan has been prepared to accompany this nomination, which sets out detailed proposals for the future, and we are grateful to the many organisations and individuals who have helped produce it.

Devon County Council and Dorset County Council, supported by the Dorset Coast Forum have prepared this nomination, with the assistance and advice of the British Geological Survey, English Nature, the Countryside Agency and the Joint Nature Conservation Committee. Together, we believe that World Heritage Site status would provide an important contribution to the long-term conservation of the Dorset and East Devon Coast. It would ensure that its earth science interests are properly recognized, both in their own right, and because of their important role within the coast's landscape, history and culture. We are fully committed to working together to support the protection and public understanding of this superb coastline, in partnership with the many organisations and individuals who own, manage, visit and value it. We are delighted, therefore, to commend this nomination to the World Heritage Committee of UNESCO.

Councillor Ken Turner
Chairman of Devon County Council



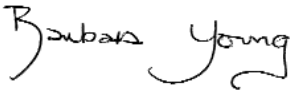
Councillor Mrs Patricia Hymers
Chairman of Dorset County Council



Professor Denys Brunsden
Chairman of the Dorset Coast Forum

Dr David A Falvey
Director of the British Geological Survey

Ewen J H Cameron
Chairman of the Countryside Agency



Baroness Young of Old Scone
Chairman of English Nature

Sir Angus Stirling
Chairman of the Joint Nature Conservation Committee

June 2000

‘What will be the future of this ... coastline, so richly endowed as a training ground and museum of geology? Few tracts of equal size could raise so many claims, scientific, aesthetic and literary, for preservation as a national park. If the English of the present generation allow this heritage of the community to be irreparably spoilt for private gain they will be held by posterity to have been unworthy to possess it. To all geologists who have enjoyed and profited by this coast, an appeal is made to do their utmost to preserve it.’

Extract from *Geology of the Country around Weymouth, Swanage, Corfe and Lulworth* by W.J. Arkell, 1947.

Contents

‘Lying between the Exe estuary to the west and Lyme Regis to the east the coastline of East Devon contains a rich variety of landscapes which represent one of the most outstanding and diversified coastal areas in England and Wales.’

Extract from *A View from the Cliffs* by Richard Butler, 1986.

World Heritage List

Nomination Form

Convention concerning the Protection of the World Cultural and Natural Heritage

Under the terms of the Convention concerning the protection of the World Cultural and Natural Heritage, adopted by the General Conference of UNESCO in 1972, the Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage, called the 'World Heritage Committee' shall establish, under the title of the World Heritage List, a list of properties forming part of the cultural and natural heritage which it considers as having outstanding universal value in terms of such criteria as it shall have established.

The purpose of this form is to enable States Parties to submit to the World Heritage Committee nominations of properties situated in their territory and suitable for inclusion in the World Heritage List.

This nomination document has been prepared in accordance with the *Format for the nomination of cultural and natural properties for inscription on the World Heritage List* issued by UNESCO.

The form, completed in English or French is sent in three copies to:

The Secretariat
World Heritage Committee
Division of Cultural Heritage
UNESCO
7 Place de Fontenoy
75352 Paris 07 SP

1. Identification of Property

1 (a) COUNTRY: UNITED KINGDOM

1 (b) STATE, PROVINCE OR REGION: ENGLAND

1 (c) NAME OF PROPERTY: DORSET AND EAST DEVON COAST

1 (d) EXACT LOCATION ON MAP AND GEOGRAPHICAL CO-ORDINATES: A location map for the nominated Site is included in Figure 1. The nominated Site includes approximately 155 km of coastline between Orcombe Rocks, near Exmouth in the County of Devon (50° 36' 23"N, 3° 23' 03"W), to the geological boundary between the Cretaceous and Tertiary in Studland Bay (50° 38' 24"N, 1° 56' 21"W). It excludes the small towns of Budleigh Salterton, Sidmouth, Seaton, Lyme Regis, West Bay, Weymouth and Swanage, which in this nomination are termed 'Gateway Towns'. The nominated Site is shown in Figure 2, and comprises eight stretches of coastline:

- Orcombe Rocks to Chit Rocks, Sidmouth
- River Sid, Sidmouth to Seaton Hole
- River Axe, Axmouth to The Cobb, Lyme Regis
- Lyme Regis to West Bay
- Chesil, the Fleet and Portland Coast
- Portland Harbour Shore
- Bowleaze Cove to Peveril Point
- New Swanage to Studland Bay

The approximate centre point of the nominated Site is 50° 40' 09"N, 2° 39' 02"W.

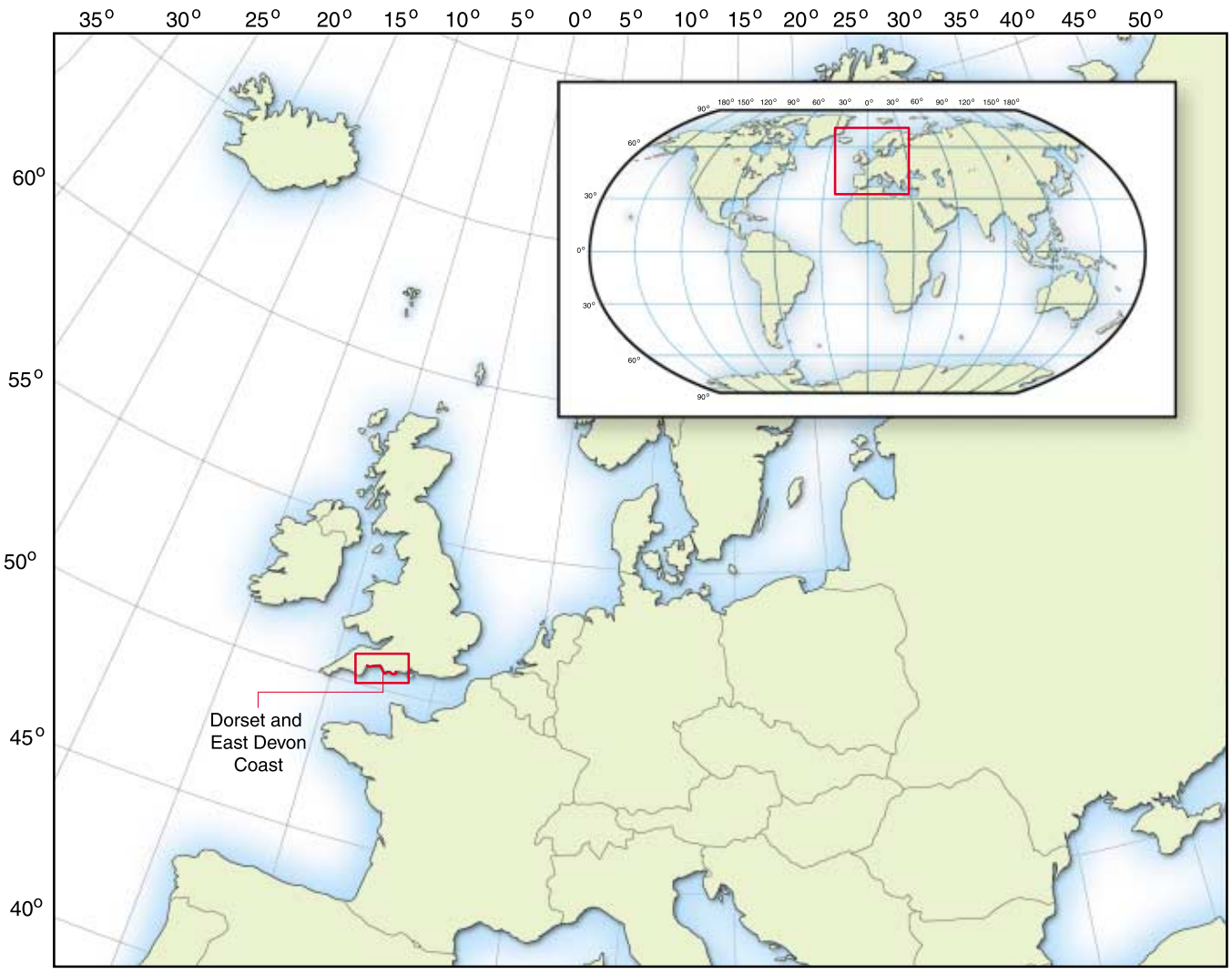


Figure 1: Map showing the location of the Dorset and East Devon Coast.

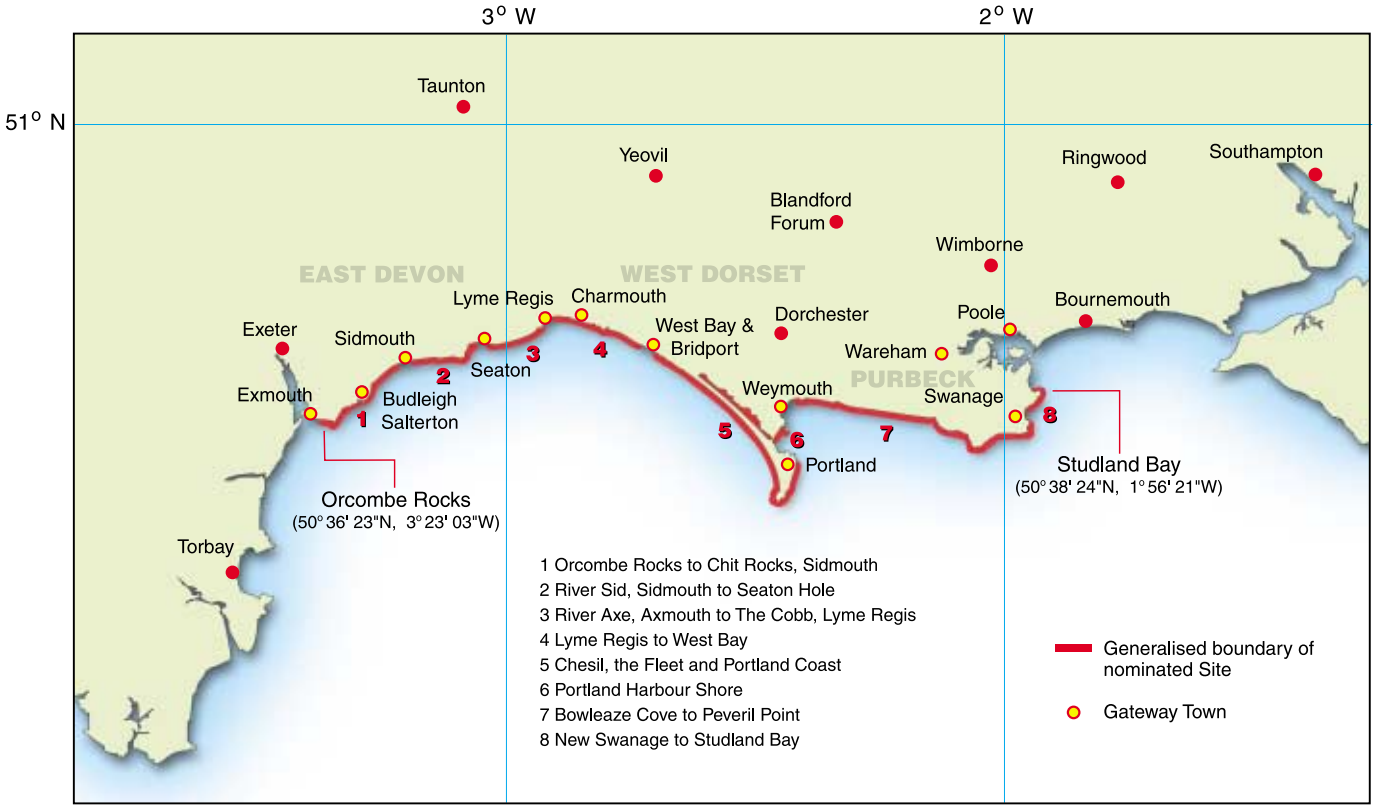


Figure 2: Overview map of the nominated Site.

1 (e) MAPS AND/OR PLANS SHOWING THE BOUNDARIES OF THE AREAS PROPOSED FOR INSCRIPTION

The boundaries of the nominated Site have been drawn to include the continuous exposure of Triassic, Jurassic and Cretaceous geological strata within the coastal cliffs, and the coastal geomorphological features including beaches, lagoons, landslides, bays, stacks and raised beaches. The coast is highly dynamic: the profile of cliffs and beaches is constantly changing, and in places the rates of change are rapid. The nominated Site's boundaries need to accommodate the natural processes of coastal evolution, and will therefore be kept under review.

In detail the landward boundary of the nominated Site has been defined as follows:

- On cliff coastline, the boundary is taken at the break in slope at the top of the most landward cliff-scarp
- On coastline with no cliffs, the boundary is taken at the back of the beach
- The nominated Site includes the Fleet lagoon and the boundary will be taken at the top of the low cliffs that lie on its northern shore

The seaward boundary of the nominated Site is taken at the Mean Low Water Mark, as defined by the UK Ordnance Survey. Under UK law, this boundary is also the legal limit of the extent of statutory planning responsibilities of local authorities under the town and country planning acts of the United Kingdom. Low Water Mark also generally forms the offshore boundary for Sites of Special Scientific Interest (SSSI) and Areas of Outstanding Natural Beauty. These protective designations, established under UK law, are important, established means through which legal protection is provided to the nominated Site. The SSSIs include, within the nominated Site, sixty-seven statutory Geological Conservation Review sites. These are part of a series of sites selected within Great Britain as being of national or international importance, following a comprehensive national assessment carried out between 1977-1990 (Ellis et al, 1996).

Paragraph 17 of the *Operational Guidelines for the Implementation of the World Heritage Convention* makes provision for the identification of a buffer zones to protect World Heritage Sites from threats beyond their boundaries. In the case of the Dorset and East Devon Coast the UK Government have already put in place appropriate conservation measures for the nominated Site and a wider surrounding area, through existing systems of protective designation, and in particular the Sites of Special Scientific

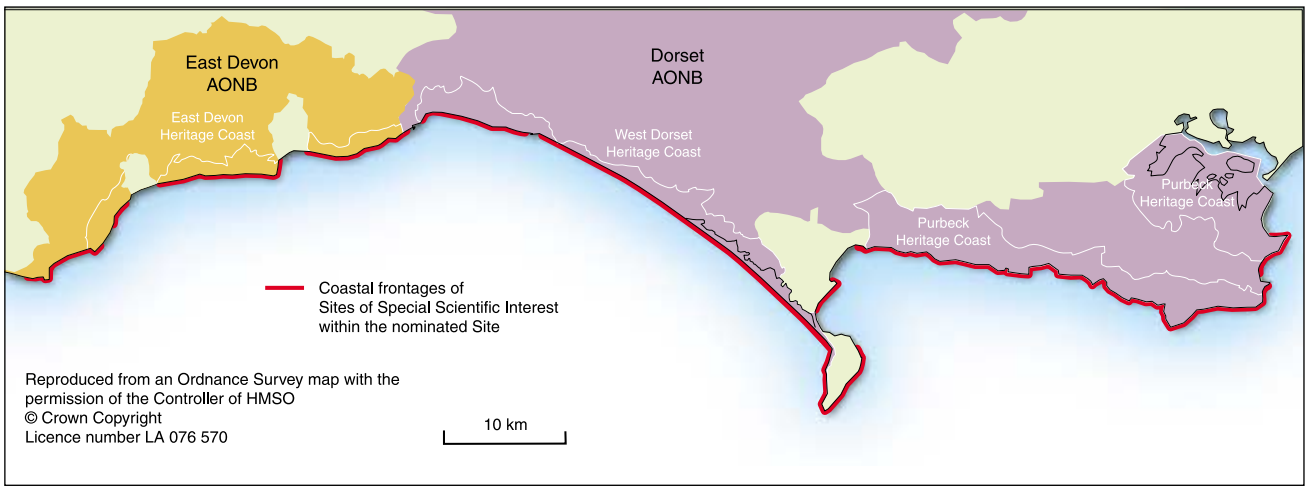


Figure 3: Map showing the main protective mechanisms for the nominated Site: Areas of Outstanding Natural Beauty (AONB), Heritage Coasts and Sites of Special Scientific Interest (SSSI). SSSIs outside the nominated Site are not shown.

Interest and Areas of Outstanding Natural Beauty. These areas are afforded strong protection, particularly through the UK's statutory planning system, and the powers and duties of English Nature, the Government's statutory adviser on nature conservation. Further protection is also provided through established statutory planning policies in relation to nationally defined Heritage Coasts, the undeveloped coastline of Portland, and Devon County Council's Coastal Protection Area. The nominated Site also lies almost wholly within sites separately identified and protected under European Law (the Habitats Directive and the Birds Directive) for their wildlife value. This range of conservation designations ensures statutory protection for a greater area than any possible buffer zone for the nominated Site, and protects its setting adequately. The identification of a separate buffer zone for the nominated Site is therefore unnecessary. Further information on the range of protective designations for the nominated Site is provided elsewhere in the nomination.

A summary map of the nominated Site is provided as Figure 2, and the extent of the Areas of Outstanding Natural Beauty and Sites of Special Scientific Interest is shown in Figure 3. Maps of the nominated Site at 1:50,000 scale, and a commentary on its boundaries are provided in Appendix A. Details of the Sites of Special Scientific Interest, including location maps and citations, are provided within Appendix B. Details of the Areas of Outstanding Natural Beauty are provided within Appendix C. Details of the Geological Review Sites within the nominated Site are provided in Appendix D, and shown in Table 2 (pages 46-47). Many locations are named individually within the text of the nomination. A series of eight maps of the nominated Site at 1:100,000 scale is included with a glossary of place names, showing their location, on pages 136-146 of the nomination.

1 (f) AREA OF PROPERTY PROPOSED FOR INSCRIPTION

The approximate area of land proposed for inscription at the date of nomination is 2550 hectares.

2. Justification for Inscription

2 (a) STATEMENT OF SIGNIFICANCE

The Dorset and East Devon Coast is one of the most significant earth science sites in the World, displaying a remarkable combination of internationally renowned features. It has a unique historical importance to the founding of geology and geomorphology, and it remains at the forefront of modern earth science research. Furthermore, its features are displayed within an unspoilt and accessible coastline of great beauty, which is both protected and managed for conservation, public enjoyment and education.

The nominated Site comprises a near-continuous sequence of Triassic, Jurassic and Cretaceous rock exposures representing almost the entire Mesozoic Era, together with outstanding geomorphological features such as landslides, a barrier beach and lagoon, cliffs and raised (fossil) beaches. Within its boundaries are a number of fossil localities that could be considered to be worthy of World Heritage Site status in their own right. This nomination document shows them in the wider context of the continuity and completeness of the geological, palaeontological, geomorphological and historical features as a whole.

Six aspects are identified which represent the significance of the nominated Site in relation to the World Heritage criteria.

2 (a) i) The coastal exposures within the nominated Site provide a near-continuous, accessible sequence of rocks that documents almost 190 million years of the history of the Earth, spanning the Mesozoic Era.

'The Dorset Coast is internationally famous for its sections of Jurassic rocks but the adjoining East Devon coast affords equally extensive and comprehensive exposure of the underlying, largely continental, Triassic succession. This succession is … an integral part of the unique exposure of the full Mesozoic sequence … seen in the nominated area. … The Subcommission on Triassic Stratigraphy fully supports the nomination of the Dorset and East Devon Coast of southern England for World Heritage status.'
Dr Michael J Orchard, Geological Survey of Canada
Vice-chairman of the IUGS Subcommission on Triassic Stratigraphy
Letter written in support of nomination.

'The nomination of the Dorset and East Devon Coast as a World Heritage Site is fully justified. [This site] beautifully represents in an almost complete succession the best concrete illustration of the Mesozoic history of the Earth. During my field trips [there] I have been surprised by the easy access to the geo-palaeontological localities, nicely exposed along the cliffs, and also the beautiful and peaceful landscapes. These characteristics make this part of the English Coast a unique site for the study of the Mesozoic Era.'
Professor Fabrizio Cecca, Université de Provence
Secretary of the IUGS Subcommission on Jurassic Stratigraphy
Letter written in support of nomination.

'The Dorset and East Devon Coast is an area of great importance for the study of Mesozoic history… In the general Mesozoic context of the region, the Cretaceous strata make the representation of the history of the Earth in SE England more complete … I strongly recommend that the Dorset and East Devon Coast should be chosen [as one of] the World Heritage Sites'
Dr Annie Dhondt, Royal Belgian Institute of Natural Sciences
Vice-chairman of the IUGS Subcommission on Cretaceous Stratigraphy
Letter written in support of nomination.

The rock strata exposed within the nominated Site provide a near-continuous geological record of earth history between 251 and 66 million years ago, in relatively undeformed sediments, representing a remarkable range of past environments. Together, the succession reveals a complete, classic and well-studied section through the Wessex Basin, one of the best known

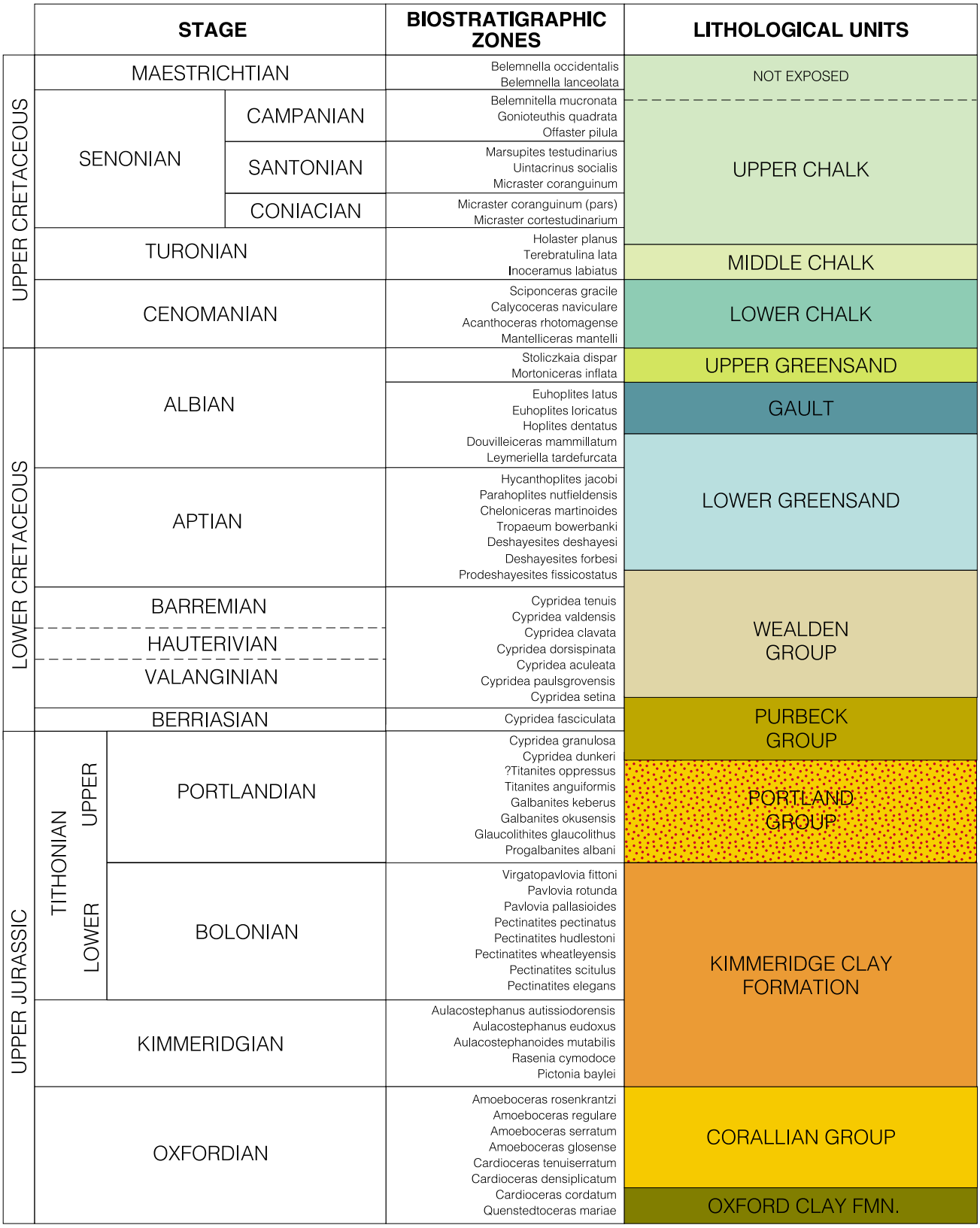
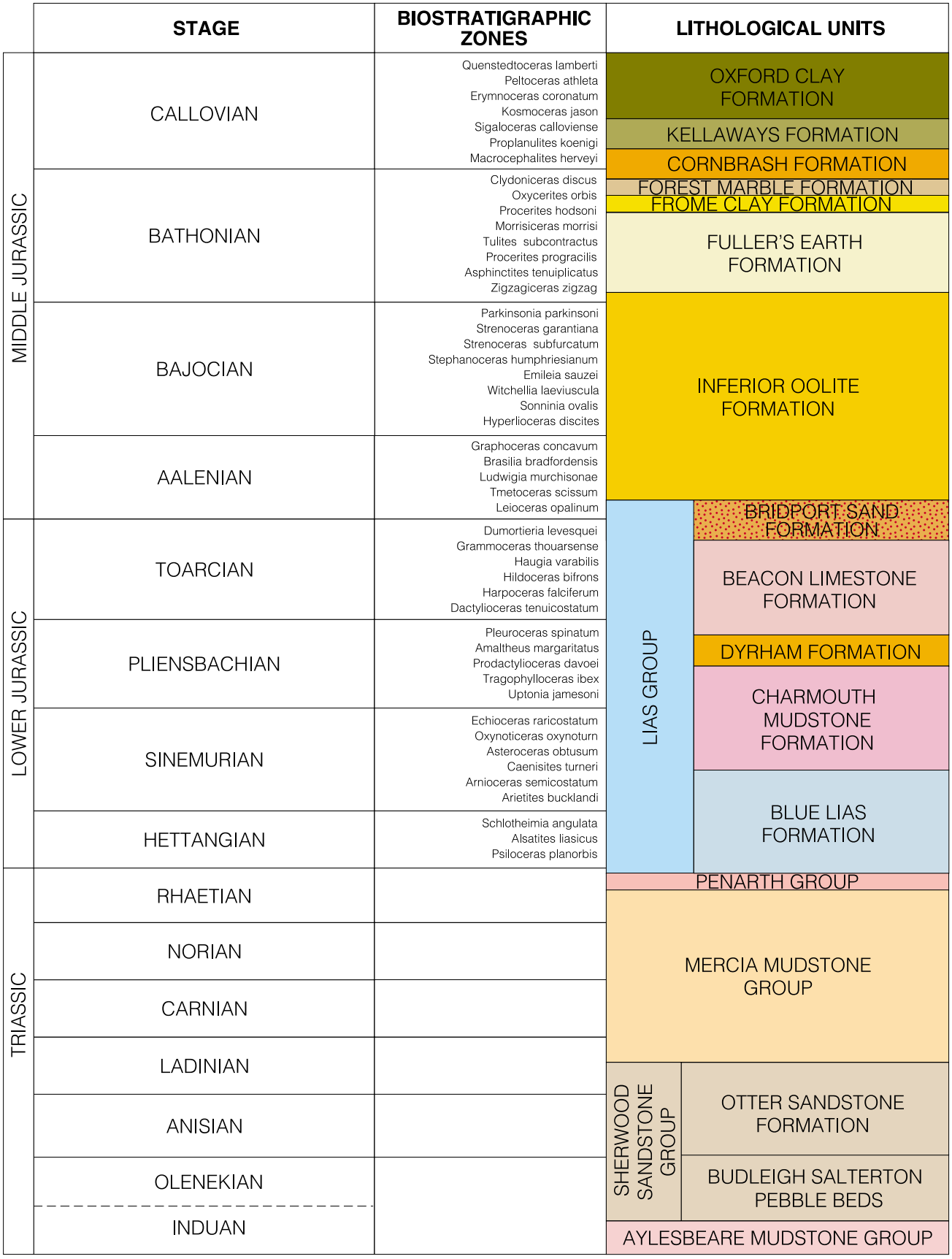


Figure 4: Generalised stratigraphic column for the Mesozoic succession of the Dorset and East Devon Coast



Mesozoic-Tertiary intra-plate sedimentary basins in Europe. A simplified stratigraphic column for the nominated Site is shown in Figure 4.

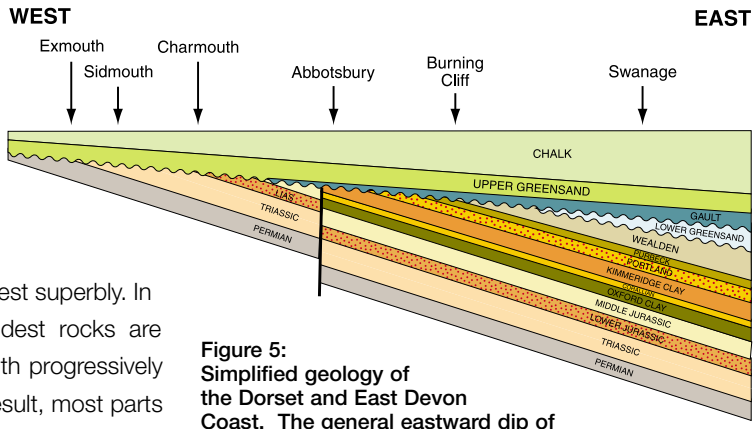
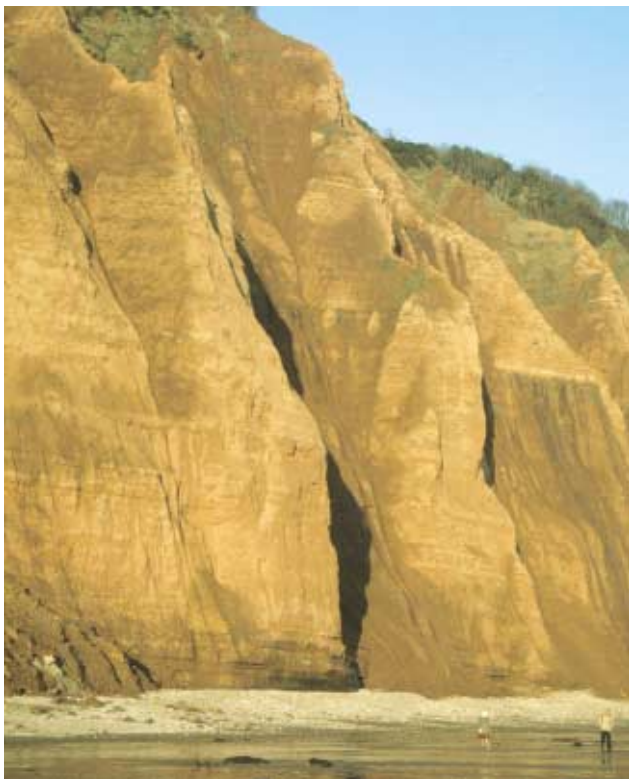


Figure 5: Simplified geology of the Dorset and East Devon Coast. The general eastward dip of the rocks creates a 'walk through time' from west to east. The major unconformity above the Wealden results in Upper Cretaceous rocks being found through most of the nominated Site.

The structure of the coast displays its geological interest superbly. In general, the strata dip gently to the east. The oldest rocks are therefore found in the west of the nominated Site with progressively younger strata outcropping to the east. As a direct result, most parts of the succession are readily accessible in sequential order within the cliffs and foreshore, while the continuous processes of coastal erosion mean that the exposures are constantly refreshed and new material is brought to light. A diagram summarising the form of the coast is shown in Figure 5.

The Triassic succession is a virtually continuous exposure of c. 1,100m of sediments representing most of the Triassic Period (c. 251-199 million years ago) in continental, terrestrial red-bed and, near the top of the sequence, shallow marine facies. These exposures record evidence of the gradual destruction and denudation of mountains formed in the Variscan orogeny of 330-280 million years ago, and the establishment of a widespread marine environment within a Jurassic basin, formed during the opening of the Atlantic Ocean (Warrington, 1999; Barton, 1999 contributions to nomination).

The Jurassic rocks within the nominated Site have been known since the early days of geology as providing one of the finest marine sequences of this age anywhere in the World (Callomon and Cope, 1995). Every stage of the Jurassic is represented; of the seventy-four ammonite zones, which have been recognised within the Jurassic (Cope et al., 1980a, 1980b), only three are definitely absent. The succession provides excellent evidence of the history of the Earth between c. 199-146 million years ago, recording six major cycles of sea level change, represented by repeated rhythms passing from clay to sandstone and then limestone. Historically, these sections have played a key role in the establishment of modern stratigraphy and biostratigraphic studies. They are internationally renowned, 'classic' sections on which comparative studies continue to be based.



Left: High Peak, near Sidmouth in East Devon. Triassic rocks are the oldest strata exposed within the nominated Site and form the red cliffs of the East Devon coast. Above: Golden Cap, between Charmouth and West Bay in Dorset. The rocks exposed in the towering sea-cliffs at its base are Lower Jurassic in age. They are overlain by Cretaceous sandstone, the Upper Greensand, which lies on the eroded surface of the Jurassic strata, and forms the distinctive yellow 'cap' of the cliff.

The boundary between the Jurassic and Cretaceous has still to be internationally defined, but, in Dorset, is expected to lie within the lowest beds of the Purbeck Formation. The succession within the nominated Site includes rocks of all stages of the Cretaceous Period, with the exception of the uppermost stage. The Purbeck Formation in Dorset is one of the finest late Jurassic-early Cretaceous terrestrial sequences in the world and offers a unique insight into environments and life at that time. The overlying Wealden Group is the most complete sequence of this age available at a single site in north-west Europe.

Much of the nominated Site displays a spectacular example of a geological unconformity. This is an exceptionally well exposed and documented record of a world-wide Lower Cretaceous marine transgression. Uplift and erosion towards the end of the Wealden led to the erosion of the underlying Cretaceous, Jurassic, and Triassic along the length of the coast, prior to deposition of the transgressive Lower Greensand, Gault and Upper Greensand. In East Devon these strata rest directly on Triassic rocks. The unconformity becomes progressively smaller to the east, until, in the Swanage area, the Gault and Upper Greensand overlie the Wealden Formation with little angular discordance. Complex lateral changes in sedimentary environments are also recorded, allowing interpretation of the changes that took place during this important phase of sea level change.

The extensive coastal exposures provided by the Dorset and East Devon coast are complemented by modern and detailed geological maps, exceptionally well documented stratigraphy and sedimentology and an extensive subsurface database. As this knowledge has been gained, the significance of the structural geology of the nominated Site has become particularly important. Today this is one of the best understood sedimentary basins in the world, and concepts developed here have a global application.

Dorset localities have provided the names for internationally recognised stages for the Mesozoic. The Kimmeridge Clay unit gave its name to the international Kimmeridgian Stage as proposed by D'Orbigny (1846-1849). Owing to a miscorrelation at that time, only the Lower Kimmeridge Clay is now included in the modern Kimmeridgian Stage, the remainder lying within the lower Tithonian of current international use. Portland gives its name to the Portlandian Stage, named by Brongniart (1829), which is still in use in Northern Europe, though now included within the upper Tithonian. The Purbeckian, named after Purbeck, was, until recently, in international use for the lowermost stage of the Cretaceous.

The coast west of Lulworth Cove. The rocks here are Upper Jurassic and Cretaceous in age. As well as the range of important stratigraphic localities, this section of coast also displays important structural geology, particularly the major fold known as the Purbeck Monocline, which was formed at the same time as the Alps in southern Europe.

Old Harry Rocks. The cliffs and stacks at this location expose the Chalk. The Upper Cretaceous rocks at this eastern extreme of the nominated Site are the youngest Mesozoic strata exposed within the coastal succession of the Dorset and East Devon Coast.

2 (a) ii) The nominated Site includes a remarkable range of internationally important fossil localities, which have produced superbly preserved and diverse evidence of life during Mesozoic times

'We would like to express our strongest support for the proposal to obtain the recognition of the Dorset and East Devon Coast among the World Heritage Sites. … The Triassic, Jurassic and Cretaceous outcrop on that part of the English coast contains a diversity of fossil life unsurpassed anywhere else: both marine and terrestrial strata are found … numerous vertebrates as well as invertebrates and plants have been discovered, studied and published.'
Professor Pierre Bultynck, Chairman of the Department of Palaeontology
Royal Belgian Institute of Natural Sciences
Letter written in support of nomination.

'Without hesitation I would like to state that [the Dorset and East Devon Coast] is one of the most superb and important sites in the world, especially for the Mesozoic part of the history of the Earth. I have never visited a major museum in the world where there is no fossil example from the Dorset and East Devon Coast. The National Science Museum is privileged to have more that 50 fossil specimens from [there]. The coast serves as the world standard in many fields such as geology and palaeontology of the Jurassic and Cretaceous times, and the history of earth sciences. In order to appreciate history of life, one cannot emphasize too much [its importance].'
Dr Makoto Manabe, Curator of Vertebrates/Birds
National Science Museum, Tokyo, Japan
Letter written in support of nomination.

The rocks within the nominated Site are, for the most part, highly fossiliferous and contain the evidence of major changes in the pattern of life on Earth during the Mesozoic Era, between two mass extinctions which took place at the ends of the Permian and Cretaceous periods. The variety of environmental conditions represented within the succession, and particularly the overall predominance of shallow marine sediments, has resulted in an exceptionally diverse range of species being represented, including plants, insects, benthic and pelagic marine invertebrates, fish, marine and terrestrial reptiles and mammals. Furthermore, exceptional preservation of material is found within a number of the fine-grained sediments including articulated skeletal remains, and rare features such as soft-tissue preservation.

FOSSIL VERTEBRATES

The nominated Site contains nine vertebrate fossil localities of international importance, ranging in age from Mid-Triassic to Lower Cretaceous.

Triassic

The Mid-Triassic Otter Sandstone Formation at High Peak and Otterton Point has yielded ten species of reptiles, fish and amphibians. It is the richest productive Mid-Triassic reptile site in Britain and has been assessed as representing one of the most promising terrestrial reptile sites of its age known (Benton and Spencer, 1995).

Jurassic

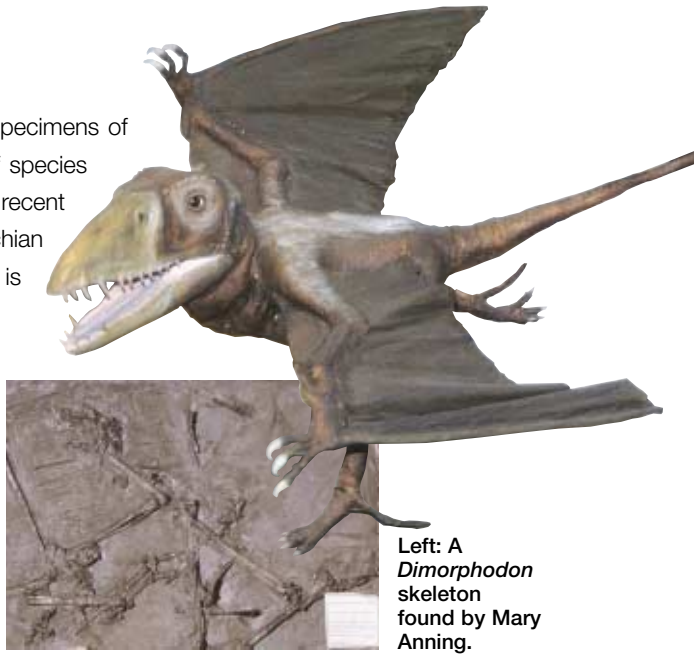
Seven sites are of international status for vertebrate remains within the Jurassic.

The Liassic (Hettangian – Pliensbachian) vertebrates of Lyme Regis (Pinhay Bay to Seatown) are world famous. This fauna is the most diverse and abundant known from the early Jurassic anywhere. The latest faunal review

A reconstruction of Mid-Triassic times in Devon, based on specimens found within Otter Sandstone Formation of the nominated Site. A scorpion (mid-foreground) contemplates a pair of procolophonids on the rocks. Opposite, a hefty temnospondyl amphibian eyes some fish of the species *Dipteronotus* in the water. Two rhynchosaurs stand in the middle distance, and behind them a pair of rauisuchians. The plants include horsetails, around the waterside, and *Voltzia*, a coniferous tree.

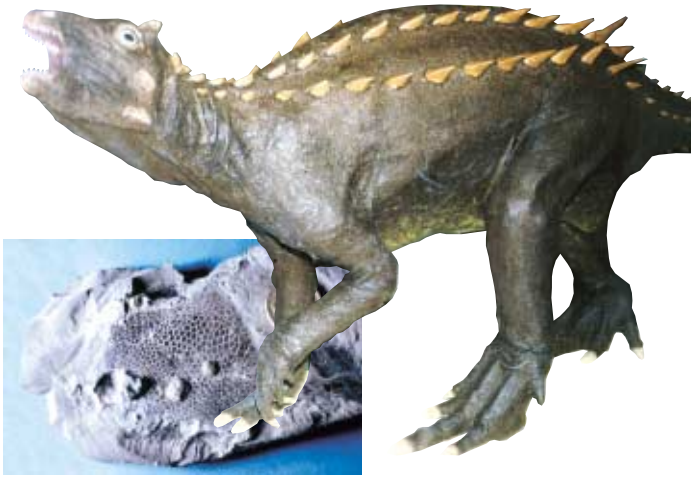
(Benton and Spencer, 1995) reported that this locality has yielded type specimens of fourteen species of reptile, nine of which occur only here. Discoveries of species new to science are still being made on a regular basis as the cliffs erode. In recent years these include a new species of ichthyosaur from the Pliensbachian (McGowan & Milner 1999), and a second discovery from 1999 which is awaiting description.

The quality of specimens is frequently exceptional, with well-articulated skeletons and soft-part preservation of features such as skin and stomach contents. This locality is the source of the geologically earliest well-preserved plesiosaurs and the earliest crown-group ichthyosaurs. The first complete skeletons were collected from these localities in the early nineteenth century (Taylor, 1997), and include holotype specimens of taxa that are still crucial to modern studies of marine reptiles (Storrs, 1997). Material from Lyme Regis has formed the basis of recent revisions of ichthyosaur relationships and evolution (McGowan, 1973-1989).



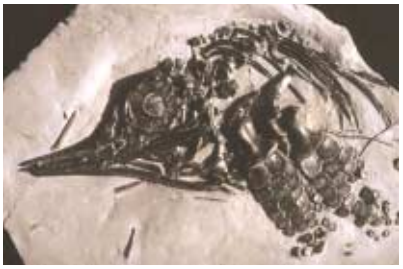
Left: A *Dimorphodon* skeleton found by Mary Anning.

The importance of Lyme Regis is further highlighted through the remains of terrestrial vertebrates. It is the only locality of *Scelidosaurus harrisoni* Owen, the oldest known thyreophoran (armoured) dinosaur (Norman, 1985). The Lias has also produced unique records of one of the earliest flying reptiles, *Dimorphodon macronyx* which is of great importance to the study of pterosaurs (Unwin, 1988). The fish fauna is also very diverse with a broad representation of both cartilaginous and bony fishes (Gardiner, 1960), and its significance has recently been assessed (Dineley and Metcalf, 1999). About forty-six species are currently recognised of which thirty-five are unique to this locality. It is the source of some of the finest preserved Lower Jurassic fish known, some of which are preserved uncompressed in three dimensions (Dineley and Metcalf, 1999).

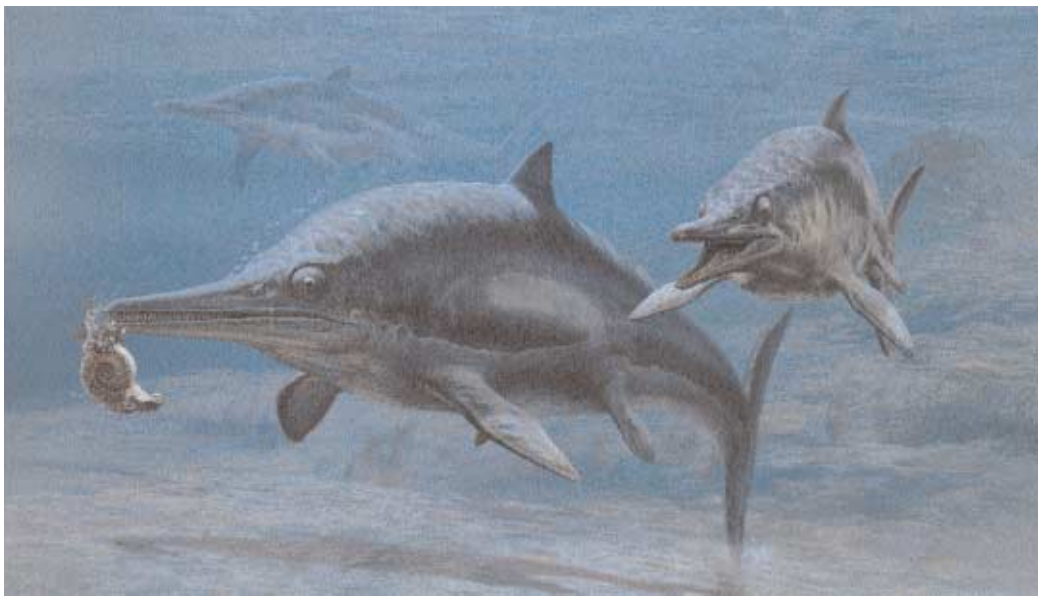


The Middle Jurassic vertebrate fauna of the Forest Marble at West Cliff, West Bay is a unique and diverse mix of marine, freshwater and terrestrial elements (Evans, 1999). The fauna includes bony fish, sharks, amphibians, frogs, salamanders, small turtles, lizards, crocodiles, dinosaurs, pterosaurs and early mammals, and much material awaits description. It is important as one of few well-known vertebrate faunas of this age (Evans, 1999 contribution to nomination).

Furzy Cliff near Weymouth is Britain's best Oxfordian reptile site, and in view of the limited number of sites of this age elsewhere, is considered one of the best in the world (Benton and Spencer, 1995). It is the source of the unique specimen of the carnivorous dinosaur *Metriacanthosaurus parkeri* (Huene, 1923), together with ichthyosaur and plesiosaur remains.



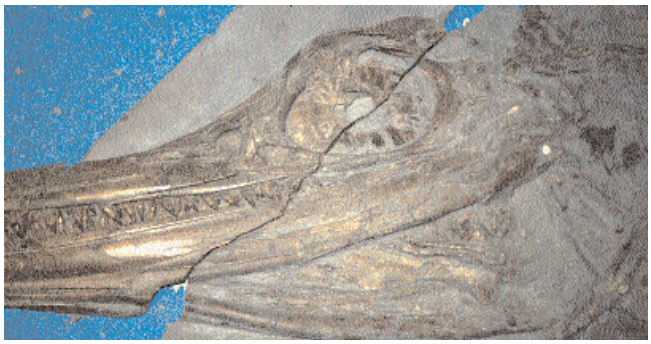
Unique and important finds of Lower Jurassic fossil vertebrates from the nominated Site include animals which lived in the air, on land and in the sea. *Dimorphodon macronyx* (top) is one of the earliest flying reptiles, known nowhere else. *Scelidosaurus harrisoni,* the 'Charmouth Dinosaur' (middle) is also known only from this Site: a specimen found in 1985 included fossilised skin (shown). The marine reptiles represent the most diverse Lower Jurassic fauna known. Exceptional preservation enables detailed reconstructions to be made, such as the above painting of a group of *Temnodontosaurus* based on a remarkable specimen from Charmouth, now displayed in Bristol City Museum. Discoveries of new species continue to be made, including a short-snouted ichthyosaur, *Leptonectes moorei* (bottom), found by a local collector in 1995.

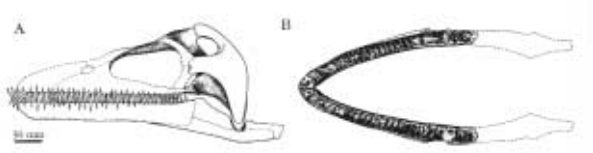


A reconstruction of the ichthyosaur *Grendelius mordax* by John Sibbick, based on a superb specimen (below) discovered within the nominated Site at Encombe Bay. Collection of the Bristol City Museum.

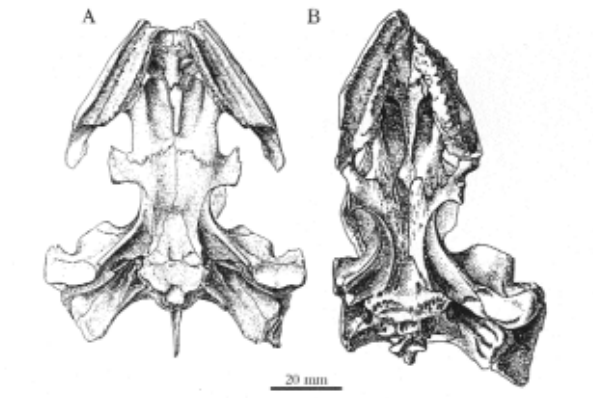
The Kimmeridgian vertebrate fauna, from three significant localities within the nominated Site, is world-renowned. Smallmouth Sands has produced one of the most diverse assemblages of Kimmeridge Clay reptiles known. Its fauna of four species of turtles and three of pterosaurs is unique; six of its vertebrate species are known only from this locality (Benton and Spencer, 1995). Within Kimmeridge Bay nearly twenty species of crocodilians, pterosaurs, dinosaurs, plesiosaurs, pliosaurs and ichthyosaurs have been found. Although many of the taxa are represented at other localities in the world, the quality of preservation of much of the material from the nominated Site is exceptional. Kimmeridge Bay has yielded more type specimens of reptiles than any equivalent site (Benton and Spencer, 1995), and its fossils have figured prominently in recent reviews of marine reptiles (Tarlo, 1960; McGowan, 1976; Brown, 1981). Encombe Bay has produced species of turtles, pterosaurs, dinosaurs, plesiosaurs and ichthyosaurs. The Kimmeridge Clay has yielded a fauna of at least fifteen published species of reptile, of which 20 per cent are unique to Dorset, but recent collections include considerable further unpublished material (Etches and Clarke, 1999). The fish fauna includes eighteen species; the material is very well preserved and new finds are made each year (Dineley, 2000 contribution to nomination).

The Isle of Portland has yielded the best faunas of marine Portlandian (Upper Tithonian) reptiles in the world (Benton and Spencer, 1995). Finds have been made in coastal sections and in adjacent quarries, which lie outside the nominated Site. Eight reptile species have been identified, of which four are represented by type specimens. The fossil turtles are particularly important and include some of the earliest known well-preserved specimens (Benton and Spencer, 1995).





The plesiosaur, *Kimmerosaurus langhami* Brown, 1981, from Encombe Bay. *Kimmerosaurus* differs from all other plesiosaurs because of the nature of its teeth, and it has been proposed that it was a filter feeder. The type specimen is in the collection of the Natural History Museum, London. (Reproduced from Benton and Spencer, 1995)



Turtle skull remains from Portland of *Plesiochelys planiceps* (A) and *Portlandemys mcdowelli* (B): two of the three type specimens of turtles known from here. These and other remains have formed the basis for recent revisions of early turtle taxonomy and anatomy. (Reproduced from Gaffney (1975), cited in Benton and Spencer, 1995)

Cretaceous

'The Purbeck Beds have and continue to yield the remains of dinosaurs and associated vertebrates, invertebrates and plants, which give us an opportunity to understand the diversity of life late in the Jurassic and at the beginning of the Cretaceous. Because of the discoveries and studies of Purbeck material in the nineteenth century, its prehistoric faunas have become an international benchmark.'

Professor William A Clemens, Department of Integrative Biology, University of California, Berkeley, USA
Letter written in support of nomination.

Extract from the 1871 monograph of mammal remains from the Purbeck Group at Durlston Bay by Sir Richard Owen (left). This work, based on the discoveries of Samuel Beckles in the 1850s established the importance of this locality, which continues to produce new discoveries. The Owen collection is one of the most important fossil collections held by the Natural History Museum, London.

The Purbeck Formation on the Isle of Purbeck (including those rocks that straddle the Jurassic – Cretaceous boundary) contains an exceptional assemblage of vertebrate fossils. Fish remains are common and locally are exceptionally well preserved. About thirty species have been identified, and the formation is regarded as one of the most important late Jurassic fish localities in the world (Dineley and Metcalf, 1999). It also contains one of the richest mid-Mesozoic tetrapod assemblages known (Howse and Milner 1995). The fauna includes amphibians, mammals and over forty species of reptiles; turtles, crocodiles, lizards and dinosaurs, complete with associated trackways. Durlston Bay is by far the richest known reptile site of this age, and has many claims to pre-eminence for specific aspects of reptile palaeontology (Benton and Spencer, 1995). The mammal fauna is also outstanding; it was first recognised in the 1850s by Samuel Beckles, and monographed by Sir Richard Owen (1871). Many new species have since been recovered. In totality, the Purbeck of Dorset is unique in providing over 100 valid named species of vertebrate within a limited geographical and stratigraphic setting, indicating that they were living in close proximity at the same time. The associated range of trace fossils, egg-shells and coprolites, together with the level of sedimentological detail, provide a record of unparalleled richness in reconstructing a complete picture of the environment of the time. There is a high potential for further discoveries: recent work, for example, at a coastal locality and a nearby inland locality has revealed Britain's only reptile eggshell of this age and an additional important microvertebrate horizon (Ensom, 1997, in press, and contribution to nomination).

FOSSIL INVERTEBRATES

The invertebrate fauna of the nominated Site is extremely rich, and the remains are found throughout the Jurassic and Cretaceous. Fossils belonging to most phyla have been described, although corals are largely missing. Many aspects have been studied in detail, including the bivalves and several different groups of microfossils.

A perfect specimen of a dragonfly from the Lias at Charmouth. The detailed preservation is due to the combination of the fine-grained texture of the rock, and the anaerobic conditions on the seabed when the fossil was formed.

Insects are known from the Triassic, Jurassic and Cretaceous rocks within the nominated Site. The particularly significant remains are the rich and diverse faunas from the Lias and the Purbeck Formation, and new discoveries indicate significant potential in the late Triassic strata near Axmouth, East Devon (Swift and Martill, 1999). The Black Ven Marls near Charmouth

are the best known source of Lower Lias insects in the World. The diverse fauna includes representatives of ten different groups. The insects have been the subject of modern scholarly works which have recognized over twenty new genera and species known only from the nominated Site, including the oldest known moth *Archaeolepis mane* (Whalley, 1985) (Jarzembowski, 2000 contribution to nomination).

Insects from the Purbeck Beds have been found at Durlston Bay, Upwey, Osmington and on the Isle of Portland. The most important locality is Durlston, where over 3,000 specimens have been collected. This is one of a small number of rich Cretaceous insect sites world-wide, and it is distinct from the other sites known. Around 150 species, mostly unique to Dorset, have been named belonging to fifteen orders, and many more species await description (Ross, 1999 contribution to nomination).

Examples of zonal ammonites from the nominated Site (clockwise from top left). *Asteroceras obtusum* from the Lower Lias at Charmouth identifies the Obtusum Zone (Lower Jurassic), *Parkinsonia parkinsoni* from the Inferior Oolite at Burton Bradstock identifies the Parkinsoni Zone (Middle Jurassic) and *Titanites anguiformis* from the Portland Group on Portland identifies the Anguiformis Zone (Upper Jurassic).

The Dorset and East Devon Coast has long been famous as a rich source of ammonites, which are often well preserved, and are abundant at most levels within the marine strata. Some specimens display exceptional preservation of jaw structures and other features, and the remarkably complete succession of faunas at certain levels provides excellent material for evolutionary and taxonomic studies. Ammonites have been collected and described extensively from the nominated Site: many type specimens of well-known species have been found here, including a significant number of important early discoveries of type specimens used in the standard ammonite zonation of the Jurassic.

The Lower Lias sequence has been described in great detail. The detailed descriptions of ammonite faunas from Dorset by Spath, based partly on the nominated Site, form the basis of the modern zonal scheme (Callomon and Cope, 1995). The Weymouth area provides the type section for ammonite faunas of three Oxfordian subzones of the North West European province. The Kimmeridge Clay provides the reference section for the Boreal Upper Kimmeridge (Bolonian/Upper Tithonian) zones (Cope 1967, 1975). The cliffs and quarries of Portland have been fundamentally important in defining ammonite zonation through the Upper Tithonian (Portlandian) Stage (Wimbledon and Cope, 1978; Callomon and Cope, 1995). Several important

A beautiful specimen of the fossil crinoid *Pentacrinites fossilis* from the Black Ven Marls at Charmouth. Large numbers of individual animals are often found associated with fossilised wood, suggesting that they lived in colonies attached to driftwood, which may have sunk to the seabed when waterlogged.

Superbly preserved brittle-starfish are found from the Middle Lias between Eype and Seatown. Dense assemblages, such as this one, are occasionally found on the foreshore, but the precise stratigraphic horizon that they come from has not yet been pinpointed. Painstaking preparation is needed to reveal the detail of the fossils.

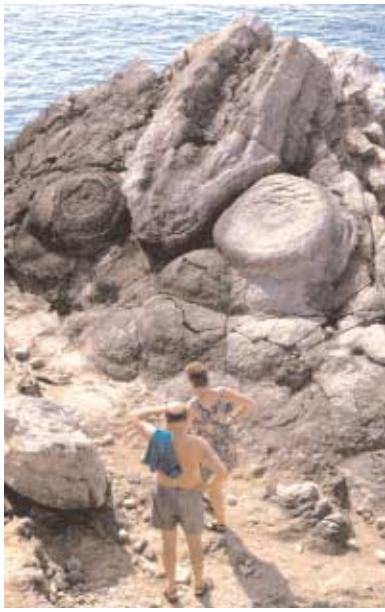
This exceptional and rare specimen of a sunstar comes from the Middle Lias exposure at Eype. The specimen is comparable to *Solaster murchisonae*, but may be an entirely new species. A further specimen was discovered in January 2000, and awaits description. From the collection of the Yorkshire Museum.

A reconstruction of the Purbeck Fossil Forest based on the fossil remains found within the nominated Site. The forest was dominated by cupressus-type trees, monkey-puzzles, and cycad ferns. Analysis of tree growth rings suggests it was subject to a seasonally-arid, Mediterranean-type climate, with exposure to prolonged droughts.

species of Cenomanian and Turonian ammonites have their type localities within the nominated Site, including *Watinoceras devonense* (Wright and Kennedy), the standard international index for the base of the Turonian Stage.

The Lower Jurassic exposures within the nominated Site are also noted for their echinoderm fauna. Extraordinarily preserved specimens of the crinoid *Pentacrinites fossilis* from the Black Ven Marls have provided crucial evidence for the pseudoplanktonic mode of life of this and related species. Higher in the succession the well known Starfish Bed has yielded many exceptionally-preserved ophiuroid, and rare asteroid starfish (Goldring and Stephenson, 1972). Tangled groups of the crinoid *Balanocrinus gracilis* also occur in exceptional preservation at a similar level in the succession. Intact echinoids occur locally at several levels, notably low in the Blue Lias, with several species described on the basis of material from here (Wright, 1855-80).

Because of the exceptionally continuous exposure on both foreshore and cliff the Jurassic succession has provided a great deal of material used in taxonomic studies of a wide range of other invertebrate groups. Notable among these are publications dealing with some of the more neglected groups, such as Lower Jurassic belemnites (Lang, 1928) and gastropods (Cox, 1926-1944), for which few detailed studies have been published. There are a range of other important monographs such as those on Corallian lamellibranch bivalves (Arkell, 1929-1937), Sponges (Sollas, 1883; Hinde, 1887-1912) and brachiopods (Muir-Wood, 1926-1936).



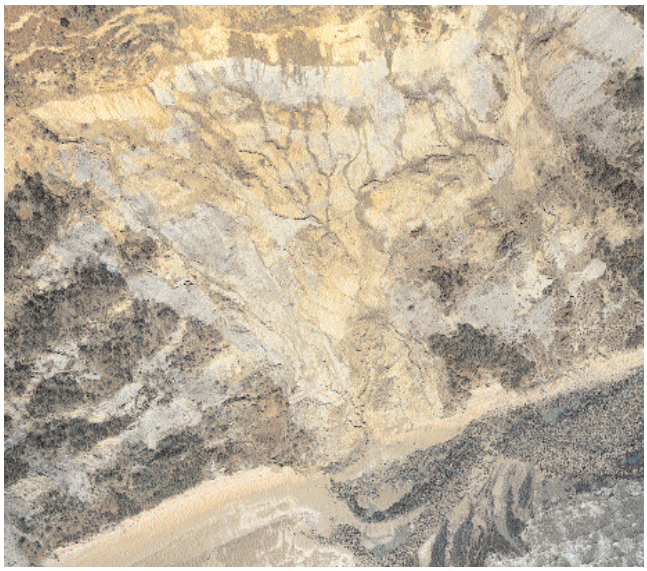
Perhaps the best exposure of the Fossil Forest is on the cliff just east of Lulworth Cove. The doughnut-shaped algal 'burrs' can be clearly seen. These deposits formed within thick masses of algae, which accumulated around the bases of trees and fallen logs. Sometimes the wood rotted away leaving a hole where the tree once stood.

FOSSIL PLANTS

There are exceptional remains of Late Jurassic fossil forests exposed on the Isle of Portland and the coast of Purbeck. These forests once grew on the margins of a large hypersaline lagoon that, 140 million years ago, covered much of southern England. It is a uniquely complete record of a forest of this age and contains large trees, sometimes in situ with associated algal burrs which formed around the bases of the trees, and fossilised soils and pollen. The wood is exceptionally well preserved in silica, displaying microscopic details of the structure, including preserved growth rings which allow a detailed assessment of the climate of the time (Francis, 1983, 1984, 1986).

A thin section of fossil wood from the Fossil Forest. The detailed preservation of growth rings in silica can be clearly seen. The irregularity of the rings indicates the variability of the annual water supply.

2 (a) iii) The nominated Site represents an exceptional range of text-book exemplars of coastal geomorphological features, landforms and processes



This vertical air photograph of the mudslides at Black Ven clearly demonstrates the dramatic mass movement at this locality (the barely-visible people on the beach give an indication of scale). Rotational landslides and tension cracks can be seen at the top of the cliff. The dark lines are wet streams of mud and water. The boulder lobes on the beach show the limits of recorded mudslide surges in 1958 and 1969.

Historical and recent views of the Hooken landslide near Beer, East Devon. The slide occurred in 1789-90 and appears to have originated below sea-level. The drawing was made by Daniel Dunster in 1840, and the erosion of the front of the slide between then and the present day can be seen by comparing the two images.

'Coastal landforms along the Dorset and East Devon Coast are known to most geomorphologists of the world as classic examples of a variety of processes working at the land/sea boundary. … Close juxtaposition of coastal mass movements of various origin, cliffs developed in a variety of rock types, landforms of differential erosion, beaches and lagoons is probably unparalleled anywhere else in the world. As the International Association of Geomorphologists, we strongly support the proposal to nominate the site as a World Heritage Site.'

Dr Piotr Migon, University of Wroclaw
Secretary General of the International Association of Geomorphologists
Letter written in support of nomination.

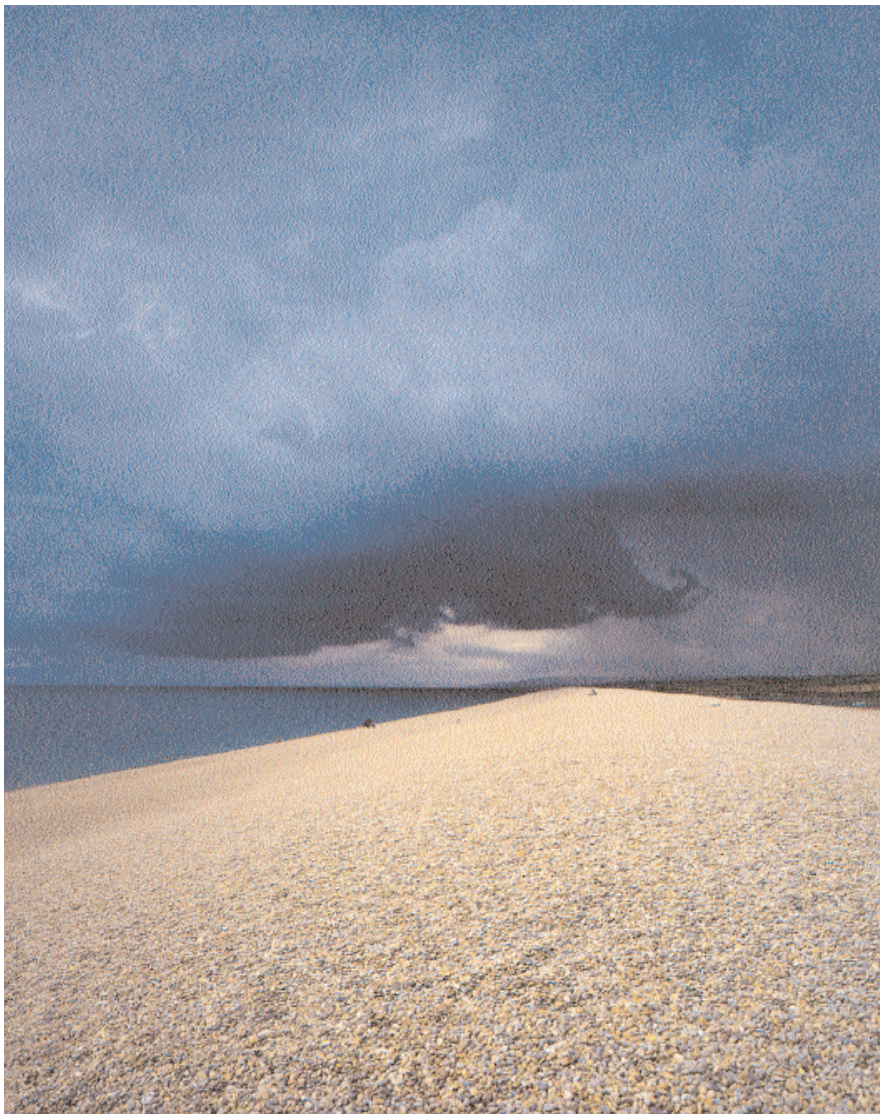
The East Devon and Dorset coast is a spectacular natural geomorphological laboratory. It is famous for its demonstration of a wide range of different mass-movement systems, the development of a unique barrier beach and lagoon, and classic examples of coastal cliff evolution in both time and space and in relation to the underlying rock structure. The nominated Site provides a superb varied assemblage of related landforms and processes, which demonstrates numerous classic and universal features of coastal geomorphology. The importance of these features is heightened by their extensive study and long history of use as examples in text-books. Five distinct and important aspects can be identified: landslides, beaches, the Fleet lagoon, cliffs and raised beaches.

Due to the lithological variation in the Jurassic strata and the presence of the Lower Cretaceous unconformity, the coast contains a near-comprehensive range of slope failures from rotational landslides to mudslides, topple and slab failures. Some are prehistoric while others have eyewitness accounts or provide the subject of ongoing research. Possibly the most significant is the Bindon Landslip between Axmouth and Lyme Regis. The massive landslide, which took place here in 1839, created the 6.5 ha 'Goat Island' isolated by a 30 m deep 'Chasm'. Black Ven is another classic and complex site demonstrating rotational landslides, and the largest recorded coastal mudslide in Europe. Portland shows fine examples of topple and slab failure, and rock-falls. The slides include East Weares, the second largest historical slide in the UK, and King's Pier, the first known landslide to have been caused by human activity (Brunsden, 1999 contribution to nomination).

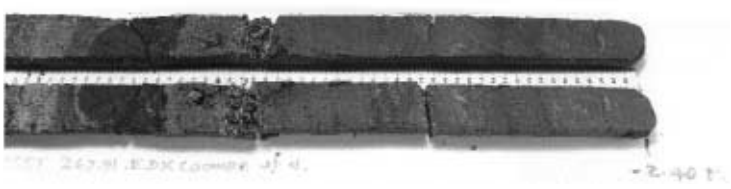
Studies on this coast provide one of the best-documented analyses of beach formation and evolution on a retreating coastline (May, 1999 contribution to nomination). There are numerous small beaches, and two larger classic sites: Budleigh Salterton and Chesil Beach. At Budleigh Salterton, the beach is formed from pebbles eroded from the Triassic pebble beds. These pebbles are found in beaches stretching all along the south coast of England and are a diagnostic marker which provide important evidence of beach evolution in the English Channel during the Holocene. The largest and best-researched beach is Chesil Beach, which faces the full fetch of the Atlantic Ocean. It is 28 km long and ranges in height from 5 m to 15 m between West Bay and Portland. Chesil Beach is a world-renowned feature, famous for the volume, type and size-grading of its pebbles. The origin of the beach and the nature of the ongoing processes have been extensively studied and are the subject of continuing research (Brunsden, 1999; May, 1999 contributions to nomination).

Chesil Beach encloses the Fleet, one of the most important lagoon areas in Europe. The sediments preserved in its sheltered waters provide information on the late Holocene evolution of the beach, and evidence for changes to sea levels, climate and vegetation. Chesil and the Fleet represent an exceptional example of a barrier beach and lagoon system, and they are recognised by a range of national and European protective designations.

The cliffs at Budleigh Salterton are made of Triassic pebble beds, which erode to form the distinctive beach. The pebbles are mainly of much older, Ordovician, rocks. They are a readily recognisable marker elsewhere on the coast, demonstrating alongshore sediment movement.



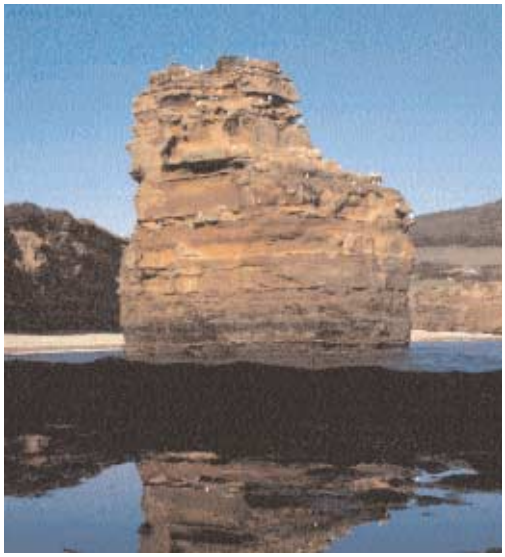
The shingle barrier of Chesil Beach runs for 28 km within the nominated Site. Much of the beach remains very remote, particularly the stretch which is isolated from land by the Fleet Lagoon.



Borehole cores from the Fleet have recovered freshwater peats, 4,000-5,000 years in age. The sediments contain small fossil crustacea, ostracods, which have been used to demonstrate the changing environments. Major changes in the distribution of the two species shown, *Cyprideis torosa* (1,2) and *Loxococha elliptica* (3,4), suggest that the Fleet environment was more estuarine in the past.

The assemblage of cliffs, stacks and arches in the Chalk cliffs at Old Harry Rocks.

The rock arch at Durdle Door, formed where the sea has breached the Portland Limestone and Purbeck Beds.

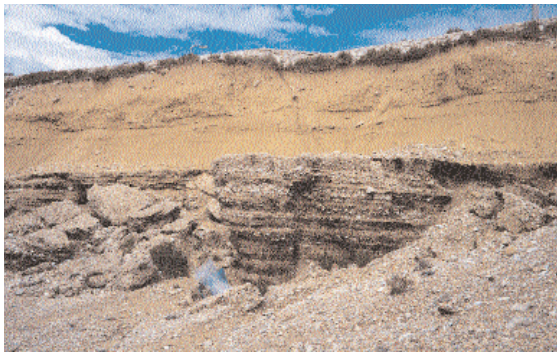


The stacks at Ladram Bay are unique in Britain in being formed in relatively easily eroded Triassic sandstones. They owe their preservation largely to the sheltered coastal setting where they occur.

Lulworth Cove is a classic example of bay formation on a concordant coast. It began to develop when the stong Portland Limestone barrier was breached by a stream. Subsequent marine erosion has removed the softer Wealden rocks to create the bay.

Over eighty per cent of the nominated Site is cliff coastline, developed in many different combinations of mudstones, sandstones and limestones. There is a particularly superb development of beautiful coastal landforms on the Isle of Purbeck. This part of the coast is the best known example of adjacent concordant and discordant coasts, displaying the differing coastal landforms which result from the action of the sea both with and across the geological 'grain' of the coast. It is a classic location for demonstrating the evolution of caves into bays (the cave-bay sequence) and shows the full range of responses to variations in the resistance of strata, and differential coastal erosion at a range of scales. It includes text-book examples of bays, stacks and a rock arch at internationally well-known localities such as Lulworth Cove, Durdle Door and Old Harry Rocks (Brunsden, 1999; May, 1999 contributions to nomination).

Two Pleistocene raised beach deposits, of different ages, are present at Portland Bill. They provide an important association of terrestrial and marine sediments up to perhaps 200,000 years BP in age. The fossil fauna of the East Beach is the most diverse found in any British raised beach, and this is the best example of a raised beach sequence along the English Channel coast (Keen, 1999 contribution to nomination).



One of the exposures of the raised beaches at Portland Bill. These beaches formed at times of higher sea levels during past inter-glacial periods.

2 (a) iv) The nominated Site has been a crucible of earth science investigations for over three hundred years. It has helped foster major contributions to many aspects of geology and geomorphology

'I write to you to support in the strongest way possible, the nomination of the Dorset and East Devon Coast for inclusion in the World Heritage List. This area is truly world-famous for its many and varied geological and palaeontological resources. These resources have played a fundamental role, historically, in the development of basic concepts in Earth history and in documenting past life. The region under consideration has been under continuous investigation for more than two centuries. There remains still more, much more, that the … Dorset and East Devon Coast has to offer Earth scientists. … The more an area is studied and published on, the more it becomes as a reference to future generations of investigators. In this regard, the long and distinguished heritage of the Dorset and East Devon Coast must be identified as one of the most important in the World.'

Professor Zofia Kielan-Jaworowska
Palaeobiological Institute, Polish Academy of Sciences
Letter written in support of nomination.

The importance of the Dorset and East Devon Coast to the earth sciences is demonstrated by its critical contributions to many of the major, formative debates in the early days of geology and geomorphology. The fossil wealth of Lyme Regis was first pointed out in 1673 by John Ray. In 1770 the fame of the area drew a visit to Weymouth from James Hutton (1726-1797) of Edinburgh, often cited as 'the father of modern geology'. The nominated Site has since inspired a large number of other significant geologists, who were either born, worked or lived here. They include William Smith (1769-1839), who made the first geological maps of England, Dr. William Buckland (1784-1856) of Oxford University, later Dean of Westminster, Adam Sedgwick (1785-1873), Professor of Geology at Cambridge, William Conybeare (1787-1857), incumbent at Axmouth and later Dean of Llandaff, Gideon Mantell (1790-1852) the discoverer of the Iguanadon, Sir Roderick Impey Murchison (1792-1871), President of both the Geological and Royal Geographical Societies, Sir Henry De la Beche (1796-1855), founder of the British Geological Survey, Professor John Stevens Henslow (1796-1861), Darwin's Tutor at Cambridge, Sir Charles Lyell (1797-1875), the pioneer of uniformitarianism, Professor Richard Owen (1804-1892), superintendent of the Natural History Museum, London and Louis Agassiz (1807-1873), the Swiss founder of modern glacial geomorphology.

The nominated Site rose to pre-eminence during the early part of the nineteenth century, at a time when, as observed by Sir Crispin Tickell (1995), geology was the 'queen of sciences': *'occupying the kind of place in people's minds as evolution and natural selection did in the second half of the century, physics in the first half of the twentieth, and information technology with molecular genetics in our own times'. 'What that world had been, and how it should be understood, was the central conundrum of this time'.*

At this critical period, the discoveries made by the Anning family, who ran a fossil hunting and selling business at Lyme Regis, advanced science in a way without parallel in Europe (Tickell, 1995; Torrens, 1995). They found the first ichthyosaur to come to scientific attention in around 1811-12, the World's first complete plesiosaur followed in 1823, the first British pterodactyl in 1828, to say nothing of other equally important finds in invertebrate palaeontology, coprology and taphonomy. Their activities stimulated the activities of many, now famous collectors, including the three Philpot sisters, William Willoughby Cole, third Earl of Eniskillen (1807-1886), Sir Philip Egerton (1806-1881), Lt. Col. Thomas James Birch (1768-1829), and Thomas Hawkins (1810-1889), a maniacal collector of giant fossil reptiles. Their collections of fossils from the nominated Site, and those of later collectors such as Sir A.S. Woodward (1864-1944) and

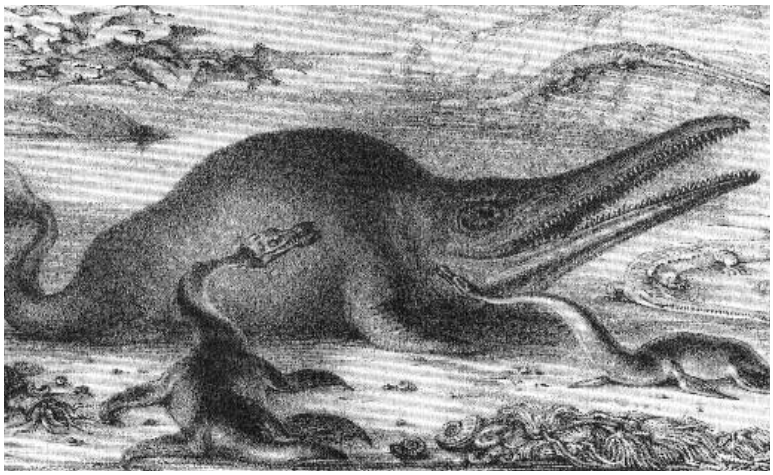


Illustration by Waterhouse Hawkins depicting a scene from the Lower Jurassic for the 1858 edition of William Buckland's *Bridgewater Treatise*.

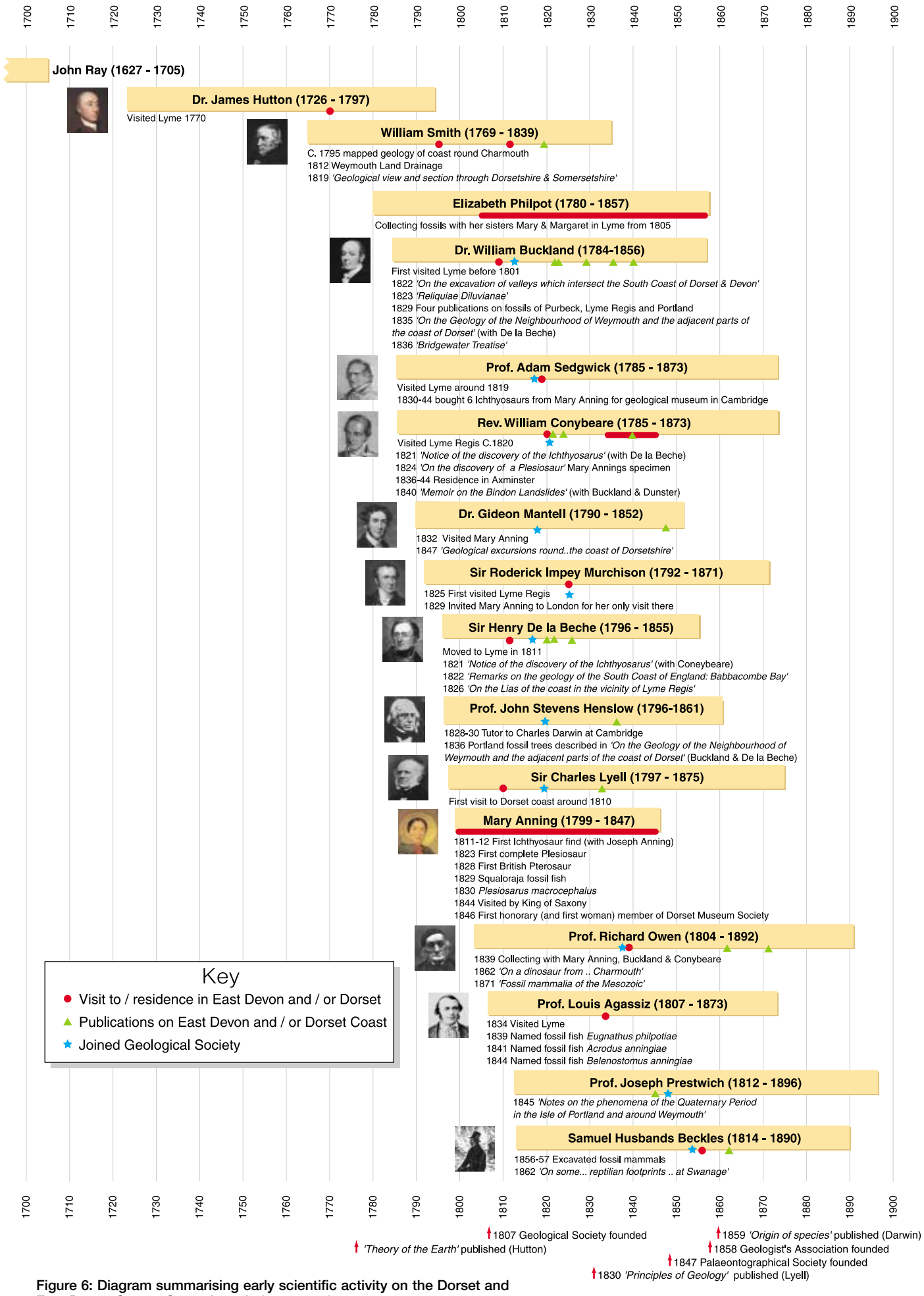
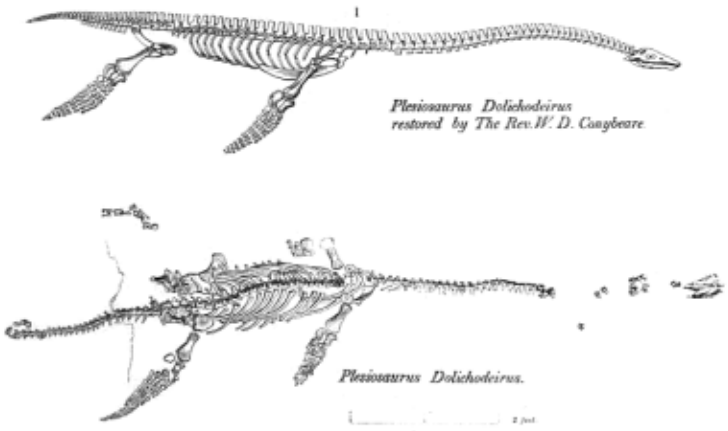
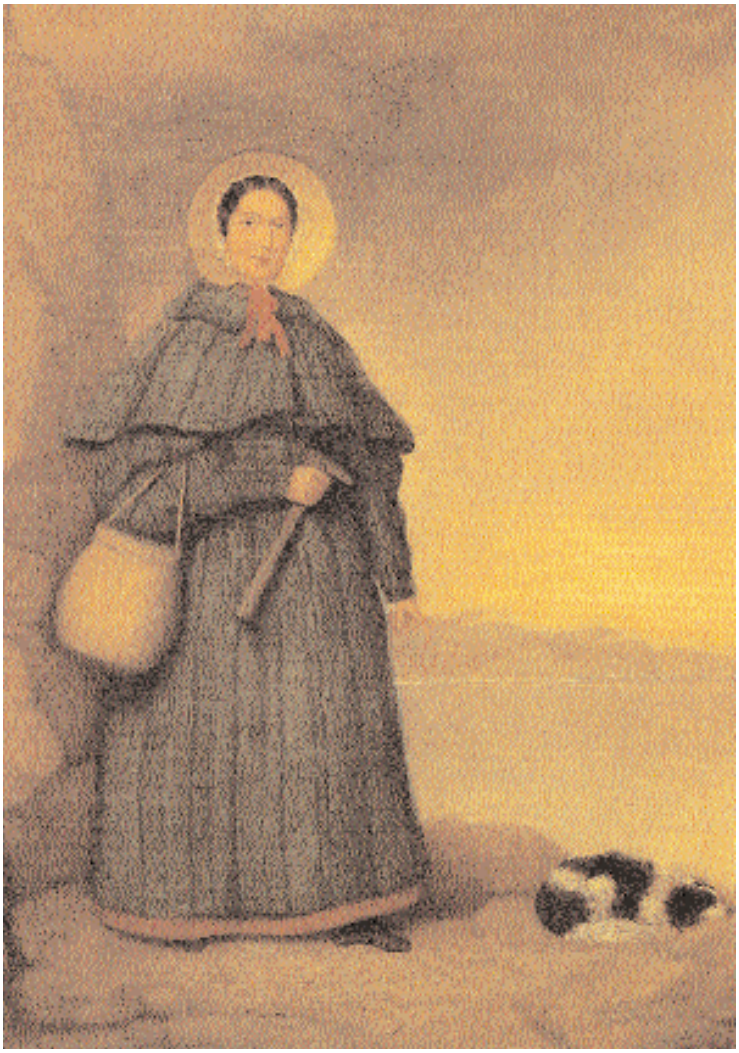


Figure 6: Diagram summarising early scientific activity on the Dorset and East Devon Coast. See acknowledgements for sources.

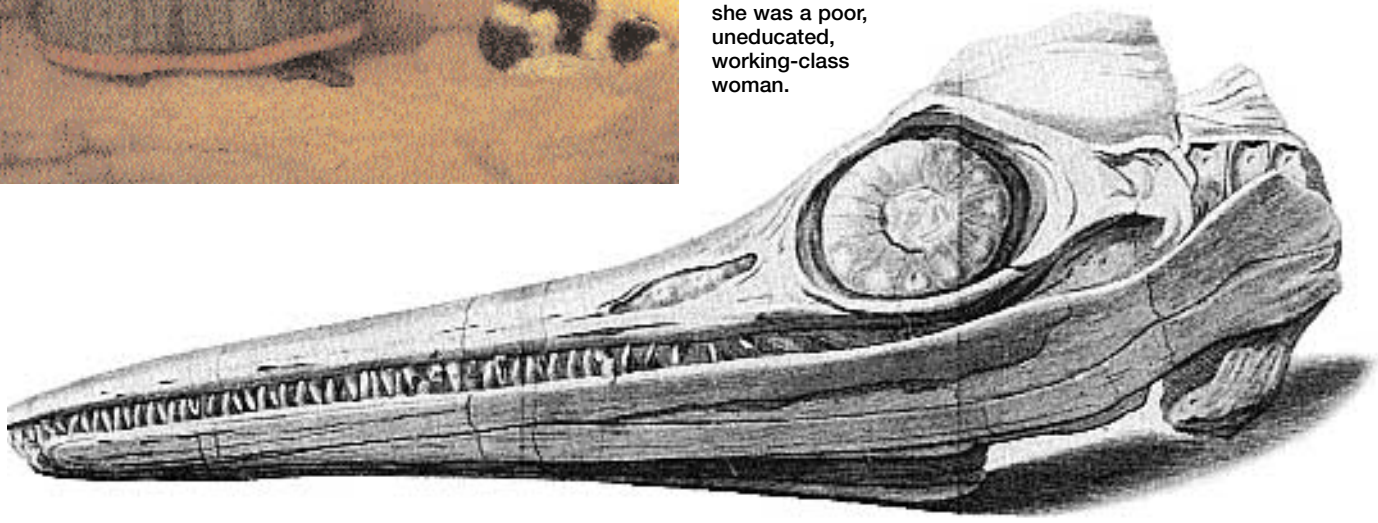


James Frederick Jackson (1894-1966) now form the basis of major museum collections including those at the Natural History Museum, London, the Sedgwick Museum in Cambridge, the Bristol City Museum and the National Museum of Wales, Cardiff. A second specimen of plesiosaur discovered by Mary Anning (1799-1847) is now displayed in the Musée Nationale d'Histoire Naturelle in Paris. This and other material from Dorset was used by the great French vertebrate palaeontologist Georges Cuvier (1769-1832) in his epoch-making *Récherches sur les Ossements Fossiles* (1821-1824).



Mary Anning's life story is extraordinary, and has been retold (often inaccurately) in several biographies and children's books. Not only was she collecting at a time when discussion of transmutation or the evolution of species was regarded as subversive, she was also a poor woman, a dissenter, uneducated and working class, in a field dominated by wealthy male amateur collectors. Yet she became the friend and associate of some of the most eminent scientists of the day, such as Agassiz, De la Beche, Buckland and Murchison, and was visited by the King of Saxony. The list of her original discoveries places her in the highest rank of the pioneers of geological science.

Mary Anning (1799-1847) has been described as 'the greatest fossilist the World ever knew' and made a series of immensely important early discoveries. They include the first well-preserved ichthyosaur to come to widespread scientific attention (below), described by Sir Everard Home, which she found with her brother Joseph. Her find of the first complete plesiosaur (top) was described by Conybeare in 1824. Both specimens are now in the collection of the Natural History Museum, London. Her achievements, and the degree to which she influenced the thinking of the leading scientists of her day are all the more remarkable as she was a poor, uneducated, working-class woman.



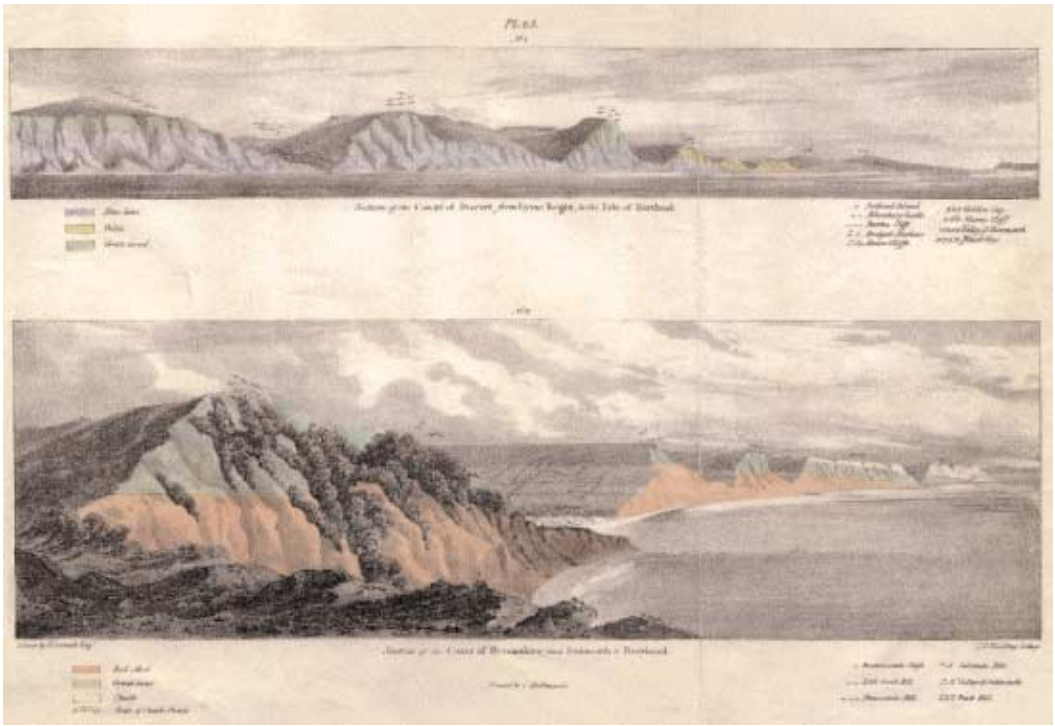
***Duria Antiquior,* and its author, Sir Henry De la Beche. De la Beche was one of the major figures in early geology, and the founder and first Director of the British Geological Survey. He lived in Lyme Regis for many years and was a close friend of Mary Anning.**

Mary Anning was also the inspiration for the World's first published palaeoecological reconstruction, *Duria antiquior* (A more ancient Dorset), produced in c. 1830 by De la Beche in her honour and for the financial benefit of her and her family. This imaginative scene was the first successful attempt to recreate a picture of the environment and animals of a geological period and became very famous throughout geological and natural history circles. It provides the clearest illustration of the leaps in scientific imagination which resulted from the finds on the coast, and the interaction of the leading scientists of the day (Rudwick, 1992).

Although the fossil-bearing strata of Lyme Regis were the early hub of scientific inquiry within the nominated Site, other features were prominent in these early debates. One of the main controversies of the time was between the catastrophists, who believed in the reality of occasional violent events in the geological past, and uniformitarians, who claimed that geological processes had never been more intense than those observed at the present day. The topography of the Dorset and East Devon coast was used by Buckland and De la Beche to argue that the valleys must have been excavated by a violent flood in the geologically recent past, while others thought that only the slow action of rivers had been involved.

Their contemporary, William Conybeare (1787-1857), was one of the first to see the results of the most dramatic historical landslide ever to occur in Great Britain, the famous event of Christmas Eve 1839 at Bindon, near Axmouth in East Devon. His illustrated account, assisted by William and Mary Buckland, is one of the two earliest scientific monographs on the mechanism of a landslide.

Drawing by William Buckland of the East Devon and West Dorset Coast from *Reliquiae Diluvianae* (1823). He considered that the valleys could not have been formed by the modern-day rivers, and took this as evidence of a geological Deluge.



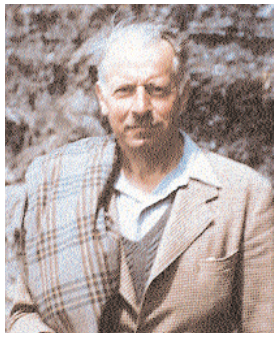
View of the Bindon landslide by Daniel Dunster (1840). The view shows The Chasm on the left and 'Goat Island'. The fame of this event led to many contemporary illustrations, produced by Dunster and others.

The important vertebrate faunas of Purbeck were another early discovery. Samuel Beckles, encouraged by Sir Richard Owen, searched for mammal remains from the cliffs of Durlston Bay with such success that he collected many unique species later described by Owen (1866). The fame of the coast as a source of fine fossil material was also helped by the activities of the then world's largest natural history agency, built up by the Weymouth hosier and glover Robert Damon (1814-1889) and his son Robert Ferris Damon (1845-1929). Between the 1840s and 1914 they supplied museums throughout North and South America, Australia and Europe with much Dorset geological material.

Other specialised advances in geology and geomorphology drew on the nominated Site. Osmond Fisher (1817-1914), born at Osmington, was inspired by his observations on the Purbeck coast to write the first ever textbook on theoretical geophysics *The Physics of the Earth's Crust* (1881 and 1889). He was the first to conclude that the crust beneath the oceans must be younger than that beneath the continents, anticipating ideas which became the basis of modern plate tectonics (Wilding, 1988). The German palaeontologist Albert Oppel (1831-1865) used the ammonite succession of the Dorset coast within his pioneering studies of biostratigraphic zonation (Hallam, 1989), and a number of significant contributions to ammonite zonation have been made through studies of the Jurassic and Cretaceous faunas from the nominated Site. Stratigraphic investigations at Burton Bradstock and West Bay by Sydney Savory Buckman (1860-1929), helped lead him to the first proper demonstration of diachroneity in rocks of the same lithology. E. St. J. Burton's studies of the Purbeck Coast led him to the idea of substituting space for time in explanations of landscape evolution – a forerunner of the so-called 'ergodic hypothesis' of geomorphology.

***Awful Changes*. This 1830 cartoon by Henry De la Beche shows, in a humorous way, the prominence of marine reptiles in the contemporary scientific debates. He portrays Sir Charles Lyell as Professor Ichthyosaurus lecturing on a fossil human skull, poking fun at Lyell's idea of the time that the pattern of life on earth was cyclic.**

Since the earliest days of study, the nominated Site has provided inspiration for new generations of earth scientists, representing many hundreds of scientists including those who have contributed to this nomination. The work of Joscelyn Arkell (1904-1958) is particularly notable. His *magnum opus*, *Jurassic Geology of the World* (1956) was the first example of a world-wide study of a system of rocks by a single person. Arkell began his work with a description of the Jurassic rocks of Dorset and East Devon, which he then took as the standard of reference. His statement at the beginning of this nomination (page 4), based on his understanding of the geology of the globe, is a passionate recognition of the international geological importance, and the beauty, of this coastline.



Joscelyn Arkell (1904-1958)

2 (a) v) The nominated Site is exceptionally well studied and documented, with a continuing importance for many aspects of earth science research, and is a teaching and training resource for the earth sciences of the highest quality

'The didactic quality of the entire coastline is exceptional: together with the Triassic, Jurassic and Cretaceous sedimentary rocks and fossils, recent processes can be observed and studied not only by specialists, but also by amateurs of all levels and by schoolchildren. In our world of virtual reality and ever faster communication … it is important to go back to nature and find out where we came from and where we go to. For those who look carefully, the Dorset and East Devon Coast holds many of the answers.'

Professor André Strasser, Institut de Géologie, Université de Fribourg, Switzerland
Letter written in support of nomination.

The Dorset and East Devon Coast is one of the best documented geological sites in the World. From the earliest days of geology to the present day the coast has generated an enormous volume of high quality scientific study. A provisional bibliography for the nominated Site (Appendix G), based on *Bibliography and Index of Dorset Geology* (Thomas and Ensom, 1989) contains over 5,000 references, although some areas of the literature are certainly under-represented within it. The earliest geological mapping of the coast dates from the 1820s. The area has been thoroughly re-mapped since 1995 by the British Geological Survey. A full series of modern maps at 1:50,000 scale will be published during 2000 and 2001, and more detailed mapping at 1:10,000 is also publicly available from the Survey. There is also an exceptional sub-surface database as a result of onshore and offshore oil exploration since the 1930s (Underhill, 1998).

The nominated Site is served by many local museums. An example is the Philpot Museum in Lyme Regis, recently re-opened by Sir David Attenborough following refurbishment (left). In 1999 it won a number of awards, including the national Gulbenkian Prize, seen above being presented by HRH Prince Charles.

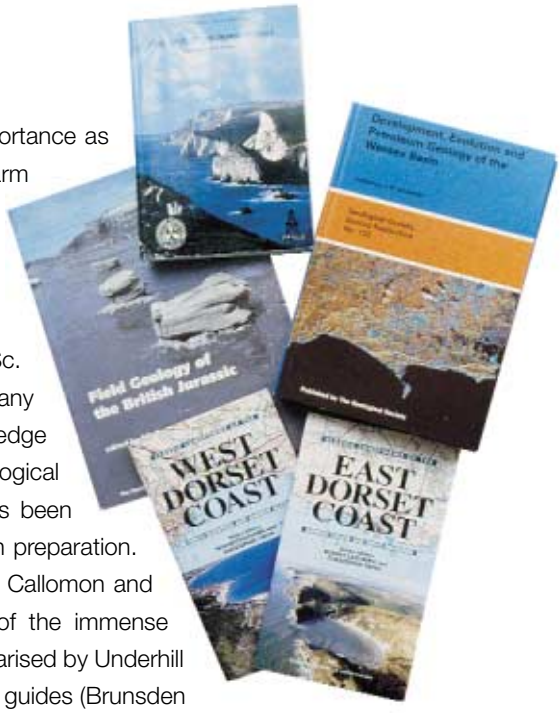
This level of information, together with the quality and accessibility of the exposures and the range of established visitor facilities, provides an exceptional teaching and training resource for all levels of study. The coast is visited by hundreds of geologists and geomorphologists each year including international groups, oil company geologists, student field trips and amateur groups. The Upper Jurassic sections are probably the most frequently visited geological sections in Europe, both by geological parties and by professional geologists, mostly from Britain, Europe and North America. Most geological undergraduate courses in the UK include field visits to this coastline, and at least 200,000 residential educational visitors come to the coast every year (Dorset County Council, 1994). There are notable geological collections in the local museums in East Devon and Dorset, which also provide various displays and advice to the public. Their locations are shown in Figure 8 on page 116.

Many professional groups visit the nominated Site every year. Here the British Geomorphological Research Group discuss landslide formation at Black Ven, West Dorset, during a field visit in Spring 1999.

The East Devon and Dorset Coast has a particular importance as a training ground for petroleum geologists, attracting international attention. The rock succession presents a complete section through an oil basin allowing source, reservoir and cap rocks, and its structural geology, to be studied at outcrop. The Kimmeridge Clay provides one of the World's best

examples of an immature hydrocarbon source rock, and is of particular importance as the main oil source rock within the North Sea. Data from the nearby Wytch Farm oilfield, Europe's largest onshore field, together with the results of other oil exploration data, add to the importance of the area for the study of petroleum geology.

The nominated Site has provided material for numerous post-graduate (M.Sc. and doctoral) studies, in addition to post-doctoral research. There are many active researchers on the coast, with a number of areas where leading edge science is being carried out. The geology of the coast is described in Geological Survey Memoirs (Wilson et al, 1958; Arkell, 1947) and a coastal guide has been prepared for Dorset (House, 1993). An account of the modern mapping is in preparation. There are classic reviews of the Jurassic succession by Arkell (1933, 1956), Callomon and Cope (1995) and Hesselbo and Jenkyns (1995). The geological results of the immense expenditure in the region during the search for hydrocarbons has been summarised by Underhill (1998). The geomorphology of the Dorset Coast is summarised in two recent guides (Brunsden and Goudie, 1997; Goudie and Brunsden, 1997), and there is an extensive detailed literature, including a range of technical reports on coastal processes and sediment transport.



The coast is very well provided with modern guides to the geology and geomorphology.

2 (a) vi) The nominated Site includes stretches of beautiful and inspiring coastline, and lies entirely within areas which receive statutory protection in recognition of their landscape importance and/or scientific interest

The character of the nominated Site is substantially that of a natural coastline, which is almost entirely undeveloped and fronts attractive rural countryside. The cliffs and foreshores included within its boundaries make a particular and distinctive contribution to the wider landscape of Dorset and East Devon. Its classic geomorphological features have an intrinsic beauty which derives directly from the essentially unimpeded operation of natural coastal processes on the underlying geology.

Most of the nominated Site (87 per cent) lies within designated Areas of Outstanding Natural Beauty (AONB). The landscapes of East Devon and Dorset were given these designations because they are a collection of fine landscapes and coasts. In Dorset *'each of [these landscapes] has its own special scenic qualities and sense of place. For arguably, nowhere is such diversity found within such a relatively small area-closely juxtaposed to create striking sequences of beautiful countryside, which are unique in Britain.'* (Countryside Commission 1993a) whilst the Devon landscape is, *'notable for its varied and dramatic coastal scenery – the grandeur of sheer, red sandstone cliffs, the steep intimate wooded coombes and coves, the stark, white chalk outcrop that punctuates the coast at Beer Head and further east the wildness of the undercliffs.'* (Countryside Commission 1993b).

Branscombe in East Devon. This is a quiet pebble beach, below cliffs of Triassic red sandstone and Cretaceous Chalk. This picture shows the unspoilt views towards High Peak.

Aerial view of the southern coast of Purbeck, looking west. This shows the range of coastal landforms on this 'concordant' stretch of the coastline, and the influence of the different strata and geological structure.

Thorncombe Beacon, with the low cliffs of West Bay and Burton Bradstock in the distance. This is part of the panoramic views from Golden Cap, the highest cliff on the entire south coast of England.

Kimmeridge Bay. The rocky reefs in the shallow bay are an important site for marine wildlife. The land in the middle distance lies within the Lulworth Ranges. The Kimmeridge oil well lies on the top of the cliffs, centre right.

The influence of the geology in the landscape has been expressly recognised within both AONBs. Dorset *'boasts an unrivalled expression of the interaction of geology, man's influence and natural processes in the landscape. In particular, Dorset's coastline is renowned for its spectacular scenery, its geological and ecological interest, and its unique coastal features, including Chesil Beach, Lulworth Cove and fossil forest, Durdle Door and Old Harry Rocks, to name but a few.'* (Countryside Commission 1993a) and Devon *'is notable for its diverse landscapes, which owe their origin to a varied geology, and to the manner in which rivers, the sea and the weather have exposed and sculpted the underlying rock'* (Countryside Commission 1993b). The designations have been successful in conserving the beauty of the coastline, which also receives substantial protection through Sites of Special Scientific Interest, National Nature Reserves, Special Protection Areas and candidate Special Areas of Conservation. Portland has not been included within the AONB, as it has been considered more important as a cultural landscape, than a natural one. *'The small island of Portland, just four miles long, is the source of one of England's most famous stones. It had supplied a fine white freestone for centuries, but Sir Christopher Wren boosted its popularity when he rebuilt St Paul's Cathedral and other London churches after the great fire of 1666. ….. Portland's unique landscape is scarred with old and active quarries.'* (Stanier 1998). The Island's landscape is protected through policies in the County Structure Plan and the Weymouth and Portland Local Plan.

The scenic quality of the Dorset and East Devon Coast results from the interactions of rock, landform, atmosphere, sea and light. Over the last three centuries the views, vistas and panoramas have inspired an extraordinary range of poets, authors, scientists and artists, who have left a rich legacy of cultural associations which are further indicators of the aesthetic importance of this coastline.

The best known is Thomas Hardy whose stories and poems are ingrained with a deep appreciation of the landscape, and its influence on people and places. In his poem *At Lulworth Cove a century back* (1920) he imagines a visit to Lulworth Cove in 1820 and watching the poet John Keats landing briefly there on his way to Rome. Earlier still, Jane Austen used Lyme Regis as the setting for incidents in her novel *Persuasion* (1818). In the twentieth century members of the literary Powys family lived at Chaldon Herring on Purbeck, their writings used the local countryside extensively and have been described as 'landscapes with people'. Important works included Llewelyn Powys's volumes *Earth Memories* (1934) and *Dorset Essays* (1935) and John Cooper Powys's *Weymouth Sands* (1934). In more recent years the major contemporary novelist, John Fowles described the life of a nineteenth century palaeontologist at Lyme Regis in *The French Lieutenant's Woman* (1969). J.R.R. Tolkien visited the area on several occasions, and as a child, found the jaw of an ichthyosaur at Lyme Regis; he described it as a 'petrified dragon' (Hammond and Scull, 1995), which may have fuelled the fascination with the mythology of dragons which led to his great fantasies such as *The Hobbit* (1935).

The coast has also inspired other artists. J.M.W. Turner painted a series of watercolours, *Picturesque Views of the Southern Coast of England*, which were subsequently engraved. John Constable honey-mooned at Osmington where he painted a series of pictures, notably *Weymouth Bay*. The artist and teacher Francis Newbery came from Bridport. His great student, the artist and architect Charles Rennie Mackintosh lived for a time in Worth Matravers, painting several idiosyncratic landscapes of Purbeck. John Everett Millais' famous painting, *The boyhood of Raleigh,* was painted at Budleigh Salterton in 1870 and shows the cliffs in the background. The artist and author Beatrix Potter visited Lyme Regis in the early twentieth century, which inspired the children's story *The Tale of Little Pig Robinson* (1930). In the 1930's Paul Nash painted and photographed the Dorset coast, as well as describing it in *Dorset: a Shell guide* (1936).

***West Bay*. A watercolour by J. M. W. Turner (1818), subsequently engraved as *Bridport, Dorsetshire* in 1820.**

The fine quality stone of Beer, Purbeck and Portland has been used to build many great buildings, in Britain and elsewhere throughout the world. Stone has been quarried at Beer since Roman times and always by hand methods. The stone is beautiful and highly prized by stone-masons. It has been used on many famous buildings including St. Paul's Cathedral, Winchester Cathedral, Westminster Abbey, Exeter Cathedral, the Tower of London and Hampton Court. The original workings are now managed and conserved as exhibition caves. One ancient adit appears in the cliffs of Underhooken, within the nominated Site.

Stone-working is an important part of the history of the Site at Beer, Purbeck and on the Isle of Portland. This picture from Portland shows a group of workers splitting the stone by hand using hammers and wedges.

Portland stone first attracted public notice when Inigo Jones used it in the Banqueting House at Whitehall (c. 1620). It was also extensively used by Sir Christopher Wren in St. Paul's Cathedral and other London churches after the great fire of London, 1666. Subsequently it has been used in many

major public buildings and monuments. Notable twentieth century examples include the Cenotaph and Waterloo Bridge (London), Stormont Castle (Northern Ireland) and the Government Buildings (Dublin). Purbeck 'marble' is a decorative limestone, which was used in most of the great cathedrals built in Britain during the Middle Ages. The vernacular architecture of the countryside surrounding the nominated Site is fundamentally influenced by the underlying geology. The buildings within the many attractive towns and villages are frequently constructed from local stone. The availability of different raw materials resulting from the changing geological succession is reflected in the distinctive character of each settlement.

Left: Portland Stone was donated by the UK Government to form part of the facing of the United Nations building in New York. Right: Portland Naval Cemetery, Dorset. As well as its use as a building stone, Portland Stone was used to make over 1,300,000 gravestones for men and women who fell in two World Wars.

2 (b) COMPARATIVE ANALYSIS

The preparation of a comparative statement for the nominated Site is a particular challenge because of the range of significant features contained within its boundaries. The Dorset and East Devon Coast displays a near-complete classic and accessible geological sequence and a variety of perfect coastal landforms within a beautiful coastline. This combination of features, together with the primacy of the nominated Site in the history of science, its continued scientific importance and its location within protected landscapes result in a unique resource.

The nominated Site is one of only four natural sites selected for inclusion on the current UK Tentative List of World Heritage Sites (Department of Culture, Media and Sport, 1999), and one of only two nominated for earth science reasons. Its significance within the UK is demonstrated by the exceptional number and concentration of nationally and internationally important localities recognised through the statutory Geological Conservation Review (GCR). This comprehensive review of the earth science resource of Great Britain, carried out between 1977-90, recognized sixty-seven GCR sites that lie within the boundaries of the nominated Site. This represents ten per cent of the total number of Mesozoic GCR sites defined within Britain, and over eight per cent of British geomorphological GCR sites.

The geological sites recently proposed for inclusion on the World Heritage List have been fossil sites, and the International Union for the Conservation of Nature (IUCN) has published a contextual framework for assessment of World Heritage fossil nominations (Wells, 1996), which proposed ten criteria for assessment. The Dorset and East Devon Coast is not a 'fossil site', but it does include a number of internationally significant fossil localities. Several of these localities could be justified for inclusion on the World Heritage list in their own right as analogues to Sites already included such as Messel Fossil Pit, Germany and Miguasha, Canada. A description of the status of each of these localities in relation to the ten IUCN criteria is provided in Table 1 (pages 36-37).

A comparative analysis is, therefore, complex. It also runs the risk of being a reductive exercise, as comparison relies on the identification of individual features and their assessment on an international basis. Such an analysis has nevertheless been attempted below, but it is necessary to remember throughout that the essence of the nomination is the nature of the nominated Site as a whole assemblage of significant features. Together these features result in a resource, which is both of global importance to the earth sciences, and lies within a beautiful and accessible coastline.

Comparative assessment: geology

Identification of a single 'best site' to represent the Mesozoic history of the Earth is, almost by definition, impossible. Just as today no single site could hope to convey the natural and physical diversity of our world, so it is in relation to the Earth in the past. It is even more the case with respect to the record of an entire geological era spanning almost 190 million years. Comparative assessment requires an understanding of the regional palaeogeography of these times, when the nominated Site initially formed part of the supercontinent of Pangaea, and throughout the Jurassic and Cretaceous lay within the continental shelf bordering the north-west of the Tethys Ocean. The Dorset and East Devon Coast is a superb record of the Mesozoic history of this part of the Earth. Clearly there are other rich sites within the Triassic, Jurassic and Cretaceous successions around the World, which provide excellent records of other environments. However, even with this qualification, the nominated Site presents a unique record of a full era of the Earth's history that is exceptional and of outstanding universal value.

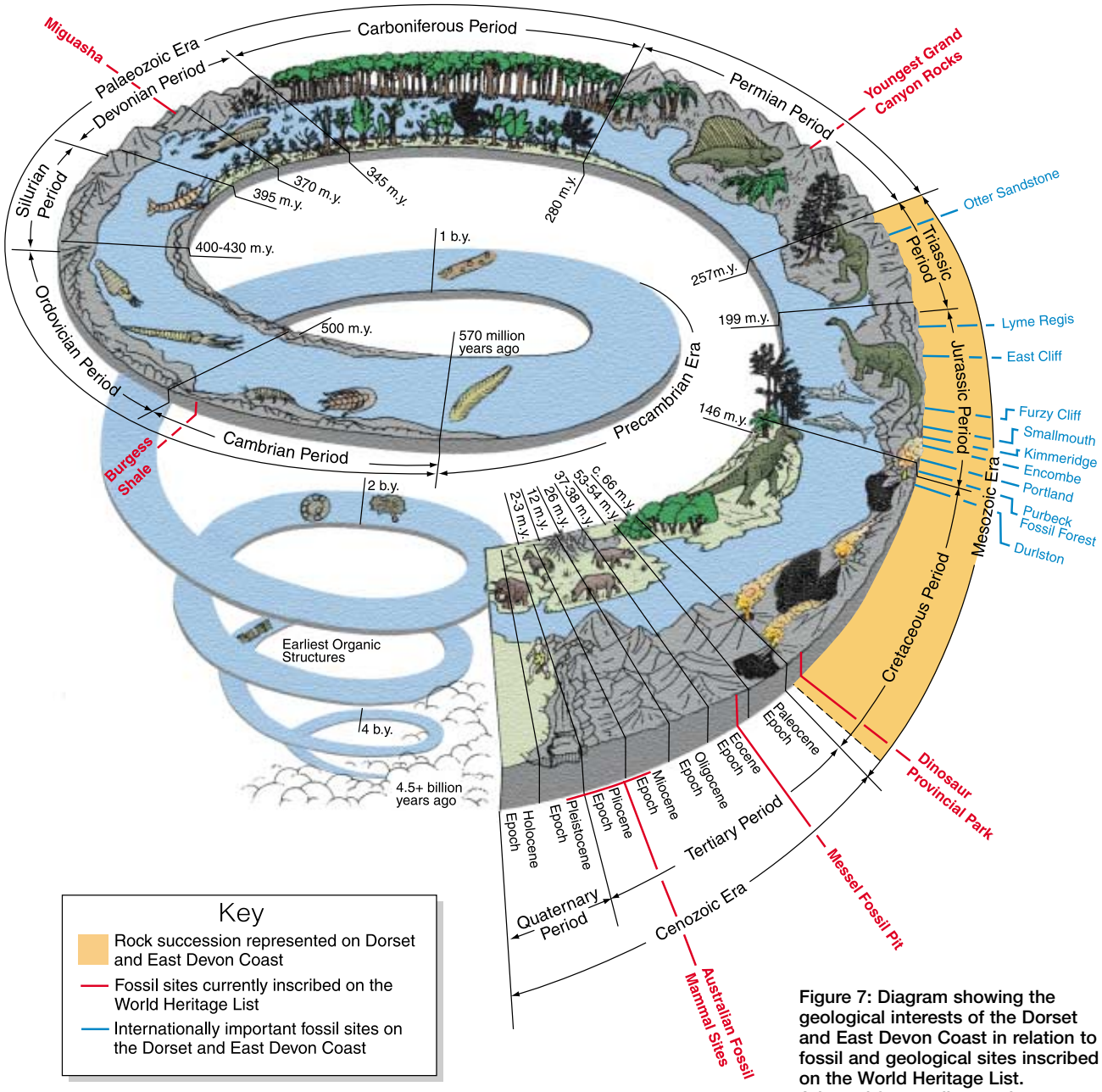


Figure 7: Diagram showing the geological interests of the Dorset and East Devon Coast in relation to fossil and geological sites inscribed on the World Heritage List. Adapted from a diagram in *Geologic Time* by the United States Geological Survey, reprinted in *Earth* by Press and Siever (1982).

Table 1: Description of selected fossil interests within the nominated Site in relation to the ten key questions set out in the IUCN *Contextual Framework for the Assessment of World Heritage Fossil Site Nominations* (Wells, 1996). The table was compiled with the assistance of a number of contributors to the nomination. The emphasis on vertebrate interests partly reflects the availability of detailed comparative assessments of these aspects through the publications supporting the Geological Conservation Review, particularly Benton and Spencer (1995) and Dineley and Metcalf (1995).

FEATURE OF THE SITE **IUCN QUESTIONS**	**Ammonite zonation:** Majority of nominated Site	**Otter Sandstone Vertebrates:** Otterton Point and High Peak, East Devon	**The Lower Lias:** Pinhay Bay to Seatown	**Forest Marble Vertebrates:** West Cliff	**Oxford Clay Reptiles:** Furzey Cliff
1. Does the Site provide fossils that cover an extended period of geological time?	Very wide - Lower Jurassic to Upper Cretaceous.	Middle Triassic (Anisian).	Early Jurassic (Hettangian-Pliensbachian).	Middle Jurassic (Bathonian).	Upper Jurassic (Oxfordian).
2. Does the Site contain fossil assemblages? I.e. how rich is the species diversity?	Diverse ammonite faunas at many horizons. Evolutionary studies possible.	Diversity typical of period following Permian mass-extinction. Ten different reptile species known. Seven amphibian and fish taxa known.	The most diverse known reptile fauna of this age. Abundant, articulated and well preserved bony and cartilaginous fish. Diverse insect fauna with representatives of ten different orders.	Diverse microvertebrate assemblage including a unique mix of marine, freshwater and terrestrial species and associated plants and invertebrates.	Limited diversity but includes unique finds.
3. How unique is the site for yielding fossil specimens from that particular period of geological time? I.e. would this be the type locality for study or are there similar areas that offer alternatives?	Many type specimens originate from the Site.	Fossiliferous sites of this age are globally rare. One of the five best Anisian age sites. Two type specimens of reptile and one amphibian known from here.	Many unique specimens. Type specimens of fourteen reptiles, nine unique to this Site. Type specimens of over fifty fish. Insect remains are the best known of this age within the World. Echinoderm preservation is also exceptional.	No equivalent sites known outside UK. Of UK vertebrate sites of this age, Kirtlington Quarry (Oxfordshire) is the best however, it shows a different faunal assemblage.	Best UK site of its age, and of global significance due to limited reptile sites of this age found elsewhere.
4. Are there other comparable sites that contribute to the understanding of the total history of that point in time / space?	One of the finest known near continual sequences known. Only three of seventy-six Jurassic ammonite zones definitely absent.	Probably the richest mid-Triassic amphibian locality in Western Europe. Equalled only by localities in Russia and Southern Africa.	Holzmaden, Germany produces similarly well preserved reptile material and is equally well known, but younger. Somerset fauna also important but more restricted range and less studied. The only comparable fish locality outside Britain is Ostenso, Italy.	Yes, see above.	Other important Oxfordian reptile sites are known from the Cotswolds, Yorkshire, France and India.
5. It the site the only or main location where major scientific advances were, or are being, made?	The ammonite faunas were used by Oppel in the established of zonation, and detailed advances were made here by Spath, Arkell and others.	First discoveries date from 1860. Major new collections since 1980.	Historically unique. A formative Site for early advances, through finds of Mary Anning and others. Early ichthyosaurs and the first plesiosaurs known to science were found here.	Active research dates from the 1970s. There are other important localities where advances are being made.	Research dates from 1925.
6. What are the prospects for ongoing discoveries at this site?	New species or well preserved features likely to continue to be found.	Very high. High Peak regarded as one of the most promising vert-ebrate localities of its age world-wide. Some undescribed fish and reptile material.	A certainty. Two new marine reptile species discovered within last year, one awaiting publication. Eroding coastline ensures exposures maintained.	High.	Moderate.
7. How international is the level of interest at this site?	Ammonite zones relate to sites throughout NW Europe, and correlation with other provinces possible.	Internationally important, with distinctive aspects to fauna which may provide faunal link between Russian/ N.American faunas and Gondwana.	Of the highest international importance.	Internationally important.	Few Oxfordian reptile sites known from elsewhere. Of high international importance.
8. Are there other features of natural value (e.g. scenery, landscapes or vegetation) associated with the site?	Exposures lie within beautiful coastline, and associated geomorphological features.	Dramatic sandstone cliff coastline.	Highly active coastal landslides.	Dramatic coastal sandstone cliffs. Heritage Coast.	At edge of developed area of Preston/ Bowleaze Cove.
9. What state is the preservation of specimens from the site?	Preservation at many horizons is exceptionally good, including rare features such as mouth parts.	Good quality preservation, some remains in articulation.	Finest quality, including soft part and preservation in three dimensions.	Well preserved micro-vertebrate fauna.	Material is well preserved. Partial specimens, some semi-articulated.
10. Do the fossils yielded provide an understanding of the conservation status of contemporary taxa or communities? I.e. how relevant is the site in documenting the consequences to modern biota of gradual change through geological time?	Evolutionary studies are possible through many horizons, particularly so in the Lower Jurassic. Adults, juveniles and sexual dimorphism present and identifiable at a number of horizons.	Represents the early recovery of terrestrial life following mass extinction.	Evolutionary studies have been carried out. Site has been of major importance in revising evolutionary relationships within marine reptiles.	Demonstrates that the Middle Jurassic was a time of diversification not extinction as once thought.	Unique species contribute to global studies of reptile evolution.

Lower Kimmeridge Clay Reptiles: Smallmouth	**Kimmeridge Clay Reptiles:** Kimmeridge Bay	**Kimmeridge Clay Reptiles:** Encombe Bay	**Portland Limestone Reptiles:** Isle of Portland	**Purbeck Group Fossil Forest:** Lulworth & Portland	**Purbeck Group Vertebrates:** Durlston Bay	**Purbeck Group Insects:** Durlston Bay
Upper Jurassic (Kimmeridgian).	Upper Jurassic (Kimmeridgian).	Upper Jurassic (Lower Tihonian/Bolonian).	Late Jurassic (Portlandian/ Upper Tithonian).	Late Jurassic (Portlandian/Upper Tithonian to Berriasian).	Late Jurassic / Early Cretaceous (Portlandian/Upper Tithonian to Berriasian).	Late Jurassic / Early Cretaceous (Portlandian/Upper Tithonian to Berriasian).
One of the most diverse known assemblages of this age. Over twenty-five different reptile species known.	Very diverse. At least eighteen known species of reptiles.	Ten different species, including ichthyosaurs, plesiosaurs, crocodilians and turtles.	A diverse array of marine reptiles. Eight different species have been found from coastal sections and within quarries on Portland which lie outside the Site.	Shows a full range of floristic features, and a variety of specimens together with associated faunas and algal remains.	The most diverse vertebrate fauna of this age known: over 100 named species.	150 species of insect from fifteen orders have been identified and others await description.
Six species, all type specimens, known only from this site. The fauna of four turtles and three pterosaurs is unique.	Has yielded more type specimens (seven) than any other known Kimmeridgian vertebrate site.	Similar remains known from France and Germany. North American and African faunas of this age are terrestrial.	The Isle of Portland has yielded the best faunas of Tithonian marine reptiles in the World. Type specimens of five species found, including dinosaurs, turtles, ichthyosaurs and plesiosaurs.	The best preserved fossil forests of this age known.	The range and quality of material, with associated trace fossils and detailed sedimentology is unsurpassed. Unique diversity within a small geographical area. 29 type specimens of reptiles alone. Diverse mammal fauna of at least nineteen species.	Substantially distinct from other better known localities elsewhere.
Other important sites of about this age include the terrestrial faunas of the Morrison Formation, USA and Tendaguru, Tanzania.	Other important sites of about this age include the terrestrial faunas of the Morrison Formation, USA and Tendaguru, Tanzania.	Other important sites of about this age include the terrestrial faunas of the Morrison Formation, USA and Tendaguru, Tanzania.	Other known marine faunas of this age have a smaller range of material. Better known faunas from elsewhere (Morrison fauna USA; Tendaguru, Tanzania) are terrestrial. Equivalent diversity in the Volgian of Russia but unpublished.	Other well preserved fossil forests are of different ages. Few are as complete showing soil, in situ trees and other features.	Some Morrison formation localities may be the same age but do not show the diversity and concentration in one location. The Liaoning lagerstätte (China) is 30 million years younger in age and less well studied at present.	Faunas from China, Russian, Spain and Mongolia are better known but most species are different.
Morrison Formation is a better known locality producing different remains. Some French and Swiss localities are also productive.	Particularly important Kimmeridgian ichthyosaurs and plesiosaurs, which occur sporadically elsewhere.	Latest Lower Tithonian sites such as this one are rare and none has been highly product-ive. The fauna from Encombe has not been completely described.	The earliest discoveries date from the ninteenth century. Recent discoveries have been made from both coastal and quarry sites.	Very well studied and recorded.	Studies date back to the nineteenth century. Nowhere else is there the potential for reconstruction of a Jurassic-Cretaceous boundary fauna.	More potential for new discoveries than other better known localities.
Potential for further discoveries.	New discoveries virtually certain. Eroding coastline.	New discoveries virtually certain. Eroding coastline.	Likely, particularly from quarries.	New discoveries from existing fossil material likely.	Certain. Recent reviews in press.	Certain. Many species are awaiting description.
Internationally important in view of unique species and diversity.	Internationally important in view of range and quality of material, and history of study.	Internationally important in view of lack of similar marine faunas elsewhere.	The best known marine reptile fauna of this age.	An exceptional survival of a latest Jurassic fossil forest.	Of the highest international importance.	One of the best known insect assemblages of this age.
Site is on the shores of the Portland Harbour and the Fleet.	Heritage Coast. Beaches cliffs and headlands.	Heritage Coast. Beaches, cliffs and headlands.	Dramatic island cliffed coastline. Landslides. Raised beaches.	Dramatic island and Heritage Coast.	Dramatic cliffs and headlands. Heritage Coast.	Dramatic cliffs and headlands. Heritage Coast.
Well preserved, generally partial and disarticulated remains.	Several fine ichthyosaur skeletons. Other remains are disarticulated.	Well preserved, generally isolated remains; some partial skeletons.	Well preserved. Complete and partial skeletons known. Excellent turtle skull material.	Exceptionally detailed preservation of wood structure, and insitu trees.	Well preserved disarticulated remains, with associated biological material including eggshell.	High.
Unique species contribute to global studies of reptile evolution. Very diverse fauna.	Has features prominently in all reviews of marine reptile evolution.	Important evidence of latest Jurassic marine reptile evolution.	The turtles from Portland have formed the basis of recent review of early turtle anatomy and taxonomy.	Palaeoecological and palaeoenvironmental reconstruction possible.	Potential for a uniquely full reconstruction of a continental vertebrate fauna in changing environments.	Records important phase of insect evolution, including highest origination of new families - mostly extant.

The nominated Site represents interests that are not already included on the World Heritage list. Primarily geological sites, which are already inscribed represent different periods of geological time, including Cambrian (Burgess Shale, Canadian Rocky Mountains Parks), Devonian (Miguasha), Eocene (Messel) and the Quaternary (Australian Fossil Mammal Sites). Dinosaur Provincial Park represents dinosaur life in late Cretaceous (75 million years and younger), interests which are different from those in the equivalent strata in Devon and Dorset. No complete Mesozoic succession is currently inscribed within the World Heritage Site series. The representation of the history of the Earth within the nominated Site, and its relationship to other geological sites within the World Heritage series are shown in Figure 7 (page 35).

Taken as a whole the rock succession is significant as a near-continuous, accessible and well-studied sequence. There is no better example of a complete succession through the Mesozoic Era anywhere in the World, nor of a sequence of rocks which includes known oil source, reservoir and cap rocks which are so readily accessible. The coastal nature of the exposures is also significant, maintaining their quality, and ensuring that they are accessible for study.

The Purbeck Symposium was one of three major earth science conferences based on the nominated Site in 1999. This delegates' field trip at Bacon Hole, is representative of numerous such visits made by scientists and students every year.

The nominated Site is also representative of an exceptionally well-documented sedimentary basin, which is one of the best known of its type in the world. Whilst the structures of many sedimentary basins around the world have now been investigated through the search for hydrocarbons, none contain the combination of a high level of coastal exposure coupled with such detailed surface and sub-surface geophysical and borehole data (Barton, 2000 contribution to nomination). The nearest international comparisons are the Sydney and Gippsland basins of Australia and the western edge of the Basin and Range Province, USA.

The nominated Site's importance within the history of geology is unique. Its level of study since the early days of scientific inquiry and the range of leading scientists who visited, lived near or were influenced by it, is clearly demonstrated in the historical record of study and immense literature. The Site has been regarded by geologists for at least 200 years as amongst the best the World has to offer. The importance of the activities of the Anning family in finding the first complete ichthyosaurs and plesiosaurs to come to scientific attention, and the range of their other discoveries, particularly by Mary Anning are exceptional (Torrens, 1995; Tickell, 1995).

What is also remarkable is the degree to which the Dorset and East Devon Coast has retained its importance for research in modern times. Many of the fossil sites are regarded as having a high potential for future new finds, and new species are continuing to come to light on an annual basis. Together with the range of new discoveries and interpretations in fields such as oil and structural geology, and palaeoecology, there is an outstanding coincidence of localities of both historical and current importance.

Triassic

The extensive and nearly unbroken outcrop of the Triassic succession on the East Devon coast (Warrington, 1999, contribution to nomination) completes the nearly continuous exposure of the Mesozoic in this region and is also in continuity with underlying Permian rocks. In its type area, in Germany, the Triassic is part-continental and part-marine in nature but access to that sequence, and continuity of exposure, are poorer than in East Devon. Continental or marine Triassic rocks, or mixtures of both facies, are widely developed in other areas, such as southern Africa, parts of South America, the Eurasian and Canadian Arctic, the Rocky Mountains and China.

Whilst much of the Triassic succession within the nominated Site is unfossiliferous, the richest active Mid-Triassic reptile sites in Britain are found in the Otter Sandstone Formation at High Peak, near Sidmouth. On a world-wide scale other places would claim pre-eminence as Triassic fossil sites. In particular, Ischigualasto in Argentina is an exceptionally rich locality, containing the earliest dinosaur remains, and is included on Argentina's Tentative List of World Heritage Sites. The Chinle Formation (Petrified Forest National Park) in the USA is probably the best-known Triassic fossil locality. The nominated Site provides a fossil record

An important specimen of *Rhynchosaurus spenceri* from the Otter Sandstone Formation at Ladram Bay discovered in April 1990 during a field trip by the Department of Geological Sciences, University of Plymouth and now held in the Royal Albert Museum, Exeter.

that is significantly older than the remains found at either of these two places. Terrestrial tetrapod faunas of this, Anisian, age are rare world-wide; the only other comparable Anisian sites are in the South Urals of Russian and Southern Africa (Benton, 2000 contribution to nomination). The importance of the East Devon fauna is that it expands our understanding of tetrapod evolution since it shows the diversification of the fauna after the late Permian extinction event, the surviving fauna being joined by the essentially new rhynchosaurs and archosaurs. The Otter Sandstone Formation is unusual because it lacks synapsids, which are abundant in North America and Gondwana and because, like other British faunas, it is dominated by rhynchosaurs, a group not known on mainland Europe, sporadically in North America and abundantly in Gondwana. The fauna from the Otter Sandstone Formation therefore appears to fill a gap in the sequence of earlier Triassic faunas, and may prove critical in making stratigraphic and palaeographic links between Russian and North American faunas and between Laurasia and Gondwana (Benton, 1997).

Jurassic

The Lower Jurassic Lias succession of the Dorset and East Devon Coast is the best-exposed in Europe and historical studies have made it a classic locality (Hallam, 1989). Within Europe, other good Lower Jurassic exposures exist on the North Somerset and Yorkshire coasts, in south-east and east France, and in Germany, but are not uninterrupted. Other good sequences elsewhere in the World, such as in Nevada, Alaska and Chile, belong to different faunal provinces. The Lower Jurassic vertebrate and invertebrate fauna has been well documented since the last century and major revisions are currently in progress for those groups and genera that have not already undergone modern review. Many type specimens have their source within the nominated Site. Lyme Regis is the best locality for Lower Lias (Hettangian-Sinemurian) marine reptiles in the World (Benton and Spencer, 1995). Other important, but later Lower Jurassic marine vertebrate remains are known from Holzmaden in Germany, which yields finely preserved material from the Upper Lias (Toarcian Stage). There is no overlap of vertebrate fauna between the nominated Site and Holzmaden and the latter has a sparse record of terrestrial vertebrates (Milner, 1999 contribution to nomination). The Liassic fish fauna of the nominated Site is unique in its diversity and its quality of preservation is generally better than at other equivalent localities; the only equivalent fish locality of comparable importance outside the UK is at Ostenso, Italy (Dineley and Metcalf, 1999).

The cliffs between West Bay and Burton Bradstock provide the finest available outcrop of the Bridport Sands, overlain by Middle Jurassic Inferior Oolite and Fullers Earth. This is also the western extreme of Chesil Beach: here the beach is made up of pea-sized pebbles.

The Middle Jurassic succession is complete and well exposed and presents classic coastal sections. The Inferior Oolite of Burton Cliff provides one of the most illuminating, easily accessible and well exposed sequences of Bajocian rocks, of great sedimentological significance because of the unique time-control provided by abundant ammonites (Callomon and Chandler, 1990; Callomon and Cope, 1995). Within the Middle Jurassic succession, the Forest Marble at West Cliff, West Bay includes a diverse fauna of small vertebrates. No equivalent examples are known from outside the UK, and within the UK it is distinctive. Of UK sites yielding vertebrates of this age, Kirtlington Quarry (Oxfordshire) is undoubtedly the best example since the bone is better preserved, more abundant and represents a greater diversity of taxa. At Kirtlington, however, there are no marine crocodiles and the sharks are less numerous. The West Cliff assemblage shows a unique mixture of marine, terrestrial and freshwater elements, including a more diverse and better preserved shark assemblage than Kirtlington. It also samples the sediments from a different landmass, Cornubia, rather than the larger Anglo-Ardennes landmass (Evans, 1999 contribution to nomination).

The Upper Jurassic exposures are also of outstanding international importance. There are other good examples of Oxfordian successions, such as those in Poland, France, Germany, Switzerland, Spain and Yorkshire, but none are as easily accessible or as well exposed, and no better examples are known (Coe, 1999 contribution to nomination). The Preston Beach to Osmington cliffs expose the type section for ammonite faunas of three subzones of the North West European province and this has been intensively studied. Thirty-three ammonites from Osmington were figured by Arkell in his monograph on Corallian ammonites (1935-1948). The Oxfordian vertebrate record is sparse, but it is important as there are few sites from this stage elsewhere in the world. Furzy Cliff is the source of the unique specimen of the carnivorous dinosaur *Metriacanthosaurus parkeri* (Huene, 1923), one of only two known Oxfordian theropod dinosaurs. This has been assessed as one of the most important reptile localities in the world (Benton and Spencer, 1995). Oxfordian reptiles are known elsewhere from Normandy in France, and from Monaco, which yield equally rare but more fragmentary fossils.

The Kimmeridge-Portlandian succession of the Dorset Coast is without equal as the best continuous exposure of rocks of this age in the World (Cope, 2000 contribution to nomination). The cliffs between Kimmeridge and Encombe provide the only complete and well exposed record of the Lower Tithonian ammonite sequence (Elegans to Fittoni Zones) in Europe and display the international reference section for the Boreal Lower Tithonian zones. This is also one of the finest exposures of organic-rich mudrocks in the world, comparable with the Monterey Formation in the USA, and Jurassic shales in India and Argentina (Coe, 1999 contribution to nomination). The Kimmeridge Clay fossil assemblages from Weymouth, Kimmeridge and Encombe Bays include some of the most diverse and productive occurrences of Late Jurassic marine reptile faunas and terrestrial vertebrates known in the World. Vertebrate assemblages are known elsewhere from several Kimmeridge Clay sites in northern France, and these faunas include some species in common with the Dorset localities (Benton and Spencer, 1995). The Morrison Formation is an equally important Kimmeridgian reptile site in Wyoming, USA, producing contrasting terrestrial faunas on which studies are currently in progress (Milner, 1999). Other significant fish remains from equivalent strata to the Kimmeridge Clay are known in central Europe, Portugal and North America. They are from similar faunas, but are rarely so well preserved or numerous (Dineley, 2000 contribution to nomination).

Kimmeridge Bay and Brandy Bay on the coast of Purbeck. To the east, between Brandy Bay and Chapman's Pool the Kimmeridge Clay is extensively exposed in the cliffs and foreshore and is richly fossiliferous.

The Isle of Portland viewed from the south. The towering limestone cliffs and extensive quarries, both modern and old, can clearly be seen. The two raised beaches are found to the west and east of the lighthouse at Portland Bill.

The Isle of Portland is the type locality for the historic Portlandian Stage and the cliff sections contain magnificent sections of international importance for stratigraphy, palaeontology and facies analysis. The ammonites of the Portlandian Stage in Dorset provide a unique record of the evolution of a group of pavloviid ammonites, often reaching diameters approaching one metre (Cope, 2000 contribution to nomination). It has also yielded the best fauna of Portlandian marine reptiles in the World. Marine vertebrate faunas of this age are rare elsewhere in the World. Better known faunas of this age from elsewhere, such as the Morrison Formation, USA and Tendaguru, Tanzania are dominated by terrestrial forms such as dinosaurs (Benton and Spencer, 1995).

Cretaceous (including the Purbeck Group)

The Cretaceous succession within the nominated Site represents a complete and continuous record, with the exception of the uppermost Chalk. The Lower Cretaceous Purbeck Group is of renowned international importance, and the exposure of the Lower Cretaceous unconformity is superb and accessible. Although there are more extensive and important Upper Cretaceous exposures elsewhere, the succession within the nominated Site is significant in the context of the overall completeness and importance of the Mesozoic succession as a whole, and because of its intimate exposure with the Triassic and Jurassic rocks, and its role in influencing the geomorphology and landscape of the coast.

The Fossil Forests on both Portland and Purbeck are a unique survival of a fossil forest of this age. No other examples are known which are so complete, so well preserved, or yield the same geological or palaeobotanical information. The Purbeck Group Fossil Forest is one of the most complete examples of a fossil forest of any age, and unlike many others, preserves *in situ* trees with soils (Francis, 1999).

The Purbeck Group in Dorset is the best known example of a Mesozoic lagoonal and lacustrine formation that demonstrates complex facies variation that is probably linked to structural fault control. The rocks are superbly exposed and very fossiliferous, and have been more extensively studied than any comparable formation of this age.

Durlston Head, looking north over Swanage. The cliffs in the foreground are made up of Portland Limestone. Durlston Bay, with its internationally important fossil remains lies around the headland shown on the right of the picture.

White Nothe is the most important Upper Cretaceous locality on the Dorset Coast and displays a particularly fine section through the Lower Chalk.

The exposures at Durlston Bay are unique because of the concentration of diverse fossil material within such a limited geographical area and in a limited stratigraphical and ecological setting. Some Morrison Formation localities in the Western USA may be the same Jurassic-Cretaceous borderline age but there is not the same concentration and diversity in one location. Another early Cretaceous fauna, the Liaoning lagerstätte in China, has produced more completely-preserved specimens from a lake bed but does not presently show the taxonomic diversity of Dorset. It also represents a different faunal province and is significantly later in age (Ensom, 1999, contribution to nomination). Benton and Spencer (1995) have also assessed Durlston Bay as one of the most important Mesozoic reptile faunas of the World, the best known early lizard site in the World, and the source of many unique species including twenty-nine type specimens of groups including the turtles and crocodilians. Durlston is also the type locality for many of the nineteen species of mammal recorded from the locality. The mammal fauna has been assessed as one of the most important of this age known (Benton et al, in press). The fish faunas compare with the important German faunas of this age, but are perhaps more varied, and are potentially amongst the most important in the World (Dineley and Metcalf, 1999; Dineley, 2000 contribution to nomination).

The insect fauna of the Purbeck Group represents an internationally important, highly diverse collection of unique species. Better-studied faunas of the same age, but with mostly different species are known from Spain, Russia, Mongolia and China. Although there are some similarities, there are also many differences, which are due to different environmental conditions of the time. The Spanish fauna lived in a warmer environment than the Dorset fauna whereas the Asian faunas generally lived in colder conditions (Ross, 1999 contribution to nomination).

The Wealden succession is stratigraphically the most extended Wealden sequence available in north west Europe at a single site. The fossil oil seep at Mupe Bay is a unique and very well described feature which provides unambiguous evidence of the timing of oil generation and migration in the Wessex Basin (Hesselbo, 1999). Although the Dorset Lower Greensand, Gault and Upper Greensand Succession was deposited at the basin margin, and there are much thicker sequences developed elsewhere in Europe, there are a number of important fossiliferous horizons. The Lower Greensand near Swanage contains the unique Punfield Marine Band with a rich estuarine-type fauna, unknown elsewhere. The exposure of the Lower Cretaceous unconformity is an exceptional record of the world-wide Lower Cretaceous transgression. There are no better extensive exposures of this feature, showing both the structural geology and the important lateral changes in the Lower Chalk due to geographical differences in the contemporary environments of the time.

Comparative analysis: Geomorphology

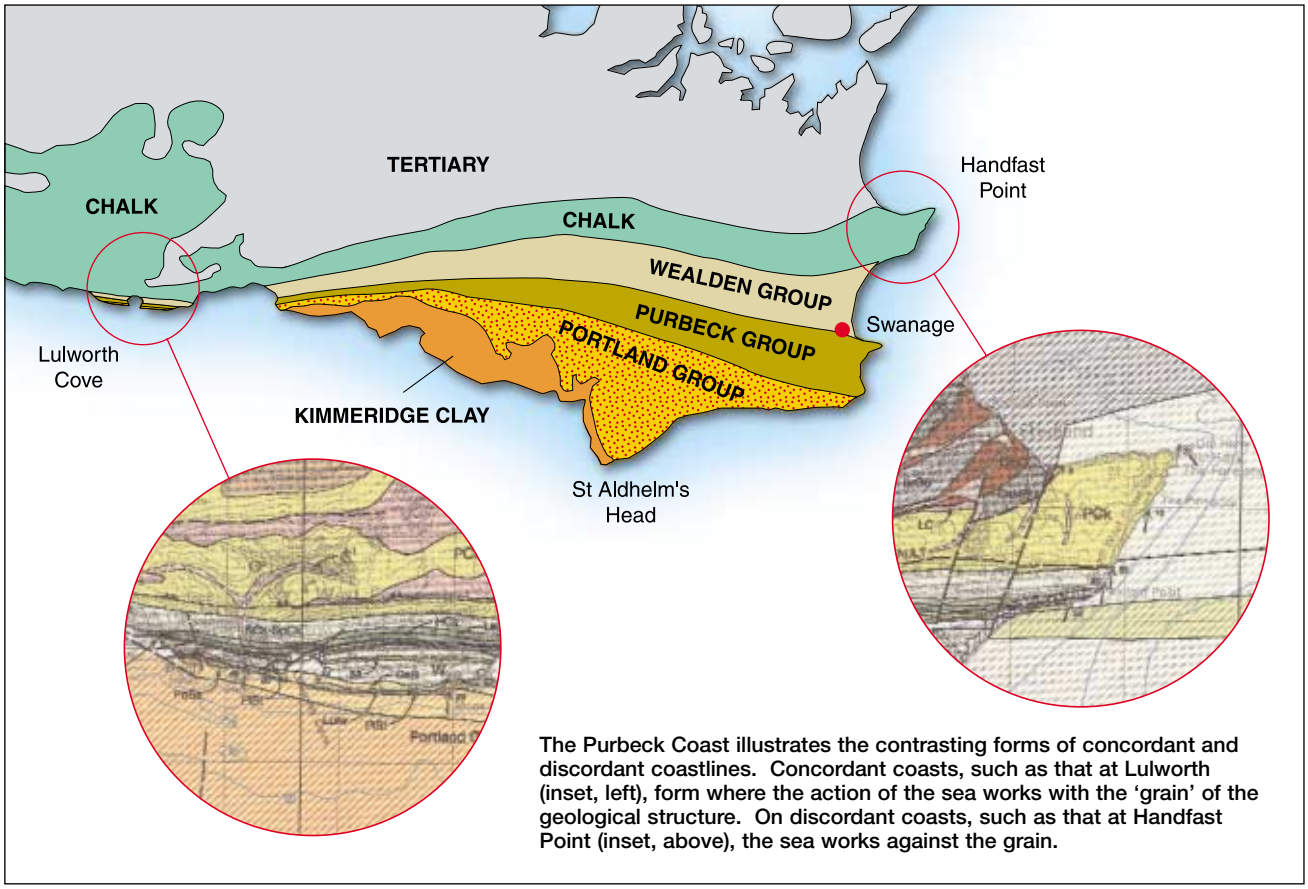
The Dorset and East Devon Coast includes superlative examples of geomorphological features common to coastlines throughout much of the world. The particular importance of the nominated Site lies in the range of classic exemplars that occur in close proximity, and in their natural relationships to each other. It is this wealth of landforms, developed in response to the varied geology of the coast, which also gives the coast within the nominated Site its particular and distinctive beauty.

The landslides of the Dorset and East Devon Coast form an excellent teaching laboratory incorporating a great range of landslide types. They display a complete spectrum of combinations of the landslide-forming rocks of the Triassic, Jurassic and Cretaceous strata, which together form one of the most important landslide generation sequences in the UK. The mudslides are particularly well known as international examples, and are comparable with those on the Black Sea Coast and in New Zealand. The mudslides of the Black Sea are also very important, and show similar material behaviour and a comparable history of study. Black Ven is the largest mudslide complex in Europe; it has the advantage of demonstrating the complete reactivation of Late Glacial landsliding over a long period and has also been the site of very innovative photogrammetric studies (Brunsden, 1999 contribution to nomination).

Chesil Beach and the Fleet are important landforms, which due to their range of features and extraordinary wealth of study, may be regarded as unique. An international comparison (May, 2000 contribution to nomination) shows that, although there are many beaches which demonstrate lateral grading (for example the now heavily managed Half Moon Bay, California, and Hawkes Bay, New Zealand) and large gravel barrier beaches are common on high latitude coasts, there are very few which have the exceptional size-grading of Chesil Beach. No known beach has been so extensively studied as Chesil Beach. A systematic assessment of shingle beaches within the UK (Randall, 1996) ranked Chesil first on grounds of combined floristic, size and disturbance criteria. The Fleet is an outstanding lagoon: not only the largest in the UK, but with the greatest diversity of habitats and of biota (Bamber, 1996). It is the largest, and it could be argued only, typical coastal lagoon in macrotidal Europe although it is small on a world scale (Barnes, 1999). The other smaller beaches are typical of those on a retreating coastline, and are very well documented.

The eastern end of Chesil Beach at Chesilton, with Portland Harbour and the Fleet lagoon in the background. The distinct ridges in the beach are formed by storm events. Part of the commercial port at Portland can be seen top right.

The cliffs of the nominated Site also present a classic example of a range of cliff formations within soft and hard rocks. The most notable range of features is displayed on the concordant and discordant coastlines of the Purbeck Coast. This stretch has been regarded as a textbook demonstration of the relationship between rocks and relief (e.g. Jukes-Brown, 1884). Other well-known concordant coasts are usually found at the regional scale and include the British Columbian coast, the coast of Croatia and Cork Harbour in Ireland. Other discordant coasts include those in south-west Ireland and north-west Spain (May, 2000 contribution to nomination). The juxtaposition of both types of coastline within the same strata is exceptional. A detailed literature search shows that no other locality is so widely reported for these features, and it can be regarded as the type area for demonstrating coastal differential erosion (May, 2000 contribution to nomination).



The Purbeck Coast illustrates the contrasting forms of concordant and discordant coastlines. Concordant coasts, such as that at Lulworth (inset, left), form where the action of the sea works with the 'grain' of the geological structure. On discordant coasts, such as that at Handfast Point (inset, above), the sea works against the grain.

Raised beaches are a common feature of coastlines worldwide, and other well known locations include Mallorca, Spain; Bahamas; New Guinea, South Africa etc. The Portland beaches are a good example. The fauna of the East Beach is the most diverse found in any British raised beach, and it has been assessed as the best example of a raised beach along the Channel coasts (Keen, 1999 contribution to nomination).

The East Devon and Dorset coast has an enviable place in the history of geomorphology, the scientific study of landforms and processes on the surface of the earth. The Bindon landslide and the other slides within the Lyme Regis to Axmouth Undercliffs National Nature Reserve comprise one of the first landslide complexes to be fully described in a scientific memoir. Only Rössberg in Switzerland received similar attention at so early a date, but it is a different landslide type, a rockslide instead of a spreading failure or block slide. Bindon is the first place where lateral extension and liquefaction of fine sands was described with a precedence of more than 50 years. The hills and valleys of the area, in particular the valley of the River Char, were used by William Buckland as definitive proof that the valleys of the earth were created by the retreating waters of the biblical Flood. Elsewhere he cited the valleys of the Auvergne, but the Devon and Dorset coasts hold precedence (Brunsden, 1999 contribution to nomination).

Contemporary illustration of the Bindon Landslip (1839-40) by Hullmandel. The fame of the event at the time was such that hundreds of people travelled to see the large 'Chasm'. A dance, *The Landslide Quadrille,* was even written by Ricardo Linter to commemorate it. A copy of the front cover survives, but the music has been lost.

2 (c) INTEGRITY

The Dorset and East Devon Coast meets the relevant conditions of integrity for a natural heritage property as set out in the Operational Guidelines for the Implementation of the World Heritage Convention.

The nominated Site contains all of the key interdependent elements of the geological succession exposed on the coastline. It is a near-complete and unique succession of Triassic, Jurassic and Cretaceous rocks, all of which are contained within one structural sedimentary basin. It is of exceptional importance to the history of geological science and includes globally important palaeontological localities. The stratigraphy represents a range of marine and terrestrial environments, and a full range of sedimentary rock types. Its completeness in representing key features of the Mesozoic Era is clearly demonstrated by the remarkable range of localities selected through the Geological Conservation Review (GCR): this comprehensive study identified twenty separate 'blocks' representing the significant geological features of the Mesozoic Era, as a basis for selecting representative British sites of national or international importance. The sixty-seven GCR sites within the nominated Site include representatives of eighteen (i.e. ninety per cent) of these blocks. They also represent both of the relevant geomorphological blocks of the GCR. A summary of the GCR sites within the nominated Site is provided overleaf in Table 2, and full details are provided in Appendix D of the nomination.

The fossil faunas at the key localities are often very rich, and show key, interrelated elements of the record of life. Some particularly rich faunas, such as the vertebrates from the Lias and Kimmeridge Clay, are not yet fully understood as new taxa are still being discovered. The geomorphology of the nominated Site includes a series of interrelated, internationally important landforms, on a coastline whose processes and evolutionary conditions are little impacted by human activity. It is located in a setting that will allow these processes to continue substantially uninterrupted in the future.

The great variety of the rock types, and the superb and varied development of classic coastal landforms has created, within the nominated Site, extended stretches of coastline of great beauty.

The boundary of the nominated Site has been drawn to include the full extent of the significant coastal geological exposures and landforms, and includes land already identified for its earth science and/or landscape importance at a national level, and which therefore receives appropriate statutory protection under UK law. The site thus includes all of the distinctive elements that distinguish it as a specifically coastal landscape, so enabling a precise definition of the boundary to be made. The identification of a boundary which tracks the natural extent of these features ensures that the nominated Site will continue to match the extent of the features of interest as the coast evolves, and is consistent with the boundaries of the nationally designated sites which protect it.

It is recognised that the rock types exposed on the coast also form a substantial control on the topography of the countryside that adjoins the nominated Site. In some places they have also exerted a strong cultural influence, particularly on the Isle of Portland and within Purbeck where they have been quarried. The setting of the nominated Site is already adequately protected through strong statutory planning policies, particularly in relation to nationally designated Areas of Outstanding Natural Beauty, and by a designated Coastal Preservation Area in Devon and policies for Portland in the Dorset County Structure Plan and the Weymouth and Portland Local Plan. These include landscape protection policies for extensive areas of Devon and Dorset, stretching well inland, which provide comprehensive protection for its setting, and the wider associated cultural and wildlife interests of the coast and countryside of the area.

Table 2: Geological Conservation Review sites within the nominated Site.

GCR NUMBER	LOCATION	GCR BLOCK	GRID REFERENCE
51	Burton Cliff & Cliff Hill Road Section	Aalenian - Bajocian	347800, 89500-349200, 88700
87	Pinhay Bay Fault Corner	Hettangian - Pliensbachian	331700, 90700-345300, 90700
163	Furzy Cliff, Overcombe	Jurassic - Cretaceous Reptilia	369700, 81700-370300, 81900
204	Hooken Cliff	Cenomanian - Maastrichtian	320900, 88100-322700, 87800
206	Hand Fast Point - Ballard Point	Cenomanian - Maastrichtian	404300, 82400-404800, 81300
208	White Nothe	Cenomanian - Maastrichtian	376400, 81300-378800, 80600
252	Seatown - Watton Cliff	Toarcian	342300, 91500-345200, 90800
253	East Cliff	Toarcian	346300, 90200-347500, 89600
432	Lynch Cove (East Fleet Exposure)	Oxfordian	364900, 78100-364800, 77400
522	Studland Bay	Palaeogene	404500, 82400-403700, 82900
546	Watton Cliff	Mesozoic Mammalia	345100, 90800-345300, 90700
547	Durlston Bay	Mesozoic Mammalia	403500, 77200-403900, 78600
632	East Cliff to White Cliff	Aptian - Albian	320900, 88000-322800, 89800 and 323200, 89200-323500, 89600
634	Worbarrow Bay	Aptian - Albian	386100, 80300-386500, 80100
635	White Nothe	Aptian - Albian	376200, 81400-377200, 81600
636	Punfield Cove	Aptian - Albian	403700, 80700-403900, 80900
724	Durlston Bay	Portlandian - Berriasian	403500, 78000
725	Cliff House	Portlandian - Berriasian	376200, 81500
726	Houns - Tout	Portlandian - Berriasian	394600, 77300-396900, 75500
793	Durlston Bay	Palaeoentomology	403500, 78000
794	Charmouth	Palaeoentomology	335900, 93100-349600, 89200
800	Axmouth to Lyme Regis	Mass Movement	325400, 89900-333700, 91700
813	Otterton Point	Permian - Triassic Reptilia	307700, 81900
814	High Peak	Permian - Triassic Reptilia	310400, 85800-312100, 86900
828	Sandsfoot	Oxfordian	368400, 79700-367100, 77100
910	Osmington	Oxfordian	369700, 81600-372800, 81800 and
914	Durlston Bay	Jurassic - Cretaceous Reptilia	373400, 81700-375200, 81300 403500, 78000
915	Broad Bench Cuddle (Gaulter Gap - Broad Bench)	Jurassic - Cretaceous Reptilia	389800, 78900-390900, 78900
916	Lyme Regis	Jurassic - Cretaceous Reptilia	332100, 90800-337300, 92800
996	Freshwater Bay	Portlandian - Berriasian	369100, 70000
997	Tar Rocks	Portlandian - Berriasian	368100, 72500
998	Tyneham Cap - Houns Tout	Kimmeridgian	388800, 79600-395600, 76800
1000	West Cliff	Portlandian - Berriasian	368500, 72900-367600, 68400
1001	Winspit - Seacombe	Portlandian - Berriasian	397600, 75900-398600, 76600
1006	Dungy Head - Mupe	Portlandian - Berriasian	381500, 80000-384300, 79700
1060	Swyre Head - Chapman's Pool	Jurassic - Cretaceous Reptilia	393700, 77300-395500, 77100
1064	Small Mouth Sands	Jurassic - Cretaceous Reptilia	366900, 76400-367200, 77200
1198	West Cliff - Kingbarrow - Yeolands & Grove Cliff, Portland	Jurassic - Cretaceous Reptilia	368500, 72900-367600, 68400 and 69100, 72900-370200, 71800
1263	Culverhole Point	Rhaetian	327500, 89300
1264	Pinhay Bay	Rhaetian	332000, 90800
1285	Blacknor	Mass Movement	367800, 71400
1297	Ringstead	Kimmeridgian	375100, 81300-376600, 81100
1298	East Fleet - Small Mouth	Kimmeridgian	365900, 76700-366700, 76300 and 366700, 76500-367200, 77200
1300	Black Head	Kimmeridgian	372300, 82000-373500, 81700
1321	Black Ven	Mass Movement	334700, 92700-336300, 93100
1330	Watton Cliff	Bathonian	345400, 90700
1506	Orcombe Rocks	Permian - Triassic	301800, 79700-302300, 79500
1507	Budleigh Salterton	Permian - Triassic	305500, 81500-307300, 82000
1603	Shipmoor Point - Butterstreet Cove	Bathonian	357600, 83600; 359600, 62200; 360800, 82200; 361200, 80800 and 363300, 79900

1628	Gad Cliff	Portlandian - Berriasian	387100, 79700-389200, 79500
1643	Portland Bill	Portlandian - Berriasian	367500, 68500-368800, 69200
1800	Chesil Beach	Coastal Geomorphology of England	346200, 90300-368200, 72900
1837	Budleigh Salterton	Coastal Geomorphology of England	304100, 82500-307900, 81900
1839	Ladram Bay	Coastal Geomorphology of England	310000, 85500
1843	Ballard Down	Coastal Geomorphology of England	404100, 82500-403400, 80400
1863	Furzy Cliff - Peveril Point	Coastal Geomorphology of England	369700, 81600-404100, 78600
2109	Golden Cap - Lyme Regis	Coastal Geomorphology of England	338000, 92700
2288	Ballard Point - Studland Bay	Alpine Structures of Southern England	404800, 81300-403800, 82700
2289	White Nothe - Bacon House	Alpine Structures of Southern England	378000, 80700-384300, 79700
2380	Tidmoor Point - East Fleet Coast	Callovian	364300, 78500-363500, 79800
2625	Lulworth Cove	Wealden	382900, 79800-382300, 79800
2626	Mupe Bay - Worbarrow Bay	Wealden	384300, 79700-384300, 80100 and 386400, 80300-387100, 79700
2627	Durdle Door	Wealden	380700, 80300
2629	Swanage	Wealden	403100, 79700-403800, 80000
2900	Durlston Bay	Mesozoic - Tertiary Fish/Amphibia	380700, 80300
2901	Watton Cliff	Mesozoic - Tertiary Fish/Amphibia	345100, 90800-345300, 90700
2952	Lyme Regis	Mesozoic - Tertiary Fish/Amphibia	332700, 90900-334100, 91500 and 334500, 91900-336300, 92900

2 (d) CRITERIA UNDER WHICH INSCRIPTION IS PROPOSED

The *Operational Guidelines for the Implementation of the World Heritage Convention* state that a site which is nominated for inclusion on the World Heritage List will be considered to be of outstanding universal value if it meets one or more of the four criteria set out. It is considered that the Dorset and East Devon Coast meets the first and third of the four criteria:

Criterion (i) The Site should be an outstanding example, representing major stages of Earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features

The Dorset and East Devon Coast is an outstanding near-continuous, accessible exposure of rocks of Triassic, Jurassic and Cretaceous age representing the history of the Earth during the Mesozoic Era. It displays a virtually complete section through a sedimentary basin, and a complete record of an oil province. It includes a series of internationally significant and diverse fossil sites, displaying many unique species, and productive of beautifully preserved specimens. It has been regarded as one of the World's most important geological and geomorphological sites since the earliest days of science, and is a crucible for the foundation of ideas that continue to shape modern earth sciences.

The coastline is evolving under natural processes, which have resulted in a series of diverse coastal landforms in their natural relationships, and which are classic, textbook examples of landslides, cliffs, beaches and lagoons.

Criterion (iii) The site should contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.

The landforms of the Dorset and East Devon Coast are a beautiful series of natural features, illustrating many classic forms that result from coastal erosion and accretion. These features, and the varied geological exposures in the cliffs have created extended stretches of aesthetically attractive coastline. The fossil remains from localities within the nominated Site are often spectacular and beautiful, and include superbly preserved, diverse specimens of plants and animals.

The distinctive coastal features of the landscape are included within the nominated Site. They lie within a setting that is protected by mature planning policies, most of which also receives statutory protection on the grounds of its aesthetic quality under UK law. Together with the associated cultural and natural importance of the surrounding countryside, the nominated Site is a historic and continuing source of inspiration for major artists and authors.

3. Description

3 (a) DESCRIPTION AT DATE OF NOMINATION

The Geology of the Dorset and East Devon Coast

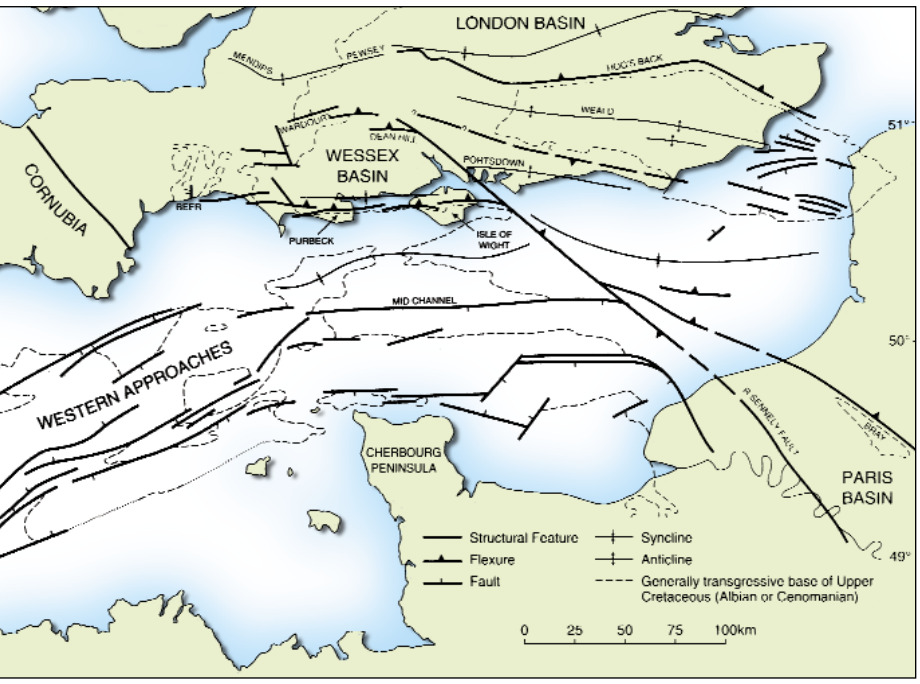
The Dorset and East Devon Coast has been known since the early days of geology as providing one of the finest sequences of Mesozoic rocks. They are displayed in a magnificent, accessible series of cliff exposures from the underlying Triassic rocks of East Devon through an almost continuous succession of Jurassic and Cretaceous strata exposed progressively to the east. They reveal a complete, classic and well-studied section through a sedimentary basin, the Wessex Basin, which allows the full succession to be viewed in its proper sedimentological and structural context (Taylor, 1995; Underhill, 1998).

STRUCTURAL GEOLOGY

The Wessex Basin is the best known of a number of Mesozoic and Tertiary intra-plate basins that formed in response to Atlantic opening and subsequent Alpine collision in north-west Europe. Its geology has been exceptionally well studied, and it is the subject of a recent, comprehensive review (Underhill, 1998). The basin is important for the study of structural geology for three reasons. First, because of the high level of coastal exposure provided by the Dorset and East Devon coast. Second, because of the availability of detailed and modern geological maps together with an exceptionally well documented stratigraphy and sedimentology. Third, because of an extensive subsurface database, obtained during relatively recent exploration for hydrocarbons. Combinations of closely spaced seismic refraction lines across the basin, calibrated by numerous deep boreholes allow a complete integration of surface and subsurface structure.

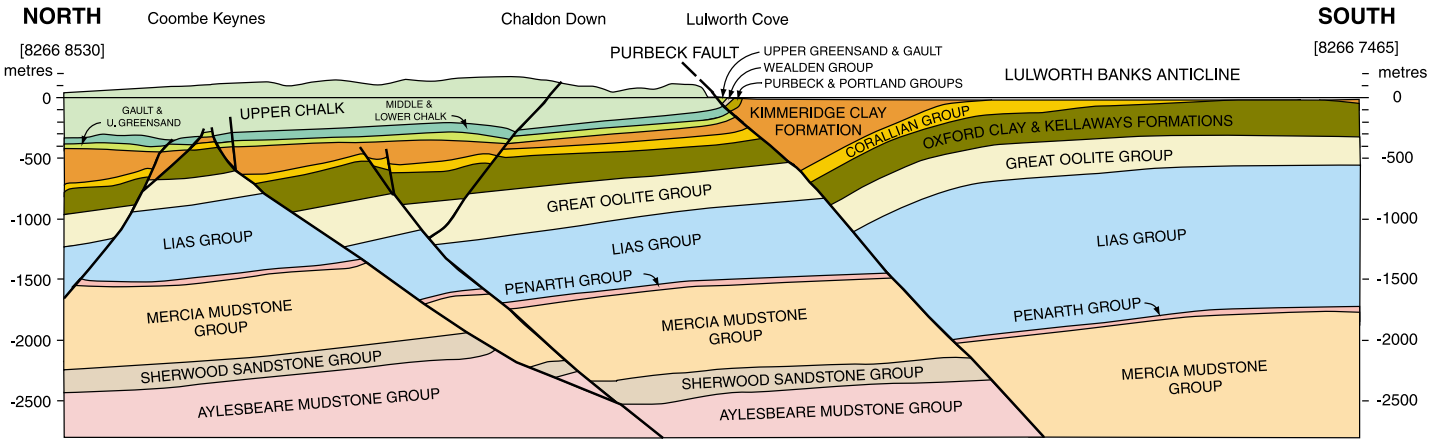
There are two main features of the structural geology, which are particularly well exhibited within the nominated Site. The first are east-west trending extensional faults that have undergone contractional reactivation. The second are important large- and medium-scale folds that verge north and contain axes that are parallel with and adjacent to the reactivated faults. The effects of this deformation can be seen from satellite images.

The principal reactivated extension faults are the Abbotsbury-Ridgeway Fault and the Purbeck Fault, each of which extends for about 25 km onshore. They are interpreted as two *en echelon* segments of a similar structure, offset by about 4 km in the vicinity of Chaldon Down. At depth, both faults show large, down-to-the-south, normal displacements consistent with formation in extension. Both faults also show substantial stratal growth, that is the same formations within the downthrown, southern fault block are much thicker (sometimes twice as thick) as those within the northern block. The thickness change of the Lias Group across the Purbeck Fault illustrates the magnitude of stratal growth and demonstrates that displacement occurred along the fault during deposition of the Lias sequence. Most of the extension in the Wessex Basin occurred during early deposition and subsidence of the basin, before the Early Cretaceous.



The location of the Wessex Basin and its general tectonic setting. The main lines of Mesozoic-Tertiary structural disturbance in southern England and the English Channel are shown. Reproduced from Stoneley (1999).

There are changes in extensional displacement along the length of both faults and these reach a maximum (>1 km) within the central parts of each fault segment. Displacement along the Abbotsbury-Ridgeway fault decreases eastward towards Chaldon Down, where extension is taken up by a westward increase in displacement along the Purbeck Fault. The



The cross-section above is drawn through Lulworth Cove from north (left) to south (right). The complete succession within the nominated Site is interpreted from the Triassic Aylesbeare Mudstone, Sherwood Sandstone Group and Mercia Mudstone Group through the Jurassic sequence (Lias Group - Portland Group) to the Cretaceous. Detailed subsurface information, both on-and offshore, enables a very detailed interpretation to be made. The diagram shows the steeply dipping strata at Lulworth Cove. Folding of the rocks is clearly seen in the field at Stair Hole, Lulworth. (right)

quality of the available surface and subsurface data allows detailed displacement curves to be drawn for these faults. There are important differences in fault geometry, with part of the Abbotsbury-Ridgeway fault showing pronounced curvature at depth where it appears to pass into the mechanically weak salt interval in the Mercia Mudstone Group. By contrast, the Purbeck Fault is a high or moderate angle fault.

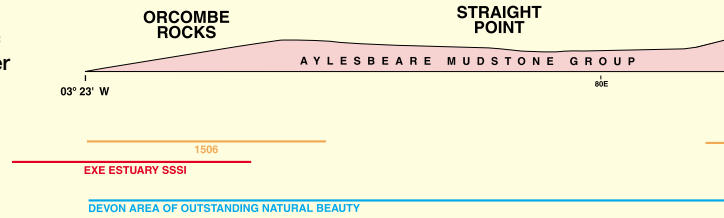
Reverse or thrust, down-to-the-north displacement along both faults occurred later, during Tertiary contraction. Reactivation followed eastward tilting of the basin and deposition of the Upper Greensand, Gault and Chalk. Because these Cretaceous sequences do not contain earlier extension faults, the effects of the later reactivation are more obvious in these sequences. Whereas Chalk elsewhere typically has gentle easterly dips, the Purbeck Ridge is a zone of subvertical Chalk (Purbeck Monocline), which has been carried north on the Purbeck Fault. The amount of contractional displacement changes along the Purbeck Fault but exceeds 500 m for part of its length.

The three principal folds along the Dorset Coast are the Weymouth, Lulworth Banks and Purbeck Anticlines. Each fold formed during fault displacement, probably during the later contractional movement phase. Each has a gentle, east-plunging axis, a steep northern limb and shallow-dipping southern limb, that together suggest formation by south to north compression. Small-scale folds with the same geometry occur adjacent to the Purbeck Fault and are thought to have formed during the same phase of contractional reactivation. The best known of these structures is the ‘Lulworth Crumple’ at Lulworth Cove, shown above.

The basin fill is Permian to Tertiary in age and is approximately 3 km thick at the Dorset coast. A broad, threefold subdivision of the fill comprises a basal Permo-Triassic sequence of red beds with important salt deposits in the subsurface, a median interval of largely marine, Jurassic to Early Cretaceous mudstones, sandstones and limestones, and an upper interval dominated by the Chalk but also including sandstone and mudstone of Cretaceous and Tertiary age. The upper interval rests on an angular unconformity that oversteps both subjacent units. As a result of gentle tilting toward the east, the oldest or Permo-Triassic part of the basin is exposed at surface in the west, in East Devon and the youngest, Tertiary interval crops out in East Dorset (Barton, 1999 contribution to nomination). The nominated Site provides a representative exposure of the Mesozoic strata of the basin in the accessible coastal exposures of Dorset and East Devon.

THE COASTAL GEOLOGY OF THE DORSET AND EAST DEVON COAST

The section diagrams shown in the following twenty pages provide a complete overview of the geological succession exposed in the cliffs of the Dorset and East Devon Coast. Rock units are mainly named using the established lithological units evident at outcrop, and some are in the process of being renamed at present. Please see the stratigraphic column (Figure 4), and detailed columns (Tables 3, 4, 5 and 6 for further information. Most of the diagrams of the Dorset Coast are based on the work of House (1993). The sections in East Devon, east of Sidmouth have been adapted from a publication of the British Geological Survey, and are reproduced with their permission.



TRIASSIC STRATIGRAPHY AND PALAEONTOLOGY

The main British Triassic deposits occur in the Midlands, South Wales, and Devon. The sediments are almost wholly continental, terrestrial red beds deposited in fault-bounded basins or on a regionally subsiding shelf in eastern England. Triassic successions are commonly only partially and selectively exposed, with coarser beds being exposed more commonly than finer, more easily weathered sediments. The extensive and almost continuous exposure of both types of sedimentary unit within the nominated Site is exceptional, and internationally important because it is an almost continuous exposure of a sedimentary rock succession which represents most of the Triassic Period (c. 251-199 Ma).

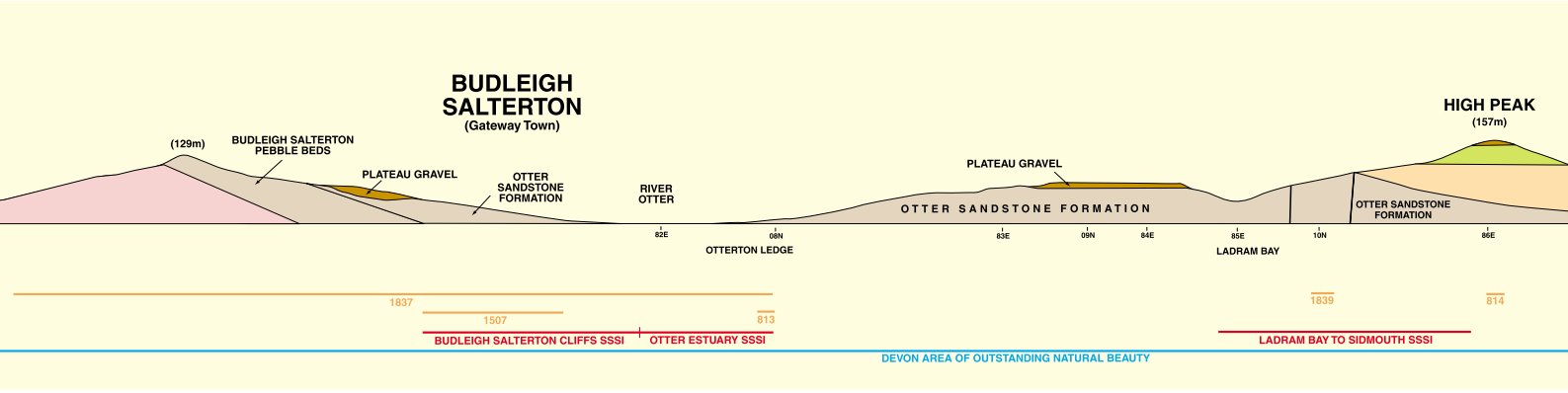
The c. 35 km of coast between Orcombe Rocks, near Exmouth, and Seven Rock Point, west of Lyme Regis, displays a succession that is over 1,100 m thick. It is in continuity to the west with older (Permian) sediments, and to the east with younger (Jurassic) sediments and is overlain, above an angular unconformity, by Cretaceous rocks. The importance of this part of the nominated Site is that the exposures are unbroken, accessible and very extensive. Elsewhere the facies are only partly exposed and do not exhibit such clear continuity. The Triassic exposures within the nominated Site therefore reflect over 50 million years of a major stage in the Earth's history.

Orcombe Rocks at the far west of the nominated Site. This is an excellent coastal section displaying sandstones deposited in a river environment, and has been selected as a Geological Conservation Review site for Triassic stratigraphy.

The underlying Permian succession rests unconformably upon an eroded surface of folded Devonian and Carboniferous rocks and represents the earliest phase of sedimentation in the region after the Variscan orogeny. It comprises predominantly coarse clastic sediments of local origin that accumulated in fluvial and aeolian depositional environments under predominantly arid conditions. The Triassic succession forms a transition between these entirely continental deposits and the marine deposits of the succeeding Jurassic. It therefore provides a spatial link in the geographical and sedimentary development of the region between the denudation of the Variscan mountains and the establishment of widespread marine environments in a tectonic basin. It is representative of an extensive concealed development of Triassic rocks present farther east and north in the Wessex Basin. It is also a main reservoir rock for the Wytch Farm oilfield and is therefore a critical element in the beautifully displayed features of an oil basin seen within the succession. The continental sediments yield terrestrial spores and pollen, although many samples taken through the interval are barren.

The mouth of the River Otter east of Budleigh Salterton. The exposures of the Otter Sandstone Formation here, together with those further east at High Peak, near Sidmouth are the two significant Triassic fossil vertebrate localities within the nominated Site.

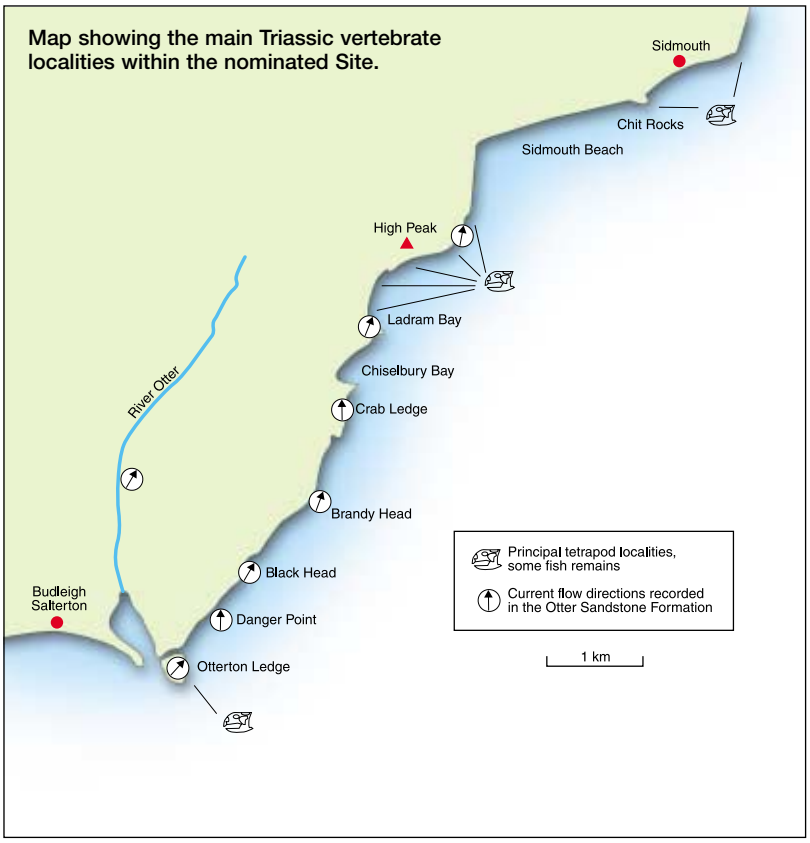
The exposed Triassic succession dips gently to the east and successively younger units are exposed eastwards from Orcombe Rocks. It comprises, in ascending order, the Aylesbeare



Mudstone, Sherwood Sandstone, Mercia Mudstone and Penarth groups, and the lowest beds of the Lias Group. Details of each unit are provided in Table 3 (Warrington, 1999 contribution to nomination).

The Mid-Triassic vertebrate sites within the Otter Sandstone Formation (Sherwood Sandstone Group) are internationally important. The British Triassic is for the most part unfossiliferous and tetrapod faunas occur only sporadically in south-west England, the Midlands and north-east Scotland. The Otter Sandstone Formation, exposed on the coast between Sidmouth and Ladram Bay in East Devon, is regarded as the richest active Mid-Triassic reptile locality in Britain, and is one of the most promising terrestrial reptile localities of its age anywhere in the World (Benton and Spencer, 1995). The rhynchosaur remains are particularly notable, and High Peak, near Sidmouth is the type locality for the species *Rhynchosaurus spenceri* Benton, 1990.

Tetrapod evolution on land underwent rapid change during the Triassic, with a switch from essentially Palaeozoic taxa, in the Early and Mid-Triassic, to essentially modern taxa by the end of the period. The earliest faunas are of low diversity, a consequence of a mass extinction event at the end of the Permian Period. This event resulted in the loss of most medium and all large herbivores, and all medium and large carnivores. The resulting gap was soon filled by several new tetrapod groups and by re-radiation of surviving groups from the Permian. Amongst these new groups the archosaurs, cynodonts and the rhynchosaurs rose to prominence. The Otter Sandstone fauna includes ten species of reptiles and amphibians, together with some fish and invertebrate remains. An assessment of the importance of the Devon fauna has been carried out (Benton and Spencer, 1995; Benton, 1997). The fauna expands current understanding of tetrapod evolution during the Triassic, providing a record of life from less than ten million years after the late Permian mass extinction. It shows the diversification of life that took place after this event, with Palaeozoic survivors like the temnospondyls, procolophonids and prolacertiforms, but a number of essentially new Triassic forms, particularly the rhynchosaurs and the archosaurs. It is typical of the global picture, since faunas were essentially cosmopolitan (Shubin and Sues, 1991), but it is unusual in two ways: firstly like other European faunas it lacks synapsids (mammal-like reptiles) which were abundant in North America and Gondwana, and secondly it is dominated by rhynchosaurs, a group only known in Europe from English localities, sporadically in North America but abundantly in Gondwana. Unpublished research (Spencer and Storrs, 2000) shows that the commonest



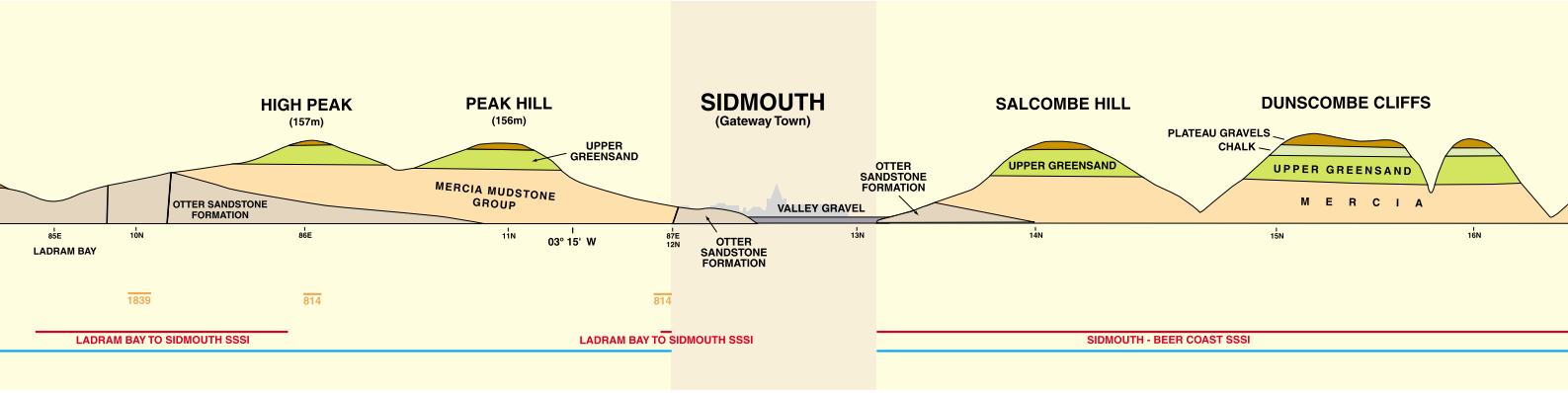
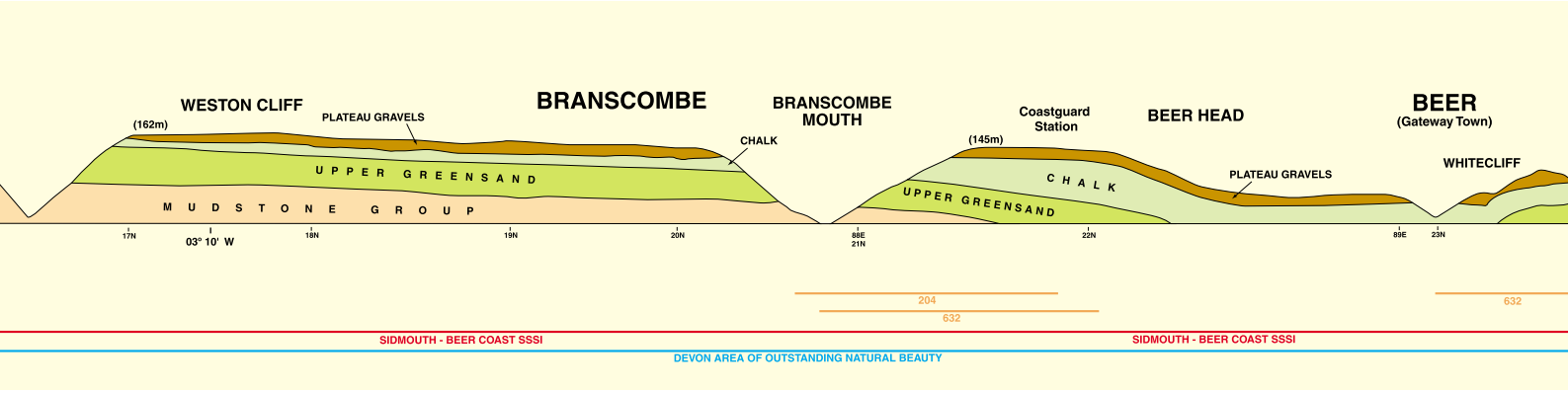
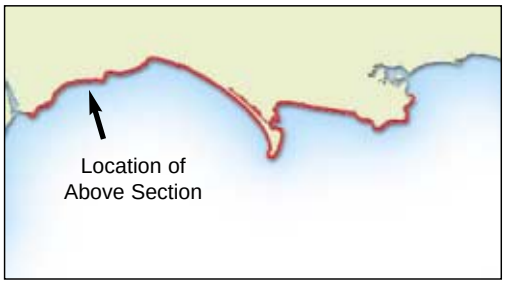


Table 3: Summary of the Triassic succession within the nominated Site

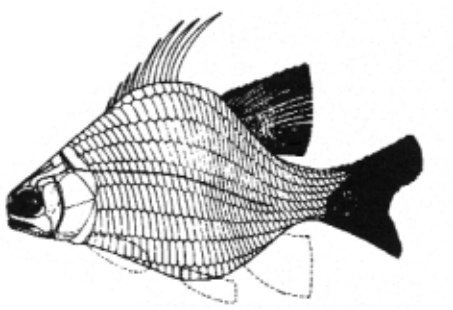
The Lias Group (part)		Succeeds the Penarth Group, probably without a significant stratigraphic break; it comprises grey, fossiliferous, calcareous mudstones and limestones of marine origin. The base of the Jurassic is placed within Blue Lias Formation at the stratigraphic appearance of ammonites of the genus *Psiloceras*. This major stratigraphic boundary is exposed in the section between Pinhay Bay and Seven Rock Point, west of Lyme Regis at a level 2.5 m above the base of the group. Beds in the group below this level (Pre-planorbis Beds or Ostrea Beds) are assigned a latest Rhaetian (latest Triassic) age.
The Penarth Group (c. 18 m)		Exposed discontinuously in the faulted and landslipped area between Culverhole Point and Pinhay Bay; it rests disconformably upon the Mercia Mudstone. The group comprises black, fossiliferous shales (Westbury Formation) overlain by grey-green, brackish-water to marine mudstones and marine limestones (Lilstock Formation) and is dated biostratigraphically as Rhaetian age.
The Mercia Mudstone Group (c. 440 m?)		Exposed between Sidmouth and Branscombe, between Seaton Hole and Culverhole Point, and at Charton Bay; it succeeds the Otter Sandstone conformably. It is overlain, above an angular unconformity, by westward overstepping Cretaceous rocks; continuity of exposure of the group is broken between Branscombe and Seaton by a combination of faulting and the effect of this unconformity. Between Weston Mouth and Branscombe, and at Charton Bay, exposure is affected by landslip. The group consists largely of red-brown mudstones, with some grey-green or silty beds. Fossiliferous dolomitic sandstones and grey-green mudstones (Weston Mouth Sandstone Member) are exposed around Weston Mouth, and higher beds near Branscombe contain large amounts of gypsum. The highest unit in the group, seen east of Seaton, comprises mainly grey-green sediments (Blue Anchor Formation). The dominant sediments of the group accumulated in playas and sabkhas under subaerial and subaqueous conditions; water was of mixed continental and marine origin, and evaporitic conditions resulted in the formation of gypsum and, elsewhere in the Wessex Basin, halite. The Weston Mouth Sandstone represents a brief estuarine episode. The Blue Anchor Formation represents a transition from dominantly continental to dominantly marine influences. Magnetostratigraphic work indicates that the base of the group is Ladinian (Late-Mid Triassic) in age. Carnian-Rhaetian ages are indicated by palynomorphs from the middle and upper parts of the Group.
The Sherwood Sandstone Group (c. 150 m)	The Otter Sandstone Formation	Rests disconformably upon the Pebble Beds and consists largely of fine- to medium grained sandstones, some of aeolian origin but most deposited by shallow, northward-flowing, braided rivers. Remains of arthropods, fish, amphibians and reptiles represent the fauna of a range of terrestrial and fresh-water habitats and indicate an Anisian (early Mid-Triassic) age, which is supported by magnetostratigraphic evidence. Internationally important reptile remains.
	Budleigh Salterton Pebble Beds Formation	Exposed at Budleigh Salterton. They rest unconformably upon the Aylesbeare Mudstone Group and comprise gravels and sands deposited in a northward-flowing, braided river system. Some of the pebbles contain fossils indicative of provenance in outcrops of Ordovician and Devonian rocks. At the top of the Pebble Beds a 'reg'-type palaeosol with numerous ventifacts represents subaerial exposure. The unit has no indigenous fossils; its age is constrained by those assigned to the under- and overlying deposits.
The Aylesbeare Mudstone Group (c. 530 m)		Exposed between Orcombe Rocks and Budleigh Salterton. It consists largely of mudstones, which accumulated in a sabkha-playa environment; a minor component is sand, which accumulated in small aeolian dunes. Magnetostratigraphic data is available.





Expertise is needed to locate the Triassic-Jurassic boundary within the Lias Group at Lyme Regis. The precise location of the boundary is marked here by Tonya West.

procolophonid in the Otter Sandstone Formation is *Kapes*, which is otherwise known only in Russia. The fauna therefore fills an important gap in the sequence of earlier Triassic faunas, and may prove critical in making links between terrestrial tetrapod faunas of the same age in Russia and North America, and so between Laurasia and Gondwana (Benton and Spencer, 1995; Benton, 1997).



***Dipteronotus cyphus* Egerton is a deep-bodied fossil fish found in the Otter Sandstone formation. It was 7-10 cm long. Well-preserved in Devon, it is also known from Morocco and the Midlands of the UK. From Dineley and Metcalf (1999).**

The key references for the Triassic succession within the nominated Site are Benton and Spencer (1995), relevant extracts from which are included within Appendix D, and Benton (1997). The Triassic stratigraphy of the coast is summarised in Underhill (1998).

JURASSIC STRATIGRAPHY AND PALAEONTOLOGY

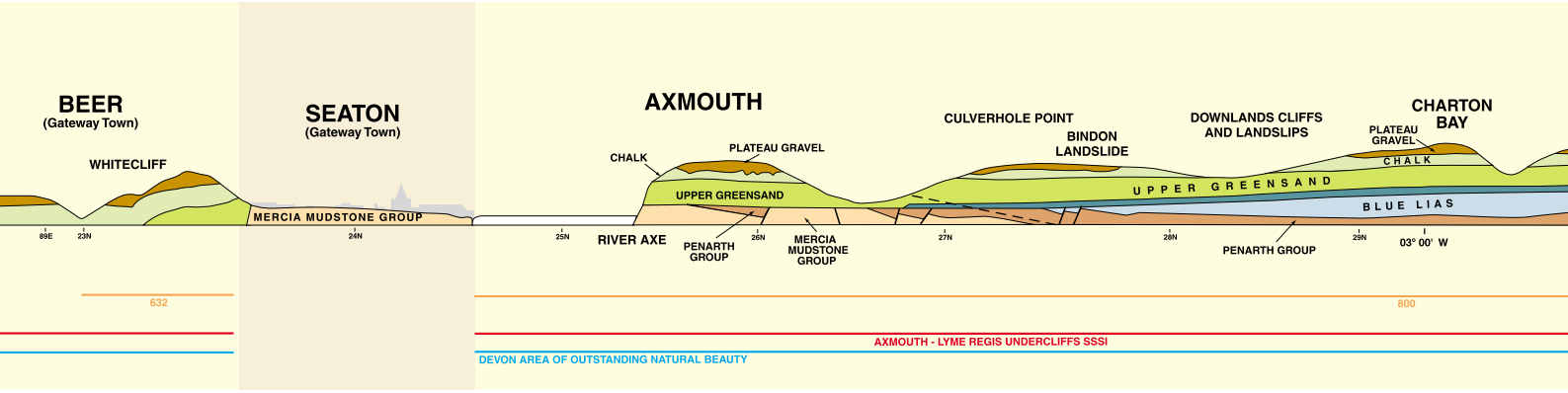
'The Dorset coast has been known since the early days of geology as providing one of the finest sections of marine Jurassic rocks anywhere in the World' (Callomon and Cope, 1995). The coastal section is exposed within the nominated Site from near Lyme Regis in the west, to Swanage in the east. It was fundamentally important to the development of both academic and professional geology, and produced some of the earliest scientifically-described fossils. This section is particularly noted for its ammonite faunas and the discoveries of marine vertebrates, but it is also of international importance for many other groups of fossil animals. Several levels within the Jurassic, particularly the Lias, Forest Marble, Oxford Clay, Kimmeridge Clay and the Portland Group show exceptional preservation of fossil material, enabling detailed reconstructions of past environments to be made.

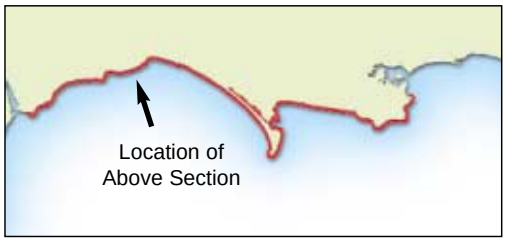
The succession of the Jurassic comprises large-scale, repeated rhythms of clay, sandstone and limestone. There are about six of these major cycles recognised in the Dorset succession. These correspond to global deepenings of the contemporary sea-level and subsequent infill with sediment. At much finer scale the sequence is punctuated by small-scale microrhythms which are thought to be due to orbitally-forced climatic changes.

The succession has recently been described in detail by Callomon and Cope (1995).

Lower Jurassic

Lower Jurassic strata in West Dorset crop out between Lyme Regis and Burton Bradstock. The succession is wholly marine, although the facies varies from fairly deep-water mudstones to shallow marine limestones and even shallower sandstones. The Lower Jurassic is generally known as the Lias, and is divided into three sections: Lower, Middle and Upper. A summary of the succession is provided in Table 4 (page 57).



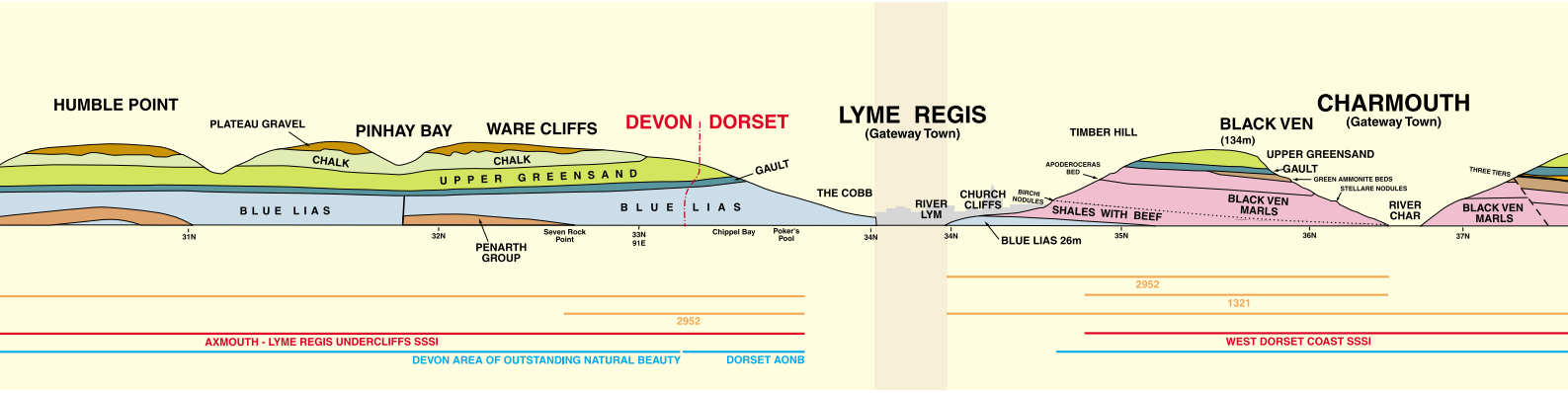


Anoxic black shales of the Lower Lias form the source rock for the hydrocarbons in the Wytch Farm oilfield. The succession is permeated by small-scale rhythmicity, which varies from hypoxic shale to oxic shale to limestone. The initial deep-water mudstone facies of the middle to late Lower Lias was followed in the Middle Lias by the deposition of the silty to sandy facies, followed by the limestones of the Marlstone and Junction Bed (Beacon Limestone Formation) around the Middle/Upper Lias boundary. This represents the top of the first of the major shallowing-upward cycles seen in the Jurassic (J1). The overlying Down Cliff Clay represents a deepening of the sea at the beginning of the Toarcian Stage, and the remainder of the Upper Lias is composed of the shoal and storm sands of the Bridport Sands, which elsewhere form the middle reservoir of the Wytch Farm oilfield.

The Lias of the nominated Site includes internationally important fossil localities, known since the early days of geology. Many important monographs on the marine fauna of the Lower Jurassic make reference to the nominated Site, often drawing heavily on specimens found within it. The studies of the ammonites are very important. Through the work of Spath, Buckman, Lang, Donovan, Howarth and others, a complete biostratigraphy of the group has been established which forms the standard for correlation with other parts of the world (Arkell, 1956; revised by Callomon and Cope, 1995). There is abundant evidence of wood from conifers and other plants derived from adjacent land areas especially as woody tissue seen at outcrop and from laboratory preparations, although the sequence yields poor macrofloral material.

The succession has provided a great deal of material used in taxonomic studies of a wide range of Liassic invertebrates. Notable among these are publications dealing with some of the more neglected groups, such as Lower Jurassic belemnites (Lang 1928) and gastropods (Cox 1936), for which few detailed studies have been published. The Lower Jurassic has long been noted for elements of its echinoderm fauna. Extraordinarily well-preserved specimens of the crinoid *Pentacrinites fossilis* from the Black Ven Marls, aside from their great beauty, provide crucial evidence for the pseudoplanktonic mode of life of this and related species (Simms, 2000 contribution to nomination). Higher in the succession the well known Starfish Bed has yielded many exceptionally preserved ophiuroid, and rare asteroid starfish (Goldring and Stephenson 1972). Tangled groups of the crinoid *Balanocrinus gracilis* also occur in exceptional preservation at a similar level in the succession and preserved by the same mechanism. Intact echinoids occur locally at several levels, notably low in the Blue Lias Formation, with several species described on the basis of material from here (Wright 1855-80). Elsewhere in the succession disarticulated material predominates but has formed the basis of taxonomic studies of several groups, with a significant number of species of crinoid (Simms, 1989) and holothuroid (Gilliland, 1992) described from here.

Examples of Lias fossils from the Dorset and East Devon Coast. Top: ammonite *Promicroceras*, displaying preserved 'mother of pearl'. Middle: A fine Eryonid lobster. Bottom: A superb dragonfly.

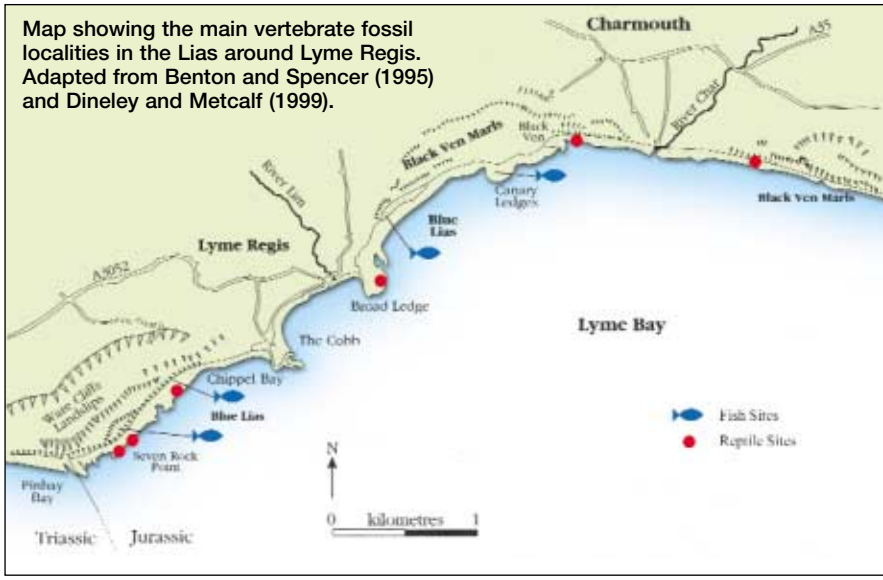


Dipaedium, a heavily-armoured Lower Jurassic fossil fish. This specimen, found within the nominated Site by a local collector, shows superb, detailed preservation and is draped over a piece of fossil wood.

The Black Ven Marls of the Jurassic Coast of Dorset are the best known source of Lower Lias insects in the world. The insects occur especially in the so-called woodstones and flatstones of Sinemurian age, which are exposed on the coast at Black Ven and Stonebarrow, either side of Charmouth. The entomofauna includes Odonata (dragonflies), Blattodea (cockroaches), Dermaptera (earwigs), Hemiptera (bugs), Coleoptera (beetles), Phasmatodea (stick insects), Orthoptera ('grasshoppers' and crickets), Raphidoptera (snakeflies), Mecoptera (scorpionflies), Diptera (true flies). The insects have been the subject of modern scholarly works which have recognized over twenty new genera and species known only from Dorset, including the oldest known moth *Archaeolepis mane* (Whalley, 1985) (Jarzembowski, 2000 contribution to nomination).

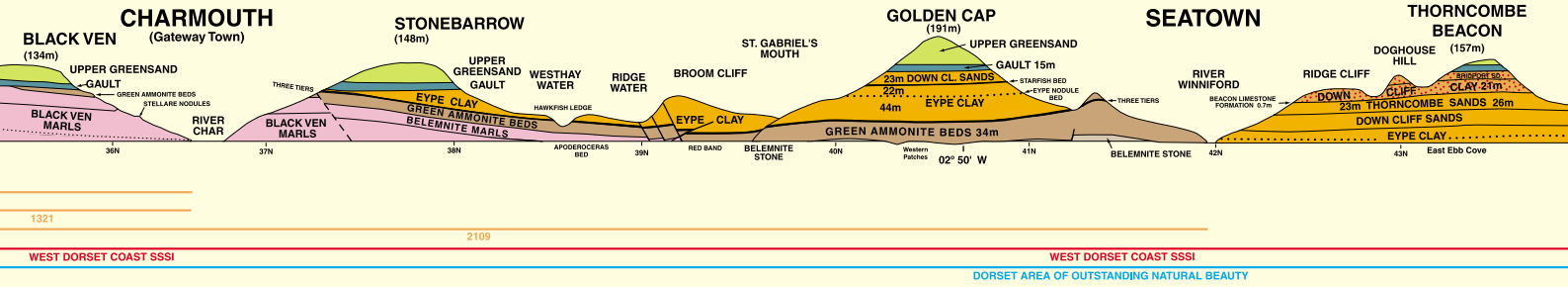
The Liassic fish fauna of the nominated Site is also exceptionally diverse with a broad representation of both cartilaginous (sharks and rays) and bony fishes. Many were first monographed by Louis Agassiz (1807-1873). About forty-six fossil fish species are currently recognised of which thirty-five are unique to the nominated Site. This locality also produces better-preserved specimens of species known from other Liassic localities (Dineley and Metcalf, 1999).

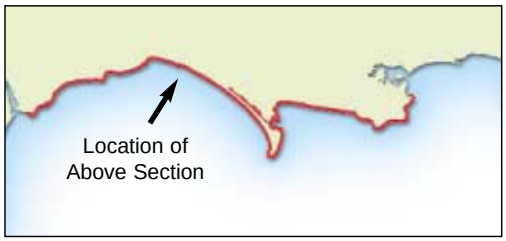
The Lower Jurassic at Lyme Regis is particularly famous for its reptile remains, which have been collected over more than 200 years. The finds include type specimens of taxa that are still crucial to modern evolutionary and phylogenetic studies. The black shales of numerous horizons indicate anoxic environments favourable for the very best fossil preservation.



Map showing the main vertebrate fossil localities in the Lias around Lyme Regis. Adapted from Benton and Spencer (1995) and Dineley and Metcalf (1999).

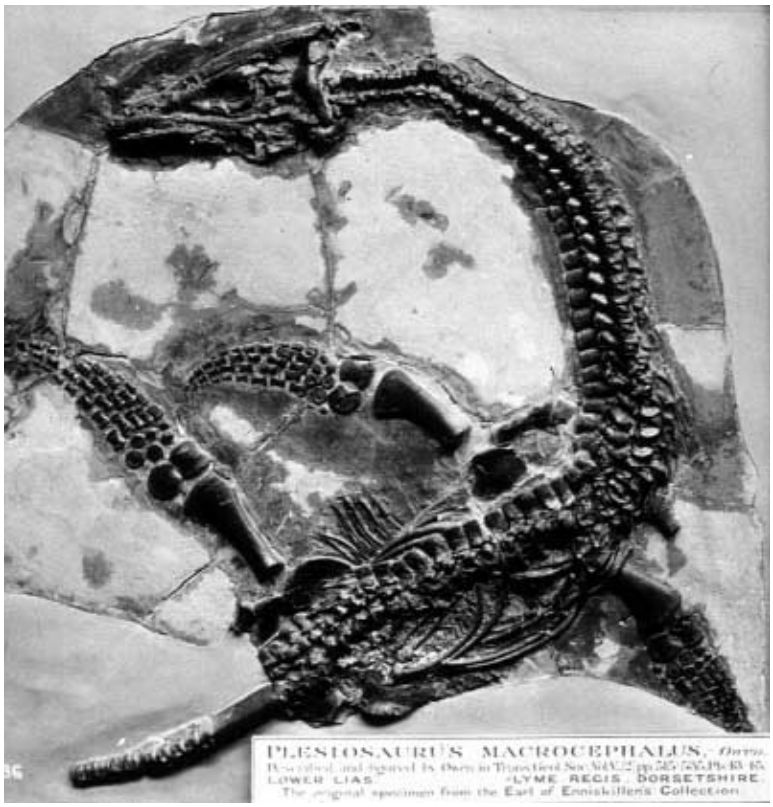
Two important groups of marine reptiles are found at Lyme Regis. The ichthyosaurs had snouted skulls with large eyes, and a more slender body with a heterocercal tail in which the vertebral column passed along the lower part of the tail fin. They swam with four paddle-shaped fins. The first ichthyosaur to come to widespread scientific attention (an example of *Temnodontosaurus platyodon*) was the first major find of Mary Anning, with her brother Joseph (see page 27). Species first described from Lyme Regis include I*chthyosaurus communis* Conybeare, 1822, *Leptopterygius tenuirostris* (Conybeare, 1822), *Ichthyosaurus breviceps* Owen, 1881, I*chthyosaurus conybeari* Lyddeker, 1888, T*emnodontosaurus eurycephalus* (McGowan, 1974), *Temnodontosaurus platyodon* (McGowan, 1974), *Leptopterygius solei* McGowan, 1993 and *Leptonectes moorei* McGowan and Milner, 1999; a specimen of a further likely new species awaits description. This fauna includes the earliest known representatives of the crown group of ichthyosaurs (i.e. the most highly evolved representatives of the species).





The distinctive cliff at Golden Cap. The unconformity between the eastward dipping Jurassic rocks and the yellow-coloured Cretaceous Upper Greensand can clearly be seen.

The plesiosaurs swam with four wing-like limbs and had barrel-shaped bodies. They fed on fish, cephalopods and other reptiles with particular species specializing in a way depending on the size of their heads. A number of plesiosaurs are known from the Lias of the Lyme Regis area, and the fauna includes some of the first specimens to come to scientific attention. *Plesiosaurus dolichodeirus* Conybeare, 1824, the first complete specimen of this group to be published in a scientific journal, and *Plesiosaurus macrocephalus* Buckland, 1837, *Plesiosaurus rostratus* Owen, 1865, *Plesiosaurus conybeari* Sollas, 1881 and *Eurycleidus arcuatus* (Owen, 1840). The fauna represents the best well-preserved plesiosaurs of this age known anywhere in the World.



The large-skulled plesiosaur *Plesiosaurus macrocephalus*, one of the major finds of Mary Anning. This superb skeleton remains in the collection of the Natural History Museum in London.

Complete skeletons are still being found within the nominated Site as the cliffs erode; the continuing finds of new taxa highlight the potential for new discoveries and the importance of site conservation. The published fauna of at least five different plesiosaur species and nine ichthyosaur species make the marine reptile fauna the most varied known from any Lower Lias locality.

Lyme Regis also produced some of the earliest remains of flying pterosaurs. *Dimorphodon macronyx* Owen is represented by two fairly complete individuals and numerous fragmentary remains. It is of great importance to the study of pterosaurs and has been found nowhere else. Rare remains of land-dwelling dinosaurs are known from the Charmouth, which is the only published locality for *Scelidosaurus harrisoni* Owen. This is the oldest known thyreophoran dinosaur (i.e. the group that includes armoured and plated dinosaurs) and therefore occupies a crucial position in dinosaur phylogeny, close to the origin of all plant-eating (ornithischian) dinosaurs. Scelidosaurus is represented by an

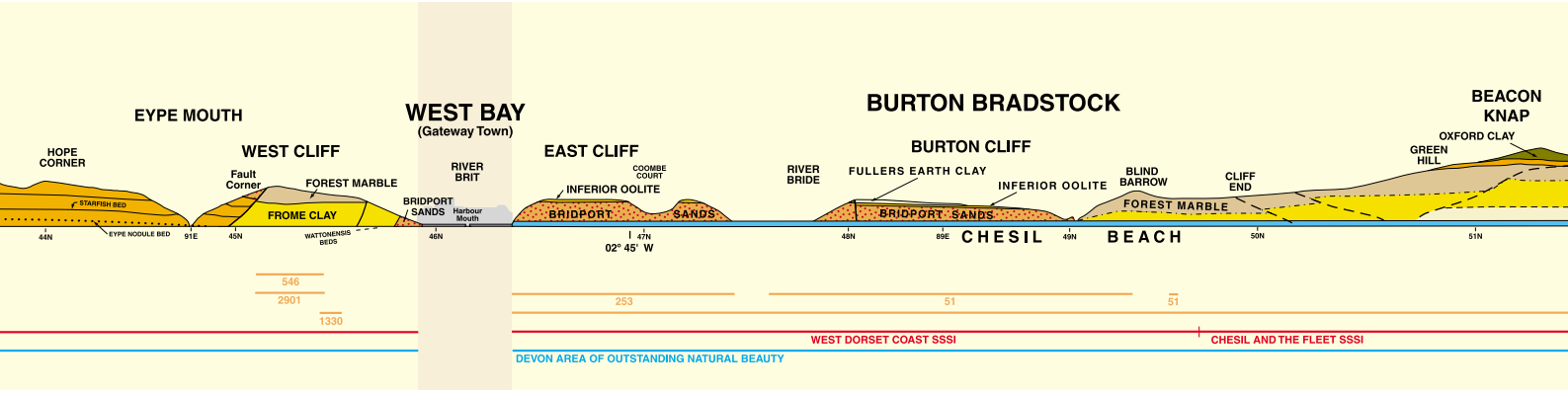
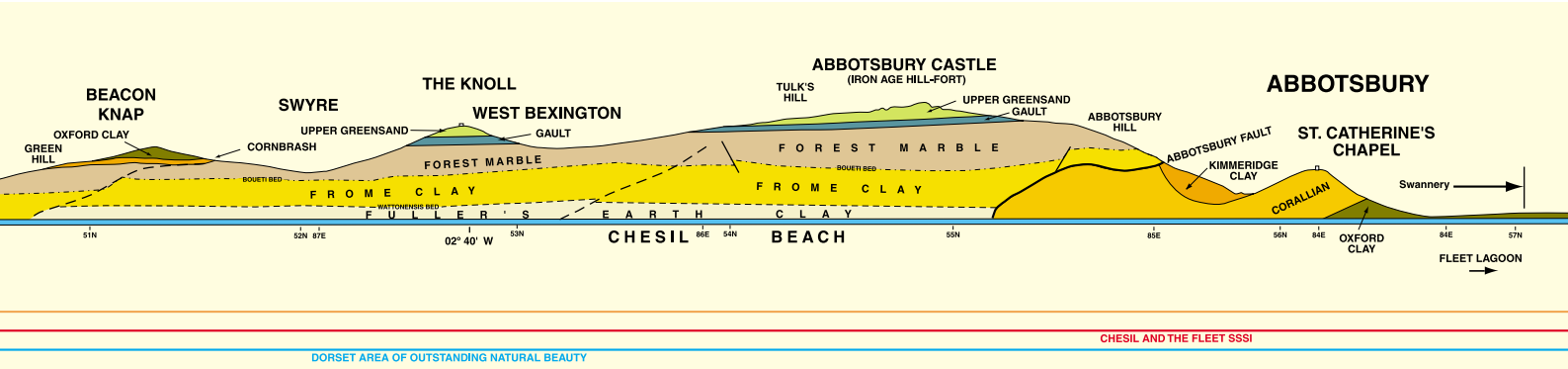
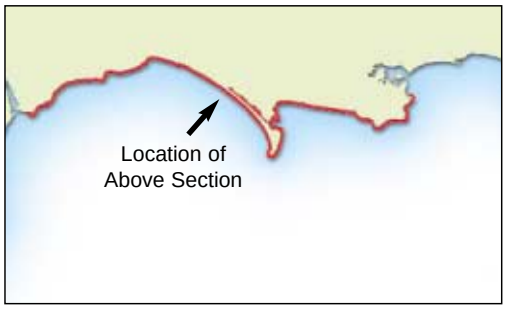


Table 4: Summary of the Lower Jurassic succession within the nominated Site.

Bridport Sand Formation (65-132 m)	Bridport Sands	Best seen between West Bay and Burton Bradstock but also below Thorncombe Beacon. The base of the Aalenian and Middle Jurassic lies in the topmost bed. These microrhythmic sandstones have been much studied at outcrop because they form the middle reservoir of the Wytch Farm Oilfield. The change in age of the sandstones of the upper Lias southward from the Midlands was first documented by Buckman and is an example of diachroneity much quoted in textbooks. Toarcian: Levesquei Zone.
	Down Cliff Clay	Best seen in Down Cliff east of Eype Mouth. Thought to belong to the Toarcian Levesquei Zone.
Beacon Limestone Formation (formerly Junction Bed) (51-128 m)		Best seen immediately east of Eype Mouth. These thin condensed limestones comprise the top unit of cycle J1. They show evidence of contemporary fault movement. The Marlstone includes condensed faunas of the Pliensbachian Spinatum Zone and these pipe down into the beds below. The overlying Junction Bed (sensu stricto) comprises condensed faunas of the Toarcian Falciferum to earliest Levesquei Zones. Dyrham Formation (29-176 m)
Dyrham Formation (29-176 m)	Thorncombe Sands	Best seen below Thorncombe Beacon this unit comprises cross-stratified sands with bioturbated levels. Topmost Pliensbachian.
	Down Cliff Sands	Best seen below Golden Cap and Thorncombe Beacon. These are laminated sandstones with the Starfish Bed yielding the fossil brittle star *Palaeocoma egertoni* at the base. The Margaritatus Stone forms the top unit. Pliensbachian: Margaritatus Zone.
	Eype Clay	Best seen around Eype Mouth. This is a light grey micaceous clay with nodules and the extraordinarily fossiliferous Day's Shell Bed within it, which has yielded about sixty species, mostly of molluscs, close to the top. (Pliensbachian: Margaritatus Zone).
	Three Tiers	Well exposed below Stonebarrow and Golden Cap, this unit comprises three well-cemented levels within a fine-grained sandstone. Pliensbachian.
Charmouth Mudstone Formation (70-280 m)	Green Ammonite Member	Seen below Stonebarrow and Golden Cap, this unit comprises marine shales, which become more silty and less calcareous upwards. Named after the colour of calcite filling ammonite moulds. Pliensbachian: Davoei Zone. Taken as the top unit of the Lower Lias although the topmost bed, Beds 39-41, are referred to the basal Middle Lias, Margaritatus Zone.
	Belemnite Marls	This light grey unit is more calcareous (marly) than the preceding unit. It is characterised by small-scale cyclicity showing as light and dark couplets thought to be due to climatic modifications controlled by precessional orbital changes. The sedimentology and geochemistry of the cycles has been studied in detail. The Belemnite Stone represents the topmost unit. Pliensbachian: Jamesoni and Ibex Zones.
	Black Ven Marls	This unit is best seen in Black Ven and below Stonebarrow. It comprises blue-black mudrocks mostly in the form of calcareous shales with occasional thin limestones and nodules. It is famous for ammonites preserved in translucent yellow calcite. (Late Sinemurian: Turneri-Raricostatum Zones).
	Shales with Beef	This unit is well exposed between Lyme Regis and Charmouth and shows a similar rhythmicity to that of the Blue Lias but the thin limestones are mostly missing and probably replaced diagenetically by fibrous calcite or 'beef'. It is thought to represent a deeper marine facies than the Blue Lias. The unit is also the source of fine fossils, especially reptiles, ammonites and belemnites. (Mid Sinemurian: part of Semicostatum and Turneri Zones).
Blue Lias Formation (40-129 m)		Blue Lias. This unit is well exposed near Lyme Regis. The Triassic/Jurassic boundary is drawn 2.5 metres above the base of this unit which comprises small-scale rhythms of anoxic shale (produced under low oxygen conditions), oxic shale and thin limestones. The limestones are full of neritic and benthic fossils indicating small shallowing-upward rhythms probably resulting from environmental control following orbitally-forced climatic changes. The unit is richly fossiliferous. A level at the top (Saurian Shales) was a major source of fossil reptiles. The limestones were formerly a source of hydraulic cement. The Hettangian Stage is represented by the lower half of the Blue Lias (Planorbis Zone to Angulata Zone) and the Sinemurian commences in Bed 21 with the Bucklandi Zone. Note that the base of the Jurassic still has to be defined by the International Union of Geological Sciences (IUGS).





almost complete skeleton and the remains, including skin, of several immature individuals; some have been found in the last ten years and are currently under study.

Relevant extracts regarding the Geological Conservation Review sites representing the Lower Jurassic, including detailed assessments of the vertebrate fauna (Benton and Spencer, 1995; Dineley and Metcalf, 1999) are provided in Appendix D.

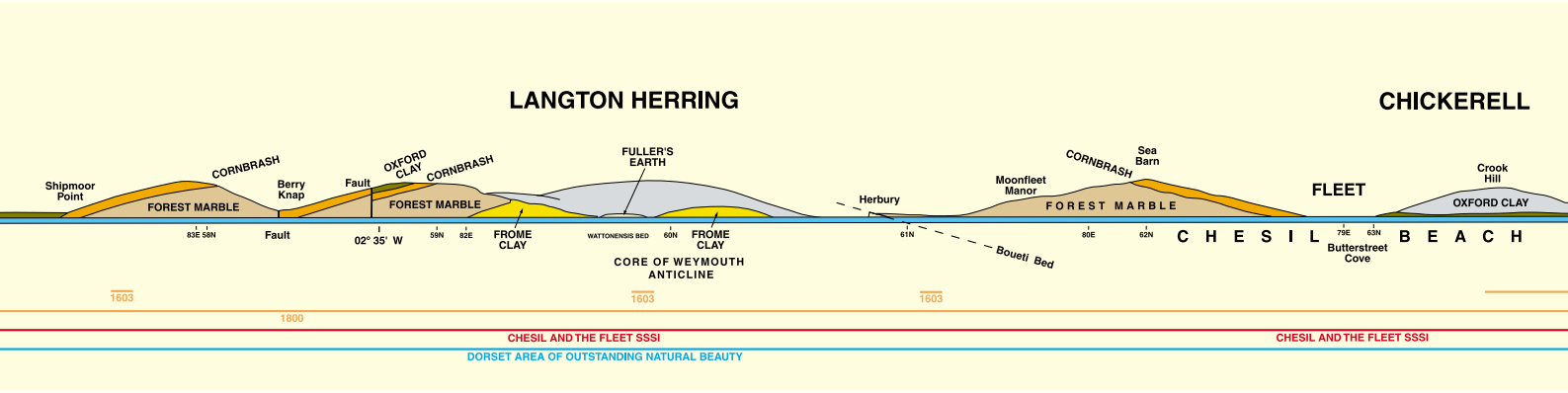
Middle Jurassic

Middle Jurassic rocks crop out within the nominated Site at shore level between Watton Cliff and Tidmoor Point and east of Weymouth below Ham Cliff when shingle levels are low. The basal unit, the Inferior Oolite, forms the top of the second major sedimentary rhythm (J2) of the coastal Jurassic. Mudstones of the Frome Clay indicate deepening of water levels and calcarenites of the Forest Marble correspond to the sand phase of other rhythms; the overlying Cornbrash is a limestone, which ends this third rhythm (J3). Details of the succession are provided in Table 5.

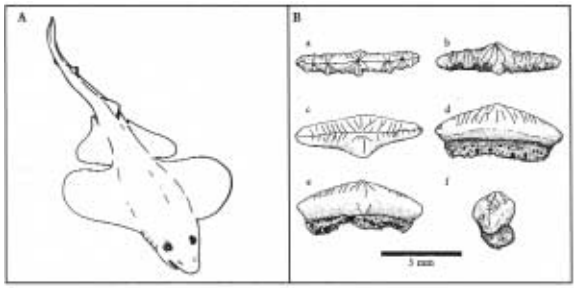
An extremely varied invertebrate fauna includes foraminifera, ostracods, and echinoderms, much of which has been monographed. Especially important is the ammonite sequence, which has provided one of the few near-complete successions from the Aalenian to top Callovian. The succession also provides a regional zonation using brachiopods up to the Upper Cornbrash.

Table 5: Summary of the Middle Jurassic Succession

Kellaways Formation (27-50 m) and Lower Oxford Clay Formation (Peterborough and Stewartby Members) (25-58 m)	The Kellaways Formation and Lower Oxford Clay are poorly exposed along the Fleet shore from East Fleet to near Tidmoor Point. They represent the initiation of the fourth major sedimentary rhythm (J4), which ends with the carbonates of the Corallian Beds (upper Oxfordian). The Oxford Clay (Callovian) is hydrocarbon-rich and has produced fine faunas of marine invertebrates and reptiles. Callovian: upper Macrocephalus to Lamberti Zones.
Cornbrash Formation (8-19 m)	The Cornbrash is exposed at Shipmoor Point, Berry Knap and near East Fleet. This thin limestone comprises a shallow-water facies with abundant brachiopods, bivalves and other fauna. The faunas show a major change within the Cornbrash at which the Bathonian/Callovian boundary is drawn. Lower Cornbrash (Barry Member), Bajocian: Discus Zone: Upper Cornbrash (Fleet member), Callovian: Macrocephalus Zone.
Frome Clay Formation Forest Marble Formation (together 126-232 m)	Discontinuously exposed just west of West Bay, between Burton Bradstock and Abbotsbury Castle, and along the shores of the Fleet. The overlying sequence from the mudstones of the Fuller's Earth through mudstones and calcareous sands of the Forest Marble to the limestones of the Cornbrash represent the third major sedimentary cycle (J3) of the Jurassic and the Bathonian Stage. An example of the latter (The Frome Clay Limestone) forms the uppermost reservoir in the Wytch Farm Oilfield. It includes richly fossiliferous horizons and fossil oyster beds. Bathonian: Zigzag Zone to lower Discus Zone.
Inferior Oolite Formation (2-25 m)	The Inferior Oolite is exposed along the coast on top of the Bridport Sands between West Bay and Burton Bradstock. This thin limestone unit of Aalenian and Bajocian age is a condensed unit but shows a very rich fauna of invertebrate fossils. It is characterised by local unconformities and discontinuities but a remarkably full ammonoid biostratigraphy is known. It is especially famous for the work by Buckman (1860-1929) on the fossil brachiopods and ammonites, both from along the coast and outcrops inland. Buckman used the ammonite sequence to establish a zonation, which can be correlated in many other areas of the world. Following the pioneering studies of Albert Oppel (1831-1865), Buckman's detailed ammonoid work established a new precision, which led to modern chronostratigraphy. Although much criticised in his day, the detailed work of Buckman has been replicated in recent years by Callomon and Chandler and others. The topmost unit of the Bridport Sands and up to the Yellow Conglomerate is assigned to the Aalenian Beds (4-7 at Burton Bradstock), and Beds 8-16c are assigned to the Bajocian.



The Forest Marble channel fills contain a diverse microvertebrate assemblage including remains of fish (bony fish and hybodont sharks), amphibians (frogs, salamanders, albanerpetonids), small reptiles (turtles, lizards, rhynchocephalians), crocodiles (marine teleosaurs and freshwater goniopholids), dinosaurs (theropods and ornithischians), pterosaurs and mammals. The Lower Oxford Clay yields abundant remains of macrovertebrates but large specimens are rare. Relevant extracts regarding the Geological Conservation Review sites representing the Middle Jurassic, including detailed assessments of the vertebrate fauna (Benton and Spencer, 1995; Dineley and Metcalf, 1999) are provided in Appendix D.

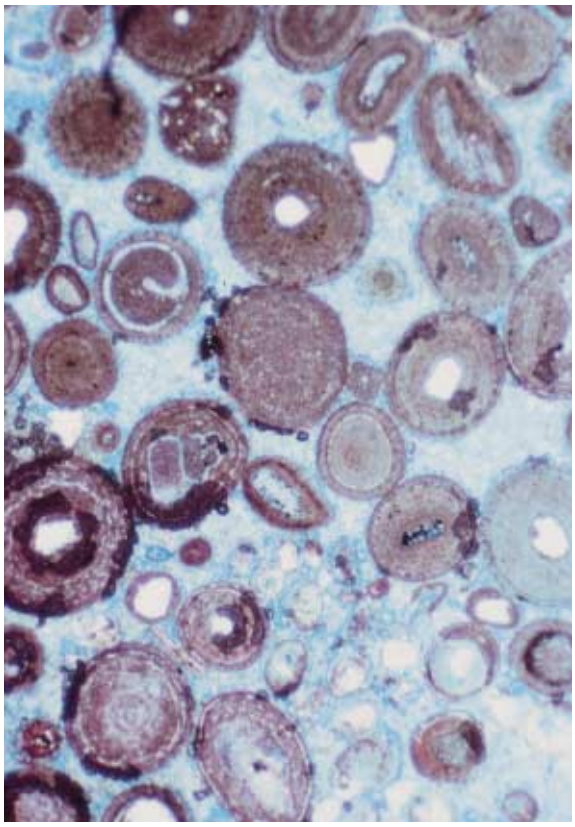


Elasmobranchs from the Bathonian including a restoration of the ray *Protospinax* and a range of teeth from *Lissodus* recovered by sieving specimens and collecting individual teeth under a microscope. Renewed research is likely to extend such microvertebrate interest in the Dorset coast exposures.

Upper Jurassic

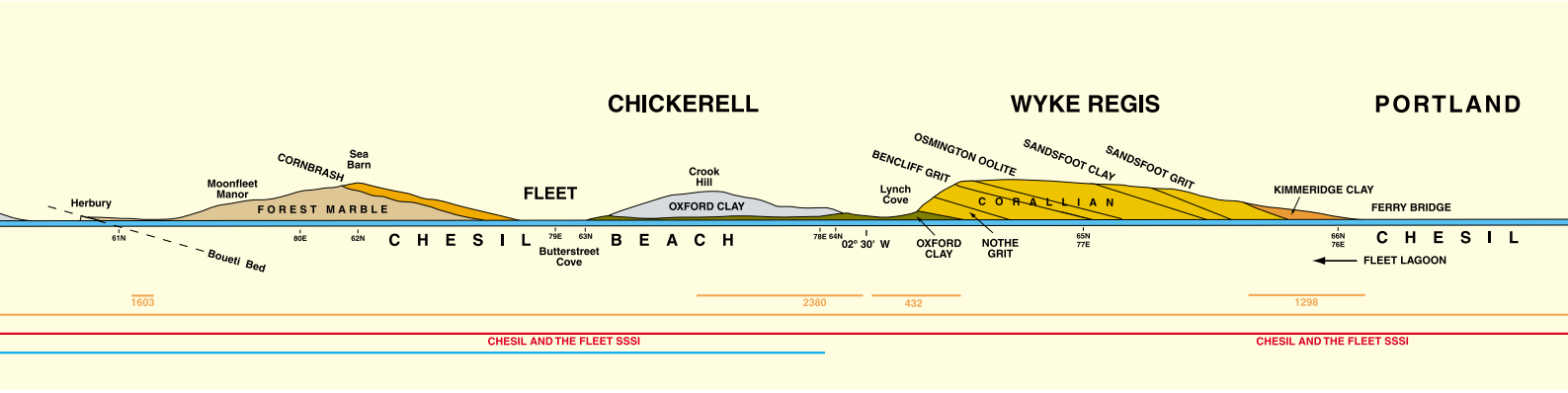
The Upper Jurassic is represented within the nominated Site by a well-exposed series of strata, which are seen on the coasts of Portland and Purbeck, and on the shores of Portland Harbour and the Fleet. Details of the succession are provided in Table 6 (page 61).

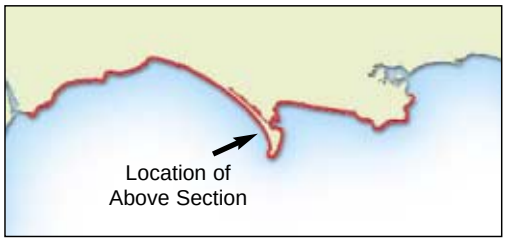
The Oxfordian Stage is represented by a succession of shallow-marine interbedded sandstones, mudstones and limestones. These lithologies comprise the Weymouth Member of the Oxford Clay Formation and the Corallian Group. The succession shows lateral variability between its various exposures along the banks of the Fleet lagoon, at Western Ledges and Nothe Fort in Weymouth, and at Black Head and Bran Point near Osmington. These Oxfordian strata are particularly notable because of their mixture of lithologies.

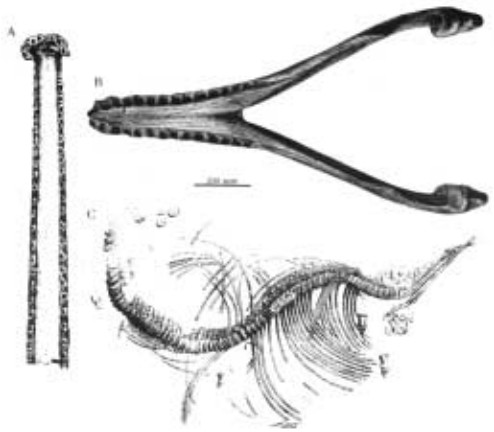


A thin section of the Osmington Oolite, an Oxfordian limestone. The rock is made of spherical 'ooliths', which in this section can be seen formed around snail shell fragments and quartz grains. Magnification: x30.

Oxfordian invertebrate faunas are well documented. Microfossils, including foraminifera, ostracods, calcareous nannofossils and palynomorphs, are described in a field guide (Lord and Bown, 1987). There have been many specific contributions, for example, by Whatley (1964) on ostracods. Especially important are the Mollusca: there are classic monographs by Arkell on the bivalves (1929-1937) and the ammonites (1935-48). Contributions on the Oxford Clay ammonites have been made by Arkell (1947) and Chapman (1998, 2000); there is also a review by Callomon and Cope (1995) and significant contributions by Wright (1986a, 1986b, 1998). This demonstrates the Dorset and East Devon Coast as being of major importance in the establishment of ammonite chronostratigraphy. The nominated Site is one of the finest in Europe for the study of trace fossils, especially within the Corallian sequences east of Weymouth, and has been well-documented by Fürsich (1973, 1974, 1975, 1976, 1977). The varied lithologies and their associated facies faunas within this unit have been used to interpret the environmental fluctuations represented (Sun, 1989; Coe, 1995; de Wet, 1998 and Newell, 2000).





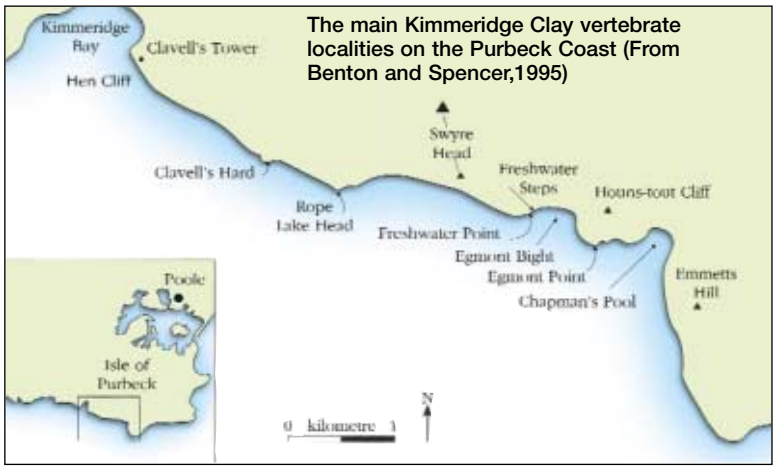


Kimmeridgian reptiles from Kimmeridge Bay. A: The snout of the crocodile *Steneosaurus megarhinus*, B: the lower jaw of the plesiosaur *Colymbosaurus trochanterius* and C: the ichthyosaur *Nannopterygius enthekiodon*. From Benton and Spencer (1995).

Furzy Cliff, at Overcombe to the north of Weymouth, is one of only three early Oxfordian sites in the UK. It has produced the only known specimen of the theropod dinosaur *Metriacanthosaurus parkeri* (Huene, 1923). Ichthyosaur and plesiosaur remains are also recorded. This is one of the few significant vertebrate sites of early Oxfordian age world-wide and hence the fossils, although few in number, fill an important gap in chronology (Benton and Spencer, 1995). A beautifully preserved ammonite fauna includes unique occurrences of representatives of the perisphinctids (Wright, 1986b).

The Kimmeridge Clay is divided into the Lower Kimmeridge Clay of Kimmeridgian age, and Upper Kimmeridge Clay of Lower Tithonian (=Bolonian) age. Vertebrate faunas are known from Smallmouth, Kimmeridge Bay and Encombe Bay. These localities have yielded a fish fauna of more than eighteen species, of which seven are teleosts; and a number of species are unique to Dorset. The material is very well preserved and new finds continue to be made. The world-renowned reptile faunas include marine crocodiles, turtles, and finely-preserved ichthyosaurs and plesiosaurs at Weymouth and on the Kimmeridge coast. Pterosaurs and dinosaurs also occur, the latter including isolated bones, and partial remains of a sauropod species. Although many of the taxa are represented at other localities, the quality of the preservation of much of the Dorset material is exceptional and the fauna includes numerous holotype specimens. Material is being collected on a regular basis and, in keeping with the history of the area, responsible amateur collectors hold important collections (Etches and Clarke, 1999). Recently collected and described material has included *Colymbosaurus* from the Kimmeridge Clay on the east side of the Isle of Portland, *Kimmerosaurus*, an unusual and possible filter- or sieve-feeding plesiosaur (Brown, 1981), and a magnificent partial specimen of *Grendelius mordax* McGowan, 1976, hitherto known only from isolated fins which is possibly conspecific with *Brachypterygius extremus* (McGowan, 1997). Detailed statements on the interest of the nominated Site are included in Benton and Spencer (1995) and Dineley and Metcalf (1999).

The Kimmeridgian invertebrate faunas of the nominated Site reflect the post-Oxfordian deepening events in what is the local Lower Kimmeridge Clay. Microfossils have been described by Lord and Bown (1987). Because of the frequent crushed preservation of bivalves and gastropods much taxonomic work is still needed, but they have played an important part in the interpretation of the environment of formation of the microrhythmic succession (Oschmann, 1988). For ammonites the Weymouth area is the classic ground of fundamental work by Salfeld (1915) updated and revised by Ziegler (1962)



The main Kimmeridge Clay vertebrate localities on the Purbeck Coast (From Benton and Spencer,1995)

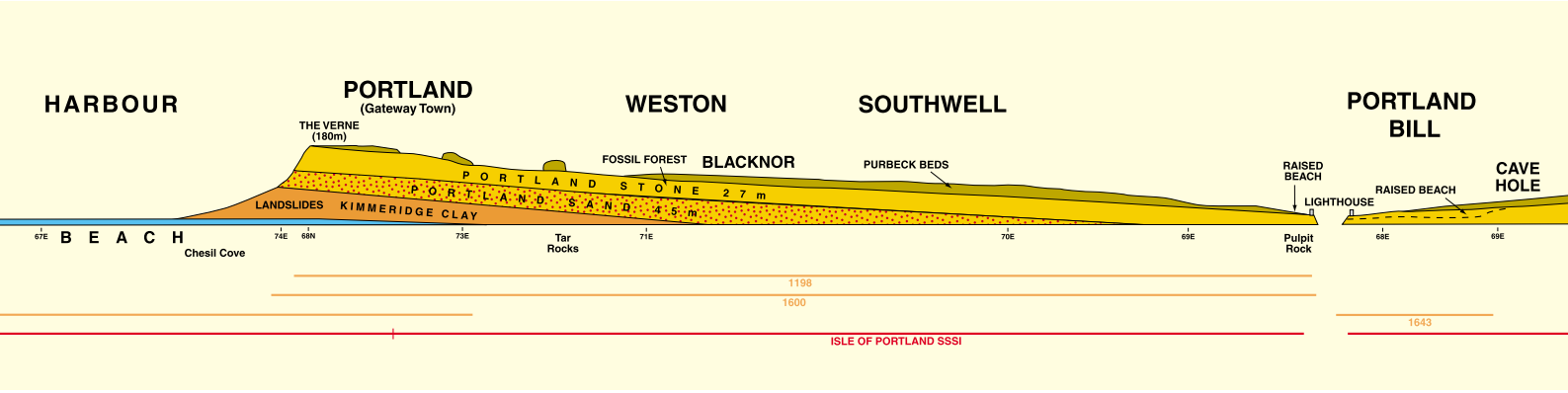
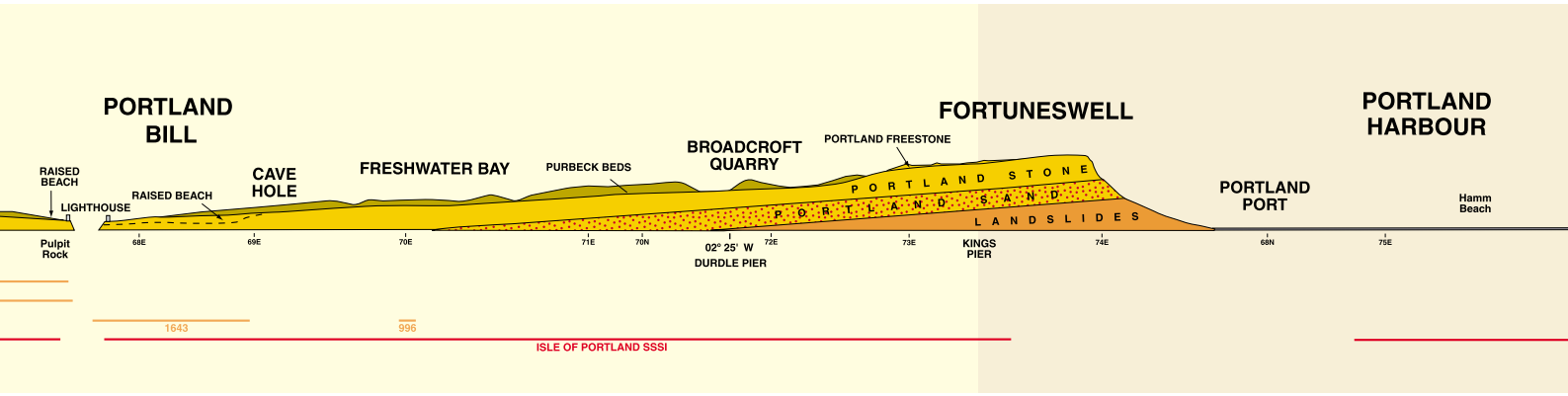


Table 6: Summary of the Upper Jurassic succession within the nominated Site

Purbeck Group (basal part) (c. 10-15 m)	The Jurassic/Cretaceous boundary has still to be defined by the International Union of Geological Sciences (IUGS) but it appears likely that it may be drawn near the base of the Grandis Zone in southern France. From dinocyst, charophyte and magnetostratigraphic evidence, this lies in the early part of the Purbeck Beds within the Cypris Freestone Member of the Dorset Coast. Thus the famous Dirt Bed levels, the Fossil Forest and Broken Beds localities of the Isles of Portland and Purbeck would then fall in the Jurassic.
Portland Group (37-87 m)	The Portland Sand and Portland Limestone formations represent the final shallowing on the last major sedimentary rhythm of the Dorset Jurassic (J5) which commenced with the deeper facies of the Oxford Clay; in the overlying Purbeck Group lacustrine and non-marine environments are finally developed. Well-exposed on the Isle of Portland and in Purbeck, the area was recognised as a key area in earliest days of investigation and in 1829 Brongniart coined the term Portlandian by which rocks of this age have been known internationally. The excellent Portland Stone has been quarried and exported nationally and internationally for over three centuries.
	The Portland Sand comprises impure siltstones and with oyster beds grading up from the Kimmeridge Clay below; levels are full of rhaxellid sponges. It contains an important ammonite fauna, which provides the last link with Russian faunas before restriction of the Boreal seas. The overlying Portland Limestone has a lower unit full of cherty levels and a Basal Shell Bed, which has yielded rich bivalve and gastropod faunas. The Portland Freestone above is the famous building stone of shelly limestones and oolitic levels with local stromatoporoid occurrences. The giant ammonite faunas have been described at least since 1668; the biostratigraphy has been well described (Wimbledon and Cope, 1978)
Kimmeridge Clay Formation (245-465 m)	The Kimmeridge Clay is represented in Dorset by a succession of mudrocks of variable organic carbon content, together with minor amounts of carbonate, siltstone, fine-grained sandstone and ironstone. The formation is remarkable in that it has some very high total organic carbon values averaging around 10 per cent but reaching up to about 60 per cent. In contrast most mudrocks have a total organic carbon content of 0-2 per cent. The individual mudrock beds of variable organic carbon content are generally tens of centimetres thick and reflect the changing chemical, physical and biological conditions in seawater at that time. The beds contain an abundant well-preserved fauna of mainly ammonites, bivalves, gastropods and vertebrates. It is the standard section for the Boreal Lower Tithonian (=Bolonian) ammonite zones and is probably the only section world wide with good exposure of the Rotunda and Fittoni Zones. Recent work on samples from the Kimmeridge Clay Formation in Dorset presents the only radiometric date for the marine Tithonian world-wide. The Eudoxus to Fittoni Zones are exposed uninterrupted between Brandy Bay and Chapman's Pool. Further sections, particularly of the lowermost zones, occur at Ringstead Bay, Osmington Mills, Black Head and West Weare Cliffs on the Isle of Portland.
Corallian Group (31-110 m)	The deeper water facies of the Oxford Clay give way to shallower-water facies of sandstones, limestones and oolites in the Corallian Beds, the former name of this unit. Excellent examples of a variety of trace fossils can be found in many of the sandstone and limestone units. One of the sandstone units (the Bencliff Grit Member) shows an uncommonly preserved sedimentary structure termed swaley cross-stratification. This is one of the best exposures of such structures in western Europe. The Bencliff Grit Member contains mature hydrocarbons at the western end of the Bran Point exposure. This represents a dissected hydrocarbon reservoir: the hydrocarbons are most likely from the Lower Lias, similar to the nearby producing Wytch Farm and Kimmeridge Bay oil fields. In the middle of the Oxfordian succession there is an oolitic grainstone. The overlying Clavellata Member has a beautifully preserved ammonite/bivalve fauna. The Sandsfoot Grit Member and overlying Ringstead Waxy Clay probably represent a beach barrier complex and associated lagoonal facies. The top of the Corallian Group and base of the Kimmeridge Clay Formation contain a complex succession of very condensed beds with a rich, well-preserved fauna.
Upper Oxford Clay Formation (87-140 m)	The boundary between the Callovian and Oxfordian Stages is well exposed on the coast at Ham Cliff and is well-known for its ammonite faunas and contribution to Oxfordian biostratigraphy. Important individual features include the well-preserved aragonitic ammonites and nodule beds. In particular the Red Nodule Bed exposed at Furzy Cliff is associated with a beautifully preserved three dimensional ammonites and bivalves. The Dorset Oxfordian sections have contributed to significant publications and ongoing work in many fields.



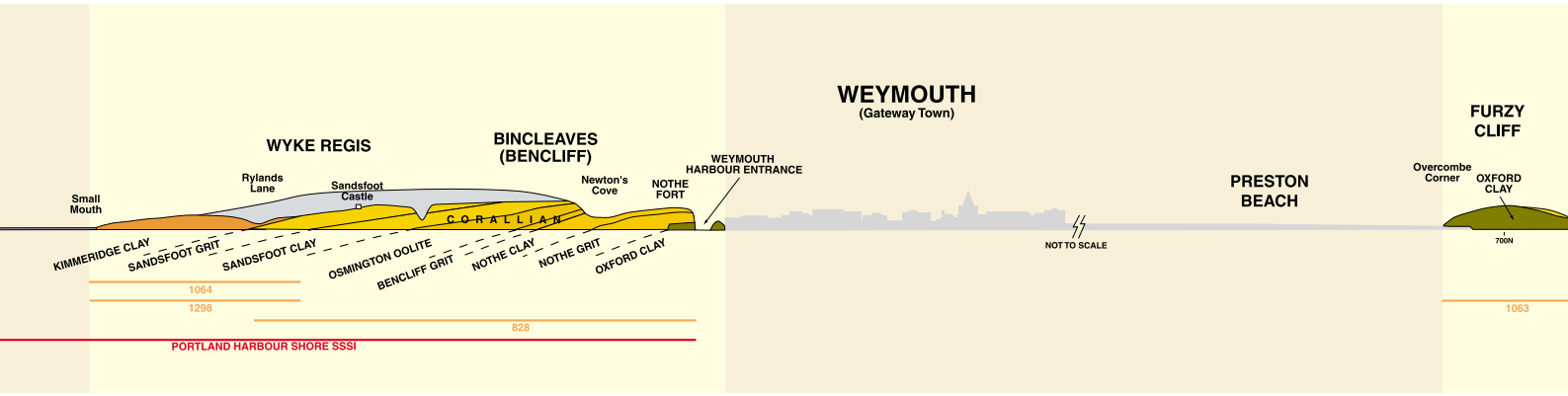
View over Chesil into Portland Harbour, and the bridge over the mouth of the Fleet at Ferrybridge. The nominated Site includes the low cliffs on the edge of the harbour to the north of this point, which have produced a rich and unique vertebrate fossil fauna from the Lower Kimmeridge Clay.

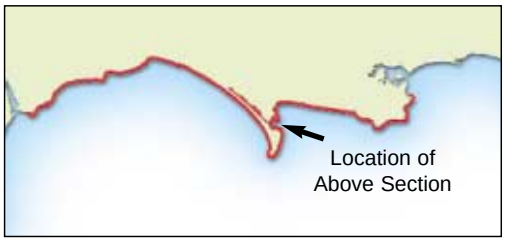
through whose work the section at Black Head has been termed the standard succession for the base of the stage. Others have added more recent information, especially Brookfield (1978) and Callomon and Cope (1995). The Upper Kimmeridge Clay (of Lower Tithonian/Bolonian age) is exposed in the classic sections around Kimmeridge, which partly continue the microrhythmic facies of the Lower Kimmeridge Clay. Again Lord and Bown (1987) have described the foraminifera, ostracods, calcareous nannofossils and palynomorphs and there have been several specific monographs on the ostracods (Kilyeni, 1978), palynomorphs (Downie, 1957; Mebradu, 1978a, b; Waterhouse, 1999), nannofossils (Medd, 1982), coccoliths (Gallois and Medd, 1979), foraminifera (Lloyd, 1959, 1962) and others. Some invertebrates are figured in Etches and Clarke (1999). This succession is part of the palaeoenvironmental study of Oschmann (1988). Following earlier studies by Spath and Arkell there have been significant contributions to ammonoid taxonomy and biostratigraphy by Cope (1967, 1974, 1978) and the biostratigraphy is updated by Callomon and Cope (1995).

The later Tithonian is represented within the nominated Site by the Portland Group and lowest Purbeck Formation, which document the environmental change to shallower-water siltstones and then, successively marine carbonates and fresh-water carbonates in the lowest Purbeck Formation. The Portland Group (Portland Sand and Portland Limestone) is magnificently exposed in the coastal sections of the Isle of Portland and on the coast of Purbeck between Durdle Door and Durlston. These sections are considered within the Geological Conservation Review to be of international importance for biostratigraphic studies, palaeontology and facies analysis.

The Portland Limestone exhibits a range of sedimentological features including cross-bedding and numerous patch reefs that enable a palaeogeographic reconstruction of the area to be made. On the Isle of Portland, this part of the succession has yielded skeletons and individual bones of plesiosaurs and ichthyosaurs. Many were collected in the nineteenth century, but there have been some important finds in recent years. The fauna includes type specimens of five species of reptile, and has been assessed as the best source of marine Portlandian reptiles in the world (Benton and Spencer, 1995). The coastal exposures included within the nominated Site are representative of the succession visible elsewhere on the Island in historic and active quarries. Environmental change at this time was accompanied by significant changes in the fossil invertebrate faunas. Microfossils have been broadly described by Lord and Bown (1986) and include foraminifera, calcareous nannofossils and ostracods.

Fossil ripples within the Purbeck Beds high on the West Weares, Isle of Portland. The processes that formed these sedimentary features are the same as those seen in the marine environment today.





Rhaxellid sponges are abundant in the lower parts (Haslett, 1992; House, 1993). The classic shelly fauna of the Portland Basal Shell Bed was monographed by Cox (1925) who later reviewed the whole Portlandian fauna (Cox 1929-30). Following the early work of Buckman the ammonite succession has been studied and a new biostratigraphy established (Wimbledon and Cope, 1978) and subsequently reviewed (Callomon and Cope 1995). The Portlandian ammonites of the nominated Site provide a unique record of the evolution of a group of pavloviid ammonites, often reaching diameters approaching one metre. These spectacular fossils are abundant at some of the exposed horizons. Biostratigraphic work has shown that the youngest Anguiformis Zone is unknown outside of Dorset (Wimbledon and Cope, 1978), but its uppermost part may correlate with the basal beds of a condensed marine Jurassic-Cretaceous boundary sequence in East Anglia (Cope, 1980b).

The Upper Jurassic fossil forests found within the Purbeck Group on Portland and Purbeck are unique and internationally important features, which are described in detail in the following section along with the greater part of the Purbeck Group, which is of Cretaceous Age.

Relevant extracts regarding the Geological Conservation Review sites representing the Upper Jurassic, including extracts from Benton and Spencer, 1995 are included in Appendix D.

THE CRETACEOUS (INCLUDING THE WHOLE OF THE PURBECK GROUP)

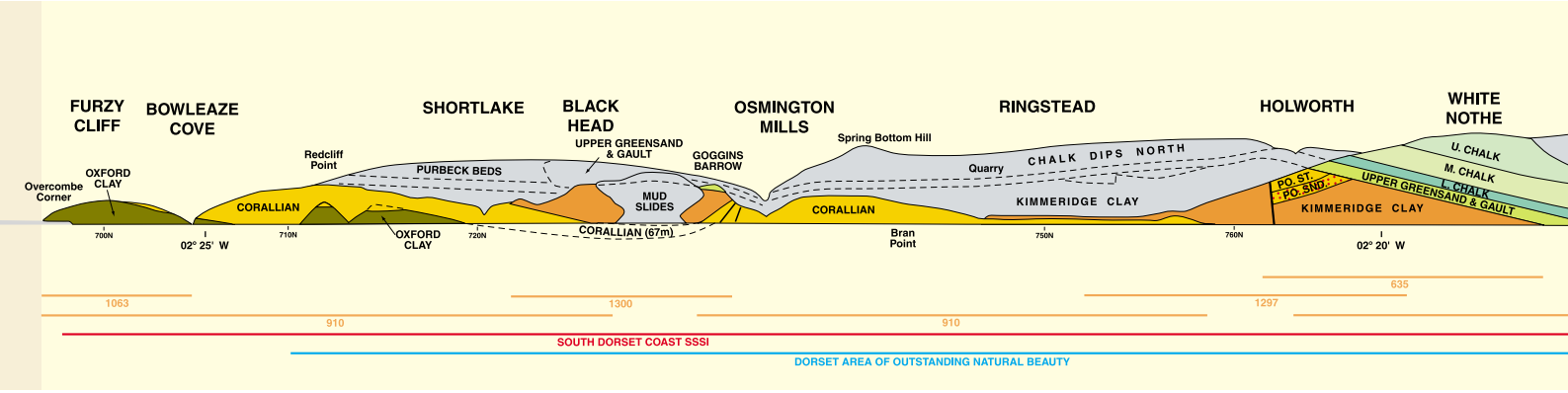
The Jurassic-Cretaceous boundary has yet to be defined internationally, but in Dorset is likely to be near the base of the Purbeck Group. For convenience, the whole of the Purbeck Group is described in this section, together with the overlying Wealden, Lower Greensand, Gault, Upper Greensand and Chalk. Together, the Cretaceous succession represents a very good continuous record of this period of the Earth's history; although thicker sequences of the post-Wealden rocks are known from elsewhere, all stages of the Cretaceous are represented with the exception of the uppermost part of the Campanian, and the Maestrichtian which are of youngest Cretaceous age.

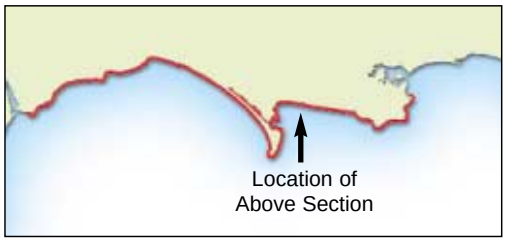
An electron micrograph of the charophyte algae *Globator protoincrassatus* from Durlston Bay. These microfossils are important diagnostic stratigraphic markers.

Purbeck Group

There are many excellent exposures of the Purbeck Group within the nominated Site. The best-known section is at Durlston Bay and the geology here has been much studied since it was first described by Thomas Webster in 1816. This classic Purbeck section of lagoonal and lacustrine limestones alternating with shales and marls is the thickest exposed within the nominated Site.

The Purbeck Group consists mainly of fossiliferous thin-bedded limestone and mudstone. It has long been recognised as a distinctive unit, and it differs obviously from the massive Portland limestone beneath not only by the thin-bedding but also by the generally non-marine fauna, rarity of thick-shelled molluscs and absence of ammonites. The lagoonal and lacustrine fauna with vertebrates of continental origin contrasts with the marine faunas of the underlying rocks. The separation from the non-marine clastic Wealden Group above is lithological. Up to 246 numbered beds have been described in some detail, and five geological members can be mapped in the field. Many are named and the ostracod and gastropod content of each is known. Petrographic, magnetostratigraphic, geochemical and clay mineralogical data exist for large parts of the succession.

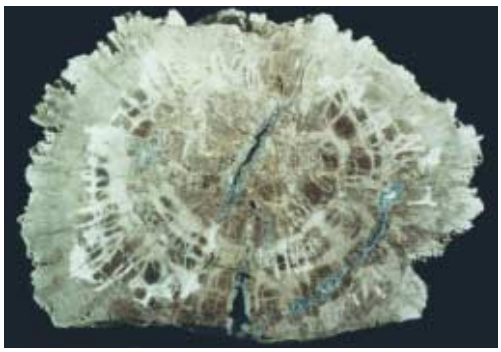




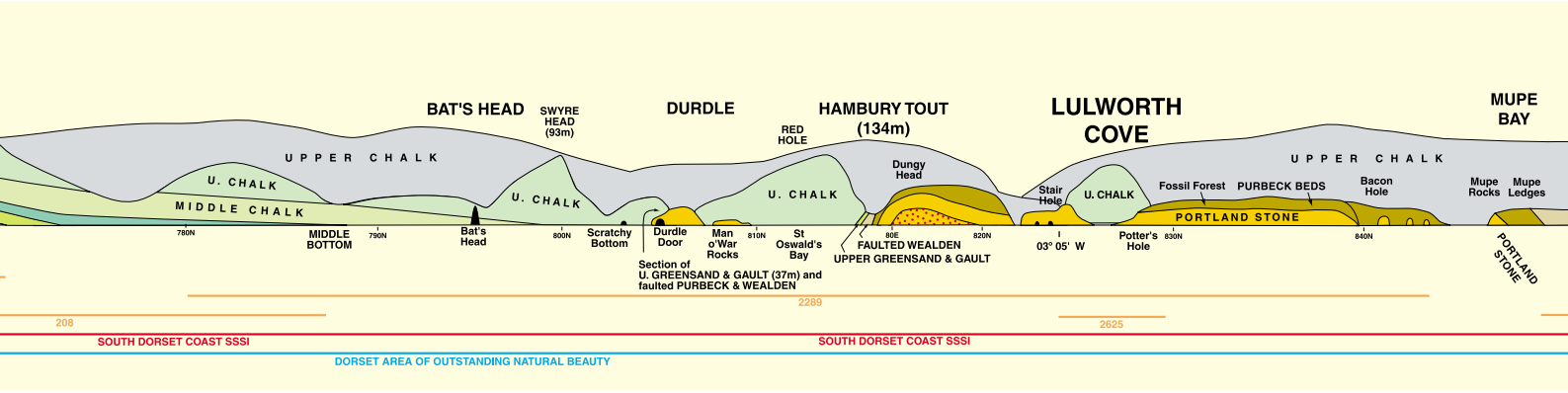
The basal part of the Group is Jurassic (Portlandian/Upper Tithonian) and the greater part Lower Cretaceous (Berriasian/Ryazanian). Its deposits are a consequence of a major regression towards the end of the Jurassic Period, seen in the transition from the relatively deep marine Kimmeridge Clay, through the Portland Sand to the shoal oolites of the Portland Stone, to the Purbeck Group. These deposits are a record of an extensive, shallow area of carbonate sand in warm Mediterranean climatic conditions, which became isolated from the open sea. The lagoonal environment was so shallow that the floor was frequently exposed, producing desiccation cracks and preserving dinosaur footprints (e.g. Ensom, 1995). At times the surface had a salt crust in the dry summer, often trapping insects and plant debris; at other times more prolonged exposure resulted in the formation of palaeosols, the Purbeck Dirt Beds. Coniferous trees growing in these were 'pickled' in hypersaline brine and then silicified to form the Fossil Forest described in more detail below. Water depths were rarely more than about one metre, so that thin beds were formed by the filling of the lagoon and the next phase of exposure. There have been many rapid salinity fluctuations, which are not readily interpreted, but have some relationship to the rapid lithological changes. Superimposed on this is, however, a progressive change from strata of hypersaline origin with evaporites in the lower part, to alternating freshwater, brackish and marine strata in the middle part, to dominantly freshwater strata with an influx of land-derived clastics and iron in the upper part. Shell-beds accumulated in the shallow water at some times, and these form the main building stones from the Purbeck group. At other times there were stromatolites, evaporites and clay sediments. Freshwater environments occurred when restriction from the sea was greatest, preserving freshwater molluscs, ostracods and charophyte algae. Small crocodiles, dinosaurs and early mammals lived on adjacent land areas and their remains are also found in the sediments (West, 1999 contribution to nomination).

The succession contains important microfossil remains. Ostracods are common throughout and have been used to determine palaeosalinities (Batten, 1982). Charophyte algae occur in low salinity beds. These freshwater algae are very useful for dating non-marine sediments. The exposures at Swanage and Durlston Bay have yielded many beautiful specimens, and provide the type-locality of several species, including *Perimneste horrida* and *Flabellochara grovesii* (Harris, 1939). The charophyte succession in Dorset, together with that in the Weald of SE England (Feist, Lake and Wood, 1995)) provides a global reference sequence, forming an important part of the standard charophyte biozonation of the Mesozoic-Cenozoic of Europe (Riveline et al. 1996). Evaporites, including gypsum and celestite, are common in the lower part of the Group and have been studied in detail (e.g. West, 1964, 1975, 1979). Some similar features in the basal Purbeck Formation can be seen at many localities in the northern part of Portland.

The unique remains of ancient forests within the Purbeck Group are superb and internationally significant. They are well exposed within cliff and quarry localities on Portland and on cliff ledges to the east of Lulworth Cove. These exposures record evidence of a forest that grew on the margins a hypersaline lagoon 140 million years ago. They record the nature of tree types at a time when conifers dominated world vegetation, before the evolution of the flowering plants. Fossil wood from tree trunks and branches is preserved within the soils in which they grew and in surrounding limestones. The fossil remains indicate that the trees were more than 10 m in height and over 1 m in diameter at the base (Francis, 1983a). The wood itself is now petrified by silica, but microscopic details of the wood anatomy are still preserved and can be used to identify the tree types. Growth rings



Section through a fossil tree-trunk from the fossil forest on Portland showing tree rings and wood structure.



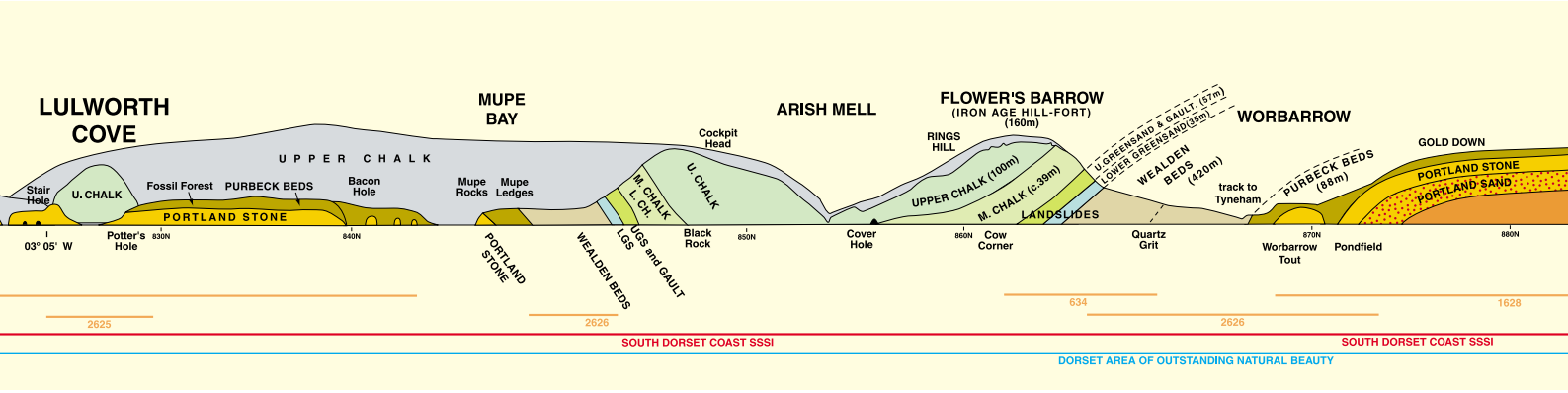
in the wood are also preserved and analysis has revealed a picture of a very seasonal climate, much like the present Mediterranean, with hot, dry summers and cool, wet winters (Francis, 1984). The number of rings shows that these trees lived for hundreds of years. The most common trees in the forests were of araucarian (Monkey-puzzle types) and cupressus (Cypress and Juniper types) affinities. They had tough, scale-like leaves and were well adapted to growing in the much warmer, drier environments that prevailed in Purbeck times. The fossil stems of cycadophytes are also preserved in these strata. Fossil leaves and pollen are preserved within the fossil soils, enabling a detailed picture of the forest flora to be reconstructed.

The finely-preserved fossil soils of the Purbeck Group formed on carbonate sediments on the shores of a lagoon (Francis, 1986). The most striking is the Great Dirt Bed, which appears as an earthy-looking, dark, organic-rich clay containing tree roots and large pebbles of limestone. It was in this soil that the greatest forest grew. There are also other fossil soil horizons in this rock sequence. This part of the succession also contains layers of algal limestones that occur between the fossil soils and forest beds. They exhibit unusual layered mound structures, formed by rhythmic algal growth around the bases of the living and fallen trees. Many of these algal 'burrs' have central holes in which can be found fossilised tree stumps, and they are important because they can be used to determine the original density of trees in the forests.

An extract from William Buckland's note book from c. 1836. The note reads: *'Section midway down the cliff 1 furlong E. of Lulworth Cove. There are tree stumps in the actual place on which they grew ….'*

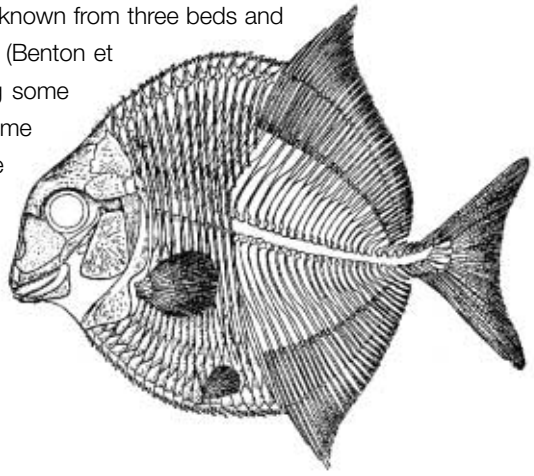
Insects found in the rocks of Purbeck Group represent an internationally important and highly diverse collection of unique species. The fossils are very rare, from unusual environments. The state of preservation varies from exposure to exposure but some are so perfectly preserved as to be aesthetically outstanding. Durlston Bay has yielded about 3,000 specimens. Important historical collections, made during in the middle years of the nineteenth century, are housed at the Natural History Museum, London, and the Sedgwick Museum, Cambridge. So far about 150 species belonging to fifteen orders have been named but many more species await description. Specimens are actively being studied by scientists here and abroad, particularly at the Palaeontological Institute, Moscow. Fossil insects from the Early Cretaceous are important because this period of time saw the largest upheaval in the Mesozoic insect fauna, with the highest origination of new families, most of which are extant, and also the highest extinction of families (thirty-one per cent of all the Early Cretaceous families). The Purbeck insects from Dorset are important because they give a good indication of the diversity of the insect fauna just before the angiosperm radiation (Ross, 1999 contribution to nomination). Key references include Jarzembowski (1993) Clifford et al (1994), Coram et al (1995) and Coram and Jarzembowski (1998).

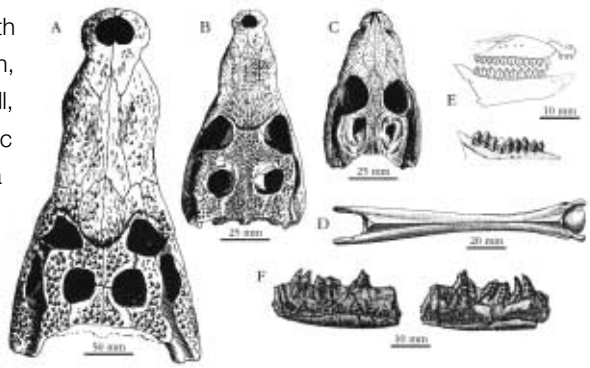
The vertebrate fossils of the Purbeck Group of Dorset are of exceptional international importance. Taken as a whole, the vertebrate fauna includes 100 valid named species, possibly unique at any Mesozoic fossil locality (Ensom, 1999 contribution to nomination).



Fish remains (monographed by A. S. Woodward, 1916 – 19) are common and locally are exceptionally well preserved. They include about thirty species, of which at least four are hybodont sharks, nine are early teleosts, and there is at least one small coelacanth. This is regarded as one of the most important late Jurassic fish localities in the World (Dineley and Metcalf, 1999). The strata exposed within the nominated Site also contain one of the richest known mid-Mesozoic tetrapod assemblages (Howse and Milner 1995). It includes amphibians (primarily from sites just inland from the coast), reptiles including turtles, crocodiles, lizards and dinosaurs (many monographed by Sir Richard Owen in the second half of the nineteenth century) with associated trackways and mammals (monographed by Owen, 1871). The reptile fauna of Durlston Bay has been reviewed in detail by Benton and Spencer (1995). The fauna is large and diverse, representing thirty-six different species and including twenty-nine type specimens. It comprises abundant lizards, turtles, crocodilians, pterosaurs and dinosaurs. Most of the reptiles have been obtained from natural cliff exposures, although some remains, especially the turtles, came from now-abandoned underground quarries. Dinosaur tracks are preserved on numerous horizons at Worbarrow Tout and in Durlston Bay.

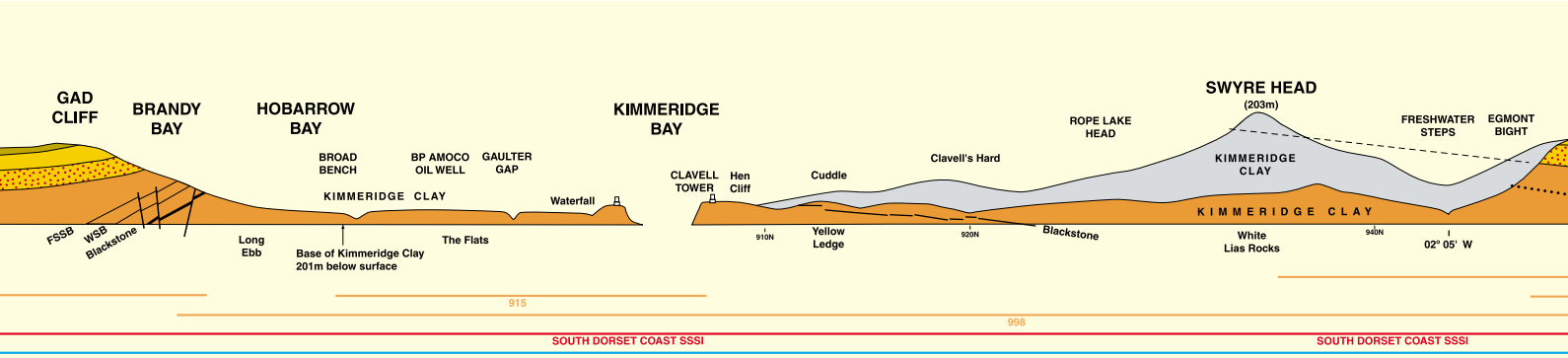
The earliest mammal finds within the Purbeck Group were from workings opened on the cliff of Durlston Bay by Samuel Beckles in the 1850s. The mammalian fauna at Durlston is now known from three beds and the fauna of nineteen named species is extremely diverse for the Mesozoic (Benton et al, 2000). It has been the subject of numerous descriptive works including some major monographs (e.g. Owen, 1854, 1859, 1871; Simpson, 1928) and some recent revisions (Kielan-Jaworowska and Ensom, 1992). The extensive eroding cliff exposures will undoubtedly continue to produce new specimens. The importance of Purbeck is also being extended through the discovery of new productive localities some of which are near, but not on the coast (e.g. Ensom et al, 1994). Recent discoveries include reptile eggshell from one coastal, and one nearby inland site and an important microvertebrate horizon (Ensom, 1997 and in press). The studies of the new vertebrate material, though incomplete, have already doubled the known fauna of the Purbeck Group. The fauna includes the oldest 'higher' (fully tribosphenic) mammal from Laurasia (Sigogneau-Russell and Ensom, 1994), and taxa with significant biogeographic links to North America, Africa and elsewhere (Kielan-Jaworowska and Ensom, 1994; Sigogneau-Russell and Ensom, 1998; Sigogneau-Russell, 1999; Ensom and Sigogneau-Russell, 1998). The substantial historic record of the vertebrate fauna has recently been reviewed at a Symposium held in March 1999 in Dorset and a collection of papers will soon be published by the Palaeontological Association.





A selection of vertebrate fossils from the Middle Purbeck Beds of Durlston Bay including the fish *Proscinates radiatus* and a selection of crocodile skulls together with pterosaur and dinosaur remains.

In its totality, the Purbeck fauna from the nominated Site is particularly valuable because of the certainty that the animals found were living together at the same time, and because of the very rich associated remains of trace fossils, egg shells and coprolites, which together with the superb preservation of sedimentary features give



the potential to provide palaeobiological data as well as taxonomic. Nowhere else is there the same potential to describe a Jurassic-Cretaceous boundary continental fauna without recourse to geographical or stratigraphic approximations (Ensom, 1999 contribution to nomination).

Wealden Group

The Wealden Group, of early Cretaceous age, comprises a succession of mudstones and sandstones laid down in non-marine (fluvial) environments. Exposures of Wealden strata are of international interest because they provide data on terrestrial environments during the early Cretaceous, a time of major environmental change. The Wealden exposures within the nominated Site are the most stratigraphically extended succession seen within Europe at a single locality. The formation is exceptionally thick, up to 600m at Swanage, and thins rapidly to zero west of Lulworth Cove. At Mupe Bay there is a critical exposure in the basal Wealden Group that provides evidence for the timing and migration of oil in the Wessex Basin and which has received considerable attention in the scientific literature (Hesselbo, 1999 contribution to nomination).

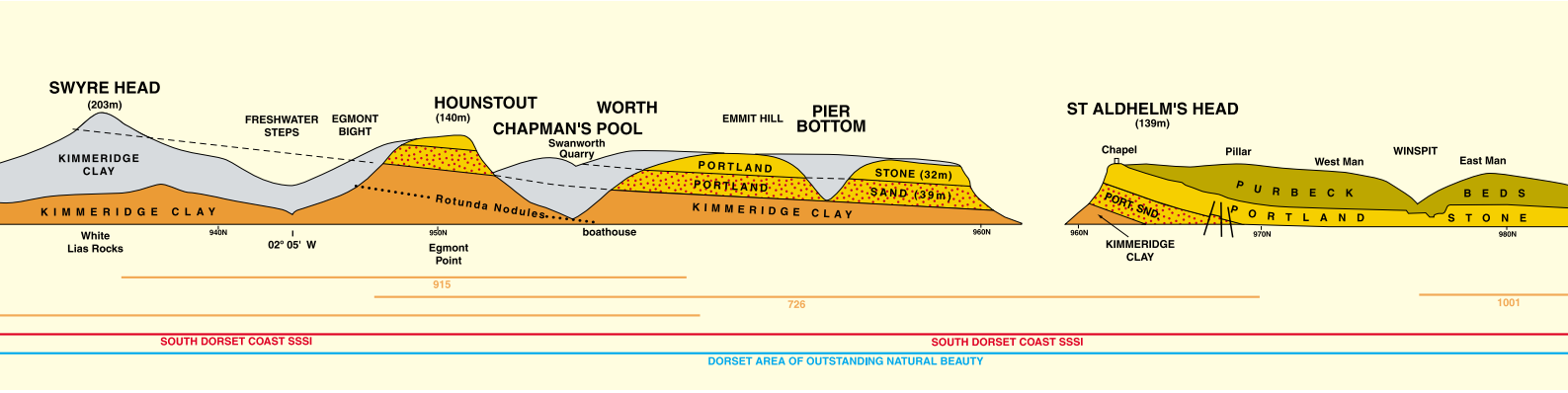
A detail from Owen's key monograph *Fossil Mammals of the Mesozoic Formations*, describing the fauna from Beckles Mammal Pit above Durlston Bay.

Lower Greensand, Gault and Upper Greensand

The Lower Greensand, Gault Clay and Upper Greensand are seen at outcrop within the nominated Site between Sidmouth and Swanage. These exposures display key features of earth history during over c. 15 million years during the Aptian and Albian Stages of the Cretaceous. They represent complex changes in sedimentary environments during the early stages of one of the greatest periods of continental flooding by the oceans that the planet has experienced culminating in the deposition of the overlying Chalk.

The evidence for these changes is seen in the dramatic exposures of the sub-Cretaceous unconformity seen within the nominated Site. In the east of the Site, these Aptian and Albian strata follow the Wealden with little stratigraphic break. However as one travels westward through the Site, they rest on progressively older Jurassic, and eventually Cretaceous strata, reflecting an eastward tilting and erosion of the underlying sediments within the basin, prior to the progress of the transgression to the west. The westward transgression of the Albian sea is also marked by complex lateral changes in the sequence traced east to west and associated changes in facies. The succession also displays outstanding examples of diagenetic processes in shallow marine sediments, notably chert development in the west and glauconite-phosphate diagenesis throughout (Kennedy, 1999 contribution to nomination). The Cretaceous sequence above the unconformity

Worbarrow Bay looking west towards Mupe Bay. The soft Lower Cretaceous rocks, particularly the Wealden Clay, have been eroded away to form the large bay. The massive Portland Limestone and Purbeck Beds form the headland of Worbarrow Tout (left).



provides a continuous section through the post-Aptian Cretaceous history of the Wessex Basin, with the exception of the uppermost part of the Chalk (upper Campanian and Maastrichtian Stages are absent).

Like the Wealden, the Lower Greensand thins rapidly to the west from 59 m at Swanage to 35 m at Worbarrow Bay and 0.5 m when last seen at Lulworth. It is overstepped westward by the Gault Formation and Upper Greensand Formation which marks the main transgressive level following the pre-Aptian eastward tilting of the Wessex Basin. The Lower Greensand Formation consists of a grey-black sandstone with ironstone levels. These horizons are fossiliferous, with marginal marine bivalves including *Eomiodon*, *Cuneo corbula*, and the gastropod *Cassiope*, and including ammonites such as *Deshayesites* spp. The formation includes, at Swanage, the Punfield Marine Band with a unique estuarine fauna, which becomes fully marine on the Isle of Wight.

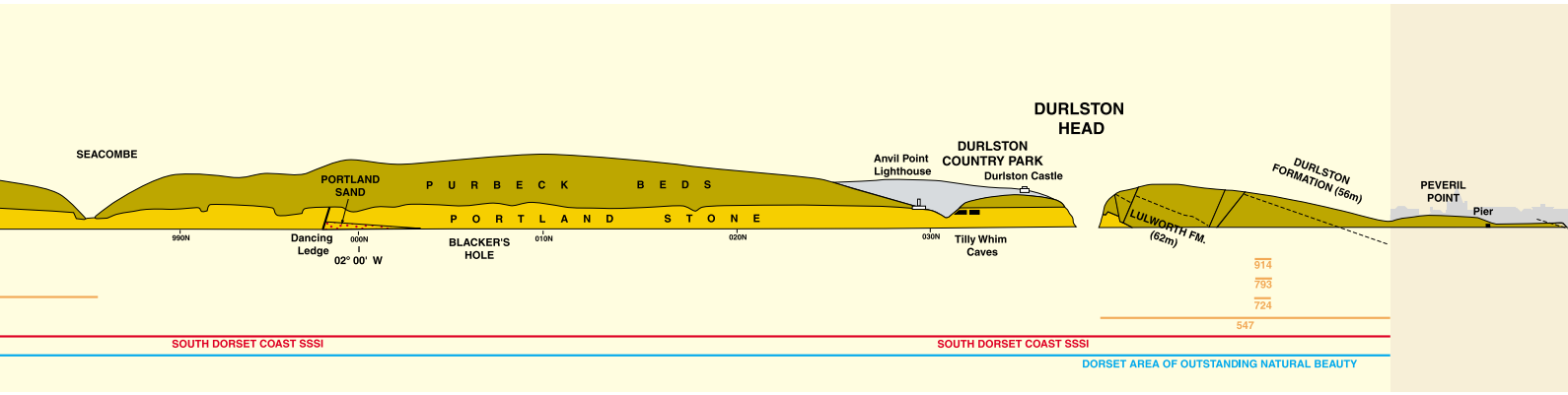
The Gault Clay and the Upper Greensand formations within the nominated Site are generally sandy in character. At Swanage and in the Lulworth area the Gault is a poorly-fossiliferous silty clay and the sand content increases both westwards and up-succession. In East Devon the Gault is inseparable from the overlying Upper Greensand. Ammonites are often abundant: over 100 species have been recorded from the Gault and Upper Greensand in Purbeck. Microfossils are quite rare, with much of the formation decalcified and badly weathered.

The Upper Greensand Formation within the nominated Site is a glauconite-rich succession of sandstones and calcarenites, with thin sandy limestones (usually concentrations of shell debris) and dark brown splintery cherts. In East Devon the chert-rich sandstones reach their maximum thickness (c. 25 m). In this area, the cherts are characterised by the presence of sedimentary bedding. Trace fossils and other macrofauna visible within the silica concentrations confirm that the cherts are replacement features within the diagenetic history of the sediment. The uppermost sandstones in West Dorset and East Devon are characterised by glauconite-rich cross-bedded sandstones that form a quite distinctive building stone. The macrofauna is dominated by the bivalves, especially *Exogyra* spp., although gastropods and echinoids are also well known. The Perinflatum Subzone is an important phosphatised horizon at the top of the formation in Punfield Cove. The microfauna is quite restricted due to preservational problems, although the sandstones of East Devon have yielded *Orbitolina sefini.*

The Chalk

The Chalk Group exposed within the nominated Site comprises up to 400 m of chalks composed dominantly of calcareous nannofossils. Traditionally, the succession is divided into the Lower, Middle and Upper Chalk, although this classification is inappropriate in East Devon. On the coast of Purbeck the Chalk forms spectacular cliffs at Bat's Head and White Nothe between Worbarrow Bay and Lulworth Cove and at Ballard Head. In East Devon it is about 100 m thick, and is seen within the cliffs between Lyme Regis and Branscombe, and occurs as isolated outliers between Branscombe and Sidmouth.

The Lower Chalk comprises marly chalks, often rhythmically bedded, which are rather sparsely fossiliferous in the field, but which contain abundant microfossils typical of the Cenomanian Stage. The basal bed of the Lower Chalk (also known as the Basement Bed or Glauconitic Marl) locally contains an abundant macrofauna of beautifully preserved phosphatised ammonites and other molluscs which are very important for inter-regional correlation. The Lower Chalk shows progressive onlap to the west with a basal conglomerate of the chalk facies younging from West Purbeck (Middle Cenomanian) westwards to Devon (late Cenomanian). The Lower Chalk is absent in West Dorset and East Devon, where it is replaced by a succession of thin, fossiliferous, sandy limestones called the Beer Head or Cenomanian Limestones. This thin (1-6 m), highly fossiliferous unit has



yielded rich and diverse invertebrate faunas, including ammonites, echinoderms and crustacea, which compare closely with those found in the sandy facies of the Cenomanian developed in the vicinity of Le Mans, France and afford a useful means of international correlation.

The Middle Chalk is present throughout the area, the lower part comprising very fossiliferous hard nodular limestone. In East Devon this yields important ammonite faunas of the latest Cenomanian and earliest Turonian age that are not found elsewhere in the UK, in addition to abundant bivalves of the genus *Mytiloides*. The Chalk in the Beer area includes the famous Beer Stone, a soft inoceramid-rich chalk that hardens into a fine ornamental building stone on exposure to the air. The overlying, softer, New Pit Formation is locally flinty in East Devon and while poorly fossiliferous in the field, nevertheless contains an highly diagnostic and abundant fauna of planktonic foraminifera, ostracods and calcareous nannofossils, all of which can be used for regional and international correlation. The nominated Site includes the type locality for *Watinoceras devonense* (Wright and Kennedy), the standard international index for the base of the Turonian.

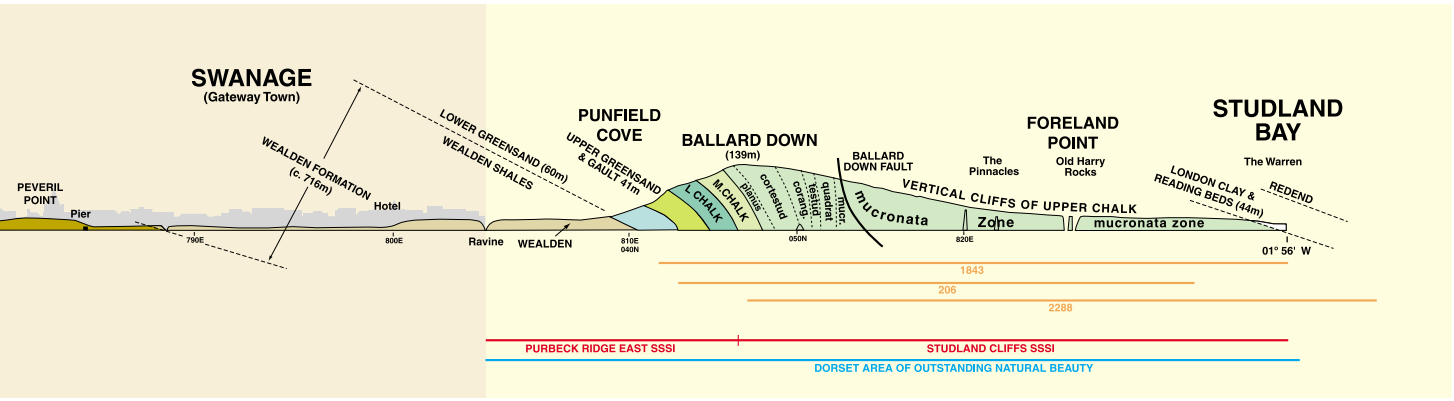
The Upper Chalk consists of variously nodular, flinty, slightly marly and smooth white chalks which display conspicuous bedding that is picked out by lines of flints, marls and beds of harder chalk. Diverse calcitic faunas of bivalves, brachiopods, belemnites, corals, echinoderms, bryozoans, serpulid worms, fish and a few reptiles have been found in the Upper Chalk within the nominated Site. The sections in the vicinity of Beer, and between White Nothe and Ballard are particularly valuable as reference sections for the chalks of southern England.

As a result of the reactivation of Variscan structures during the Cretaceous and Cenozoic, the chalks of Dorset have been subjected to quite intense structural deformation. As well as being folded, faults, thrusts and joints have been developed that are not seen in such rocks anywhere else in Europe (Hart, 1999 contribution to nomination).

The Chalk at (from top) Beer Head, White Nothe, Bat's Head and (over page) Old Harry Rocks. Due to the near horizontal orientation of the Upper Cretaceous strata, the chalk appears across the nominated Site but the distribution is complicated by the Purbeck Monocline which has thrown the strata into a vertical or near vertical orientation between Bat's Head and Ballard Down.

PETROLEUM GEOLOGY

Seepages and impregnations of free oil have been known to occur along the Dorset coast for most of the twentieth century. The key reference for petroleum geology within the Wessex Basin is Underhill (1998), which provides a comprehensive review. Exploration for subsurface oil reservoirs began in the 1930s, and eventually led to a commercial discovery in 1959 at Kimmeridge. Although the Kimmeridge oilfield is small, the find led first to the Wareham field, and subsequently to the Wytch Farm oilfield in east Dorset which is now the largest onshore field in western Europe. The oilfield is located to the north-east of the nominated Site, and taps reservoirs through 'extended-reach' wells drilled from the land which extend up to 12 km offshore under Poole Bay. The area surrounding the nominated Site, both on- and offshore, has been the subject of oil exploration, which continues in the Poole Bay area, associated with the Wytch Farm operation.



The Dorset oilfields benefit from a unique level of surface exposure in which both the organic-rich mudstone source rocks from which the oil was derived, and the reservoir rocks in which the oil is stored, can be readily examined along the coast. The Lower Jurassic black mudstones within the Blue Lias and Charmouth Mudstone formations, exposed at surface between Lyme Regis and Charmouth, form the principal hydrocarbon source rocks. Their total organic carbon content is locally seven per cent and is contained as algal material within the mudstones. Although these strata are immature at outcrop, the same mudstones have been buried deeply enough south of the Purbeck Fault (>2 km) to generate hydrocarbons.

Other organic-rich mudstones, particularly the Peterborough Member of the Oxford Clay Formation, and the thick Kimmeridge Clay Formation are known to form source rocks in the North Sea but neither are at sufficient depth to have entered the oil generation window in Dorset. Much of the Kimmeridge Clay Formation is bituminous, with local concentrations of oil shales. One of these oil shales is present on the coast of Purbeck at Burning Cliff, named for the spontaneous combustion of 1826 to 1829 which broke out as a result of heat generated by oxidation of pyrite. A similar phenomenon occurred in 1909 in the Lower Lias close to Lyme Regis.

The most important reservoir rock in Dorset is the Mid-Triassic Otter Sandstone Formation of the Sherwood Sandstone Group, exposed between Budleigh Salterton and Sidmouth in east Devon. The unit is 120 to 150 m thick and consists of highly porous and permeable fluvial and aeolian sandstones. The impermeable cap rock, which prevents the escape of hydrocarbons at depth as well as the ingress of meteoric water, is the largely Upper Triassic Mercia Mudstone Group.

The Bridport Sand Formation also forms a significant reservoir rock and comprises the earliest discovered and middle play at Wytch Farm. At Bridport, the unit consists of about 60 m of fine-grained, shallow marine sandstones sealed by a mudstone cap of Fuller's Earth Formation. Fractured mud-rich oyster bed limestones of the Frome Clay Limestone form the smallest and shallowest reservoir at Wytch Farm. Equivalent beds are exposed on the north shore of the Fleet at Langton Hive Point. The reservoir rock in the Kimmeridge oilfield comprises fractured limestones of the Cornbrash Formation overlain by impermeable mudstones of the Kellaways and Oxford Clay formations.

The large area of oil seeps that occurs along the coast between Osmington Mills and Worbarrow Bay, centred on Mupe Bay, is thought to represent the remnant of a large oilfield, perhaps once as large as Wytch Farm. Uplift of the fossil oilfield during Tertiary northward movement on the Purbeck Fault has resulted in breaching and removal of the oilfield by erosion.

Handfast Point and Old Harry Rocks. The Cretaceous-Tertiary boundary, which is the limit of the Site lies on the coast below the woodland on the far right of the picture.

The Coastal Geomorphology and Quaternary Geology of the Dorset and East Devon Coast

The coastal geomorphology of the Dorset and East Devon Coast derives mainly from the action of the sea on the varied sedimentary and structural geology of the Triassic, Jurassic and Cretaceous rocks. The combination of the continued variation in lithology resulting from the generally eastward-dipping strata, and the fact that the processes which have shaped the coastline are substantially unaffected by human intervention has resulted in a diverse range of classic examples of coastal landforms. The forms seen are typical of coastlines world-wide, and the close juxtaposition of many different forms is regarded as exceptional (letter from International Association of Geomorphologists, 2000).

The coastal landscape is very well known to science, having been studied for over 200 years, and some of the landforms represent amongst the most frequently quoted examples in textbooks for school and university students. The coastline represents a teaching resource for geomorphology of great importance. It continues to be cited as one of the leading case study areas for school and university level geomorphology, and is very well visited by educational groups of all ages. For example, the education ranger service provided at Lulworth alone taught 102 school group visits in 1999, and noted in the order of 1000 school, college and university parties being independently taught.

The following statements describe the landforms within the nominated Site, under the main headings of landslides, beaches and lagoons, cliffs, and the important Quaternary raised beaches on Portland.

LANDSLIDES

Landslides are developed in many places on the coastline. It displays a remarkable variety of forms due to the range of strata, and different combinations of rock types (Brunsden, 1996). Between Orcombe Rocks and Axmouth, sliding is developed in a number of localities, including the historically interesting slide at Hooken, which was described in 1840 by Daniel Dunster (Conybeare et al, 1840).

The Hooken Landslide, Beer Head. Landslides dominate the character of the coast wherever they are active, most notable the East Devon/West Dorset coast, Portland and White Nothe but the resultant landforms are subtly different depending on the geological strata involved.

The landslides of West Dorset are of importance because they have been the subject of considerable research programmes over the last fifty years. Black Ven is a mudslide cascade formed in the soft Lower Lias mudstones, which are overlain by the Upper Greensand. The mudslides are extensive and can be rapid; they were recorded being one of the largest and most dynamic mudslides in Europe by Dikau et al (1996). This system has been very well studied, including documentation using advanced analytical and digital photogrammetry, and this was the first place where dynamic equilibrium was demonstrated on an active hill-slope process system (Brunsden and Chandler, 1996). Stonebarrow Hill is a landslide complex in which it is possible to demonstrate the process-scale changes that take place as sea-cliff recession causes failures at higher levels in the Undercliff, leading eventually to retrogression of the landslide scar. The sequence of changes was used by Brunsden and Jones (1972) to gain an understanding of how inland slopes, now degraded, might have evolved. The detailed information required to demonstrate these processes was provided by the instrumentation of the slide between 1965-70 and 1995-97.

The Axmouth-Lyme Regis Undercliff is a locality of major importance for the study of landslides. It occupies the extreme south-eastern coastal strip of Devon and stretches for approximately 8 km. The area is entirely landslipped with old landslides now reactivating following the post glacial rise of sea level and therefore overlain by infrequent, but dramatic modern slips.

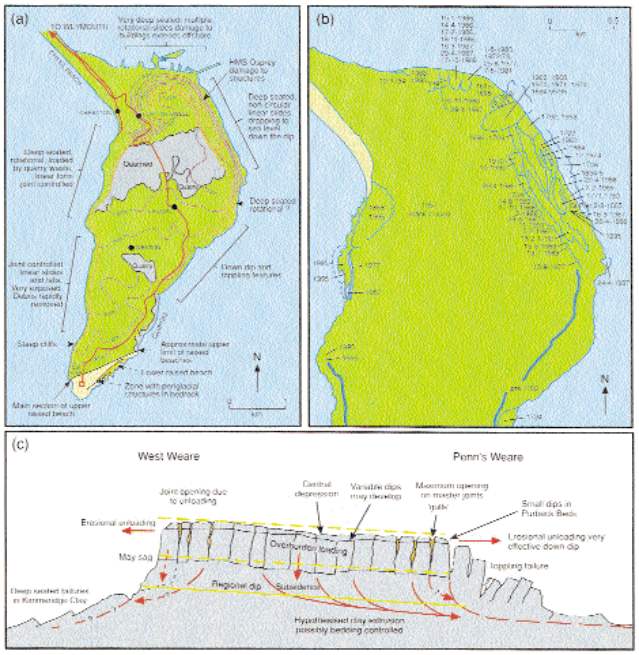
Major landslip events take in the whole section from cliff top to shore, 500 m in width and over 200 m high. These range from a major, famous block slide, the Bindon landslide of Christmas Eve 1839 (Conybeare et al, 1840), to huge multiple-rotational slips, mud-slides, rockfalls and topples. The main slides and dates of historical failures are Humble Point (1689, 1765, 1840), Dowlands (1790), Pinhay (1828, 1886, 1960, 1976), Haven Cliffs (1830), Bindon (1839), Whitlands (1840), Culverhole (1886), Rousdon (1911), Ware (1968) and Charton Bay (1969).

The most important event to take place was the 1839 Bindon Landslide. This involved the subsidence of a 'Chasm' 200 m wide, 30 m deep and 1.5 km long as a piece of land, known as Goat Island, moved seaward. This is the most widely documented event of its kind in the British Isles (Pitts, 1974, 1981) because of the fortuitous presence in the area of two of the leading 'catastrophist' geologists of the day it is one of the two first landslide events ever recorded in a full scientific memoir, as described in more detail in the following section.

Lyme Regis, looking west into the Undercliff. Native woodland has established itself within the landslipped areas, on land which was previously farmed. The Undercliff is now a National Nature Reserve, managed by English Nature.

Portland Island is one of the most instructive places to demonstrate the influence of lithology and geological structure on the form of cliffs and landslides. Writing about the geomorphology of the Island in 1836, W.H. Fitton, the eminent British gentleman geologist, observed that '*Few places, probably, in the World exhibit with such clearness, and in so small a space, phenomena of more extraordinary interest, or of greater importance to theory*'. The rocks consist of a cap-rock of strong, jointed limestones overlying sandstones and mudstones. Water is unable to move freely downwards and builds up high pressures on the impermeable mudstone strata, and because the rocks dip from north to south water drains across the island from high to low ground. The mudstones deform in a ductile manner and can be slowly squeezed out beneath the weight of the limestone.

Systems of rock joints run NNE-SSW, North-South and East-West, and are controlled by the axes of the main geological structures: the Shambles Syncline and the Purbeck Anticline and provide weaknesses to be exploited by both natural processes and quarrying. These determine, at all scales, the outline of the island, the quarrying and the form and activity of the landslide processes. The dip of the rocks means that the landslide type changes on either side of the island. In the north, at West Weares there is maximum exposure of Kimmeridge Clay, high relief, deep water offshore and the escarpment faces up-dip. Here the slides are deep-seated and rotational. They are dominated by the NNE-SSW joints and therefore occur in thin slices. Similar but very large and *en echelon* failures occur at East Weares, the site of the second largest historical landslide in Britain in 1734. At Great Southwells and between Durdle Pier and Freshwater Bay, the landslides are in a down-dip position, receiving water and extruding clay but are still controlled by jointing. The rocks 'founder,' sliding forward and creating subsiding hollows, called



Landslides on Portland. The level of document-ation of activity is clearly seen, and the range of mechanisms is shown in the lower part of the diagram. From Brunsden and Goudie (1997).

grabens, at the rear. In places the rock pillars topple forward or settle into the ductile clays below. Elsewhere around the coast detached pillars, topples and a myriad of rockfalls make the coastal walk one of the most instructive geotechnical experiences possible (Brunsden et al, 1996).

Landslides are also very much in evidence on the Purbeck coast; there are major landslide complexes at Osmington, White Nothe, Lulworth, Worbarrow, Gad Cliff, Chapman's Pool, and St Aldhelm's Head, about which very little is known. The largest are very old and have not yet been reactivated by the post-glacial rise in sea level.

BEACHES AND THE FLEET LAGOON

The beaches of this coast are composed mainly of flint and chert eroded from Jurassic and Cretaceous strata, and from the Pleistocene gravels that often cap them. One exception is the Triassic-aged Budleigh Salterton Pebble Beds, which comprise fluvial sands and gravels. The pebbles are largely metaquartzites and include rock clasts of Ordovician and Devonian age. These have been eroded from the cliffs and nearshore seabed at Budleigh Salterton where they form a beach about 4 km in length. The distinctive petrology and shape of the pebbles means that they stand out from the predominant flint and chert clasts elsewhere. Budleigh Salterton pebbles have been identified further to the east in Chesil Beach and Weymouth Bay and indicate a longshore transport pattern when sea levels were low enough for pebbles to travel around Portland Bill (Carr and Blackley, 1969). A once more extensive beach may have extended along the foot of the cliffs of East Devon and West Dorset. Today it is fragmented into many small beaches. In Weymouth Bay there are over twenty small pocket beaches formed almost entirely of flint and chert for which there are only very limited local sources (Goudie and Brunsden, 1997). The history of these beaches provides one of the best documented analyses of the links between cliff retreat and nearshore seabed erosion, reactivation of landslide talus, relative sea level rise and beach formation and development.

Budleigh Salterton pebbles form a very distinctive marker in beach sediments elsewhere on the coast, and are very durable. They have been traced as far east as Hastings, over 250 km away.

Chesil Beach extends for 28 km from Bridport Harbour at West Bay to Chesilton beneath Portland Bill. The beach becomes steeper and higher toward Portland. It is 5 m high at West Bay, 10 m at Abbotsbury and 14 m at Chesilton. It varies in width from 90 m at the western end to 36 m at Burton Bradstock, 200 m at Wyke Regis and 50 m at Portland. The beach is at its widest when separated from the mainland. The depth of the sea-bed progressively increases toward Portland and offshore and the wave energy environment is very powerful.

The beach is famous because of the volume, type and size grading of its pebbles. It is thought to comprise up to 100 million tonnes of material, ranging in size from sand and pea gravel at Bridport, to 5.0-7.5 cm cobbles at Chesilton. The grading is often claimed to be so perfect that a fisherman landing at night is said to be able to pick up a pebble and know exactly where he has landed. Around 98.5 per cent of the pebbles are flints and cherts, with the remainder composed of limestones, vein quartz, porphyry, igneous materials from the south-west and quartzites from the Budleigh Salterton Pebble Beds (Carr and Blackley, 1969). Although some of these may be from the ballast of wrecked ships, it is generally believed that the pebbles must, at some time in the past, have been able to move freely around Lyme Bay along an earlier coastline, unhindered by the present headlands and harbours (Coode, 1853).

The origin of the beach and the cause of the remarkable size grading are controversial subjects in coastal geomorphology. No fully accepted theory has yet been published. An early idea was that the beach was a result of the longdrift of shingle along the coast, from the west, so that it grew like a spit out into the sea at Portland to eventually form a tombolo (Coode, 1853; Prestwich, 1875; Baden-Powell, 1930). A second speculative view (Carr and Blackley, 1974), suggested by the presence of pebbles from Budleigh Salterton and other places to the west, is that there used to be a 'great beach' offshore along which such pebbles could freely move. This hypothesis requires that the beach was pushed onshore as sea-level rose and eventually attached itself to the land between Lyme Regis and Abbotsbury to enclose the Fleet. At this time it was fed by sediment from the cliffs of West Dorset.

The historical fragmentation of the beaches to the west and the building of the Cobb and West Bay Harbours have resulted in a lack of western sediment supply to Chesil which, with historical mining loss and attrition, is now a relict feature showing a slow decline in volume (Bray, 1986, 1990). Evidence that the beach has been driven onshore is partly from the positions of the beach on historical charts, plans and maps, and partly because peat and clay which formed in the 'proto-Fleet' now underlie parts of the beach. In storms large blocks are often eroded from the seaward face and thrown up onto the beach at Abbotsbury and West Bexington.

The beach is very dynamic. It is known from historical surveys that the beach is still moving onshore at a rate of approximately 5 m per century due to storm overwash (Hook and Kemble, 1991). The pattern is difficult to establish because the long-term trends are also confused by the short-term dominant wave direction regimes that move the sediment east and west over quite long time periods. Storms have a dramatic effect on Chesil, as do long period deep-water swell waves. One event in 1979- temporarily lowered the crest at Chesilton by 2.5 m (Heijne and West, 1991). In the major storm of 1824 the accounts suggest that Chesil was badly overtopped. A neglected feature has been the effect on the stability of the beach of the construction of the Portland Harbour and breakwaters. Before this the beach was also open to large waves from the east and may even have been overtopped from that direction (Brunsden and Goudie, 1997).

Chesil encloses a tidal lagoon called the Fleet, which separates it from the mainland between Abbotsbury and Wyke Regis. The Fleet has an area of 480 ha, varies from 50 m to over 910 m in width and is generally shallow at 0.3-3.0 m. Its significance as a feature has recently been reviewed at a European level (Barnes, in press), who concluded that it is one of the few, and it could be argued is the only typical coastal lagoon in macrotidal Europe. Unlike a normal estuary, the lagoon has a relatively small discharge from streams, a large volume of 'estuarine' water at low tide, and a tidal flow greatly retarded by the restricted nature of the marine inlet. Thus a salinity gradient is well developed from Smallmouth towards Abbotsbury, though the degree of dilution and the steepness of this gradient varies from season to season (Whittaker, 1978, 1981). Some local percolation of sea-water occurs through Chesil Beach, but except in storm conditions, this is of minor importance in comparison with the tidal interchange. In the summer months, the Fleet behaves like a large rockpool, with high water temperatures (>20°C), oxygen and nutrient availability. This results in its exceptional importance for wildlife, containing the richest European lagoonal fauna and flora, including specialist lagoonal species, and rich local populations of otherwise rare species (Dyrynda and Cleator, 1995).

Chesil Beach and the Fleet. The beach and the lagoon are part of the privately-owned Ilchester Estate, and are managed as a nature reserve.

Organic mud and peat sediments preserved within the Fleet may enable us to date its evolution, and that of Chesil Beach, as well as sea levels and the south coast climate and vegetational history for the late Holocene. Boreholes have recovered fresh-water peats for radiocarbon and absolute dating (c. 4,000-5,000 BP) (Coombe, 1996). The shells of ostracods and the remains of other organisms have been used to identify the changing environment. Ostracods, in particular, are niche-specific and therefore of particular use for this purpose. Two species, for example, *Cyprideis torosa* and *Loxoconcha elliptica* have a widespread occurrence throughout the post-lagoonal phase of the West Fleet. Today the former has all-but disappeared and the latter has become totally extinct, indicating very recent and perhaps remarkable wholesale environmental change (Whittaker, 2000 contribution to nomination).

CLIFFS

Sea-cliffs are the dominant landforms seen on the Dorset and East Devon Coast. In addition to the cliffs which result from landsliding, as described previously, there are extended stretches of coast which demonstrate cliffs formed primarily by erosion, together with the associated forms of bays, caves, arches and stacks.

The cliffs within the nominated Site vary in colour and form with the changing geological succession to provide a remarkable demonstration of the way in which landforms reflect the geological and structural setting. At the east of the nominated Site the cliffs are typically vertical, formed in the red sandstone and mudstone cliffs of the Triassic rocks. At Ladram Bay there are good examples of shore platforms and stacks, with their forms shaped by the variable resistance of the Triassic strata. The cliffs here are also notable for the display of honeycomb weathering, or taffoni, due to wind and salt erosion. These processes etch out the sedimentary structures within the rock in fine detail. Cliffs form part of the landslide-dominated coastlines of Hooken, near Branscombe, Axmouth to Lyme Regis, West Dorset and Portland as described previously.

Ladram Bay, looking north towards Sidmouth. The rock structure controls the form of the coastal landforms: erosion along near-vertical rock joints has played a major role in isolating stacks from the mainland, while some shore platform surfaces coincide with joint planes.

To the east of Portland the cliff coastline of Purbeck is a world-renowned example of classic cliff coastline landforms. This coast, between Furzy Cliff in the west to Studland Bay in the east is an exceptional example of adjacent concordant and discordant coastlines, developed through natural processes acting with and across the structural 'grain' of the rock strata respectively (Goudie and Brunsden, 1997). The scientific interest is enhanced further because the landforms are developed in a rock series that shows a continued variation of hard, resistant rocks with soft, weak materials.

The concordant coastline of south-east Purbeck is seen between Durdle Door and Durlston Head and is mainly developed in rocks of the Portland and Purbeck Groups. It contrasts with discordant sections of the coast seen at Worbarrow Bay and between Durlston Head and Studland Bay, which occur in a wide variety of different rocks and structures. These stretches of coast also differ in exposure to waves and in their length, from several kilometres (Swanage Bay) to a few hundred metres (Man O' War Bay). Within the bays, there is a series of beaches distinguished by local grading of sediment fed from distinct, identifiable sources which provides unrivalled opportunities for the study of beach development. Rates of shoreline and cliff top retreat vary from almost no change on the limestone cliffs between St Aldhelm's Head and Durlston Point to over 0.5 m per annum in the clay cliffs (May, 1971; Sunamura, 1992).

From west to east, this cliffed coastline changes constantly in height, form and stage of development. From Furzy Cliff eastwards to Black Head, the cliffs are dominated by several landslides that feed the beaches with a variety of sediments ranging in size from clay to boulders. From Black Head to Ringstead, the complex structural patterns of the cliffs and shore platforms give rise to a great variation in coastal landforms providing an excellent field location for examination of differential erosion processes at the shoreline. At White Nothe, the Kimmeridge Clay outcrops and is partly responsible for a complex 'staircase' of rotational slip blocks and active mass-movements that feed chalk and flint to the eastern end of Ringstead Bay. The beach here is, however, in receipt of only small quantities of such material and is composed mainly of rolled flint. Variations in size distribution can be related to the interference with wave energy distribution by the intertidal and offshore platforms of Corallian rocks (May, 1999 contribution to nomination).

East of White Nothe, the Purbeck monocline produces a change in the dip of the rocks, which decreases from west to east so that the angle presented to the sea yields a complete suite of structural-process relationships. The cliff forms vary from vertical

Durdle Door and Man O'War Cove. The dry valley of Scratchy Bottom lies to the west (left), and the coastal section provides an important section through the recent deposits in the valley sides.

cliffs in horizontal beds to overhangs and an arch in steeply dipping strata. Compression and thinning of the beds in this sequence also yields a famous series of arch, barrier breach, cove and bay development as the concordant coastal barrier is destroyed. The sequence of a small arch at Bat's Head, the large arch at Durdle Door, the barrier-protected cove at Man O'War Cove, the arches at Stair Hole, the classic, circular bay at Lulworth Cove and the larger bay at Worbarrow with its submerged offshore rock barrier is very famous, and reveals extraordinarily well the rock-structure-process relationships (e.g. Jukes-Brown, 1884; Steers, 1946; Rice, 1988).

Worbarrow Bay and Lulworth Cove, together with other bays on the coast demonstrate mechanisms of bay formation superbly (Strahan, 1906; St J. Burton, 1937). They are distinguished by enclosing headlands (usually of limestone) and a Chalk back-wall with the bays being developed in the sand and clay cliffs of the Wealden Beds or Upper Greensand. In detail each of these bays is a different expression of the effects of erosion, both marine and sub-aerial, on rocks of contrasting resistance. Several of these bays also have a narrow steep platform of chalk upon which rests a narrow, predominantly flint beach. The beaches show a size grading which is indicative of the wave energy distribution within these semi-enclosed bays. This stretch of coast also demonstrates narrow offshore submarine ridges which occasionally appear above the sea surface (May, 1999 contribution to nomination).

Eastwards from Worbarrow Tout, the cliffs are increasingly dominated by the Kimmeridgian rocks which form near-vertical cliffs up to 60 m in height and extensive platforms which extend several hundred metres offshore. At Houns-tout, the Portlandian rocks reappear to form the upper part of the cliffs, which attain 120 m in height. Large landslides extend around Chapman's Pool to St Aldhelm's Head and are particularly active where the Kimmeridge Clay is exposed near to sea level (Goudie and Brunsden, 1997). The landslides, however, have produced large boulder fields, which act as natural rock armouring and slow dramatically the rate of shoreline retreat. Where the boulder fields are breached, rapid cliff-foot erosion occurs and landslides become active. From St Aldhelm's Head to Durlston Head, the cliffs become much simpler in form with their vertical faces rarely higher than 30 m. The cliffs are broken by several small valleys such as Winspit Bottom and Seacombe, which show varying levels of adjustment to changes in base level and shoreline retreat.

In Durlston and Swanage Bays, the coastline crosses the geological sequence from Portlandian to the Upper Chalk. Headlands are associated with the outcrop of the Upper Portlandian/Lower Purbeck Beds at Durlston Head, a small synclinal structure in the Upper Purbeck Beds at Peveril Point and the Chalk outcrop at Ballard Down. Between these points, bays have been cut into the Middle Purbeck Beds in Durlston Bay and the Wealden, Lower Greensand, Gault and Lower Chalk in Swanage Bay. This repeats the shorter sequence in Worbarrow Bay at the western end of the Isle of Purbeck, although the Chalk has barely been breached at Arish Mell. At the northern end of the chalk cliffs, Old Harry Rocks provides a complete example of the cave-arch-stack-stump sequence of landform evolution.

Houns-tout cliff. The cliffs are developed in the thickest British sections of the Portland Beds, with the basal Purbeck Beds above, and Kimmeridge Clay below.

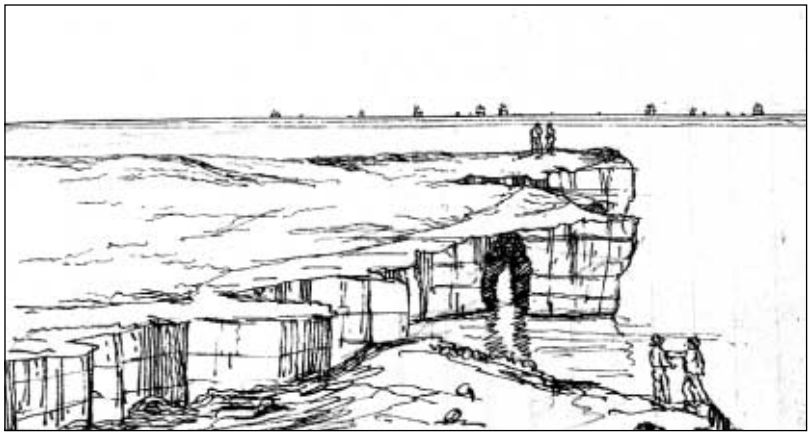
Associated with the erosional coastlines, the nominated Site also shows interesting development of shore platforms, which are well developed at Charmouth, Portland Bill and Worbarrow. These display a full range of shore platform processes in hard limestones, chalk and mudstones, including the role of bio-erosion in their formation (Goudie, 2000 comments on nomination).

RAISED BEACHES

Portland Bill is one of the few places on the south coast of England where two separate raised marine deposits, in association with terrestrial sediments, can be demonstrated. The site was first described by De la Beche in 1839 who noted the existence of marine deposits. The marine fauna was described by Baden-Powell in 1930. In recent times, full descriptions of the deposits and revisions of their included faunas have been published as well as preliminary data to provide a geochronology for the deposits. The key elements comprise the Portland West Beach and the Portland East Beach, and the Portland Loam and Head.

Portland West Beach outcrops in two sections, the larger of which is 40 m in length. The widespread occurrence of loose beach gravel, for 200 m south of the main section, probably indicates the former extent of the raised beach deposits. In the main section, the beach consists of up to 2.5 m of well-sorted sandy gravel arranged into as many as seven fining-up units, each grading from pebbles to coarse sand. The deposits are planar-bedded and cemented by calcium carbonate, although considerable voids also occur. The planar bedding in this sediment indicates that the Portland West Beach was deposited under high energy conditions. The few shell fragments it contains are suggestive of sea temperatures no colder than now and a sea-level perhaps 10 m higher. Davies and Keen (1985) estimated dates of c. 125,000 BP for the East beach, and c. 210,000 BP for West beach.

The Portland Loam and Head rest on the cemented shingle of the West Beach and are best seen in the main section. Reworking of calcium carbonate has resulted in the development of concretions in the loam which is otherwise silty in texture and devoid of coarser material, except for a few pebbles near the base derived from the underlying raised beach deposits. The head overlies the loam with a sharp boundary. The matrix of this deposit also consists largely of silt, but limestone clasts, up to 0.25 m long, are also present. Both the loam and the head are crudely bedded, with the former dipping south at 3°, with individual beds being picked out by lines of calcareous pellets. The head is more steeply inclined at 5-10° to the south. It is not decalcified and contains abundant land shells typical of a cold climate.



Sketch of Portland Bill by De la Beche, from his notebook of 1818-1819.

Portland East Beach comprises deposits that crop out north-eastwards for 1.5 km between Portland Bill and Longstone Ope Quarries. They consist of subangular clasts of Portland and Purbeck limestone with a few pebbles of flint and chert and calcareous fossil debris in a sandy matrix. The largest clasts are c. 60 cm in diameter and in places these represent the whole thickness of the beach. Elsewhere, the beach deposit is less than 45 cm thick and consists of shell which infills interstices between the larger clasts. The deposits of the beach are structureless, probably due to post-depositional cryoturbation. Unlike the West Beach, the East Beach is almost entirely uncemented and is richly fossiliferous: a 2 kg sample from the most fossiliferous part of the exposure, 200 m north-east of Portland Bill, yielded 6,670 individual shells. A total of thirty-four gastropod taxa, one chiton, and seventeen bivalve taxa have been recorded from the East Beach and a further seven species of gastropod and four species of bivalve are also known from earlier studies. Other faunal remains include foraminifera, *Balanus* spp. plates, and crab and echinoderm fragments. The thin deposits of the East Beach give little sedimentological evidence for its conditions of deposition. However, its fauna, more extensive than that from any other raised beach deposit on the south coast, gives comprehensive details of the contemporary marine environment and of its age. Amino acid ratios confirm an age in the last interglacial at 125,000 BP (Keen, 2000 contribution to nomination).

The Importance of the Dorset and East Devon Coast in the History of Science

The nominated Site has been known to geological science for over three hundred years. The fossil wealth of Lyme Regis was first pointed out in 1673 by John Ray, the important early naturalist. There follow many recorded visits to the Dorset and East Devon Coast by some of the major figures in the early days of geology, and fossil material from within the nominated Site became renowned throughout the World. In 1770 the fame of the area drew a visit to Weymouth from James Hutton (1726-1797) of Edinburgh, often cited as 'the father of modern geology'. William Smith (1769-1839), who made the first geological maps of England was called in by the Weymouth Corporation in 1812 to help drain the Backwater and Radipole Lake (Torrens, 1999 contribution to nomination.

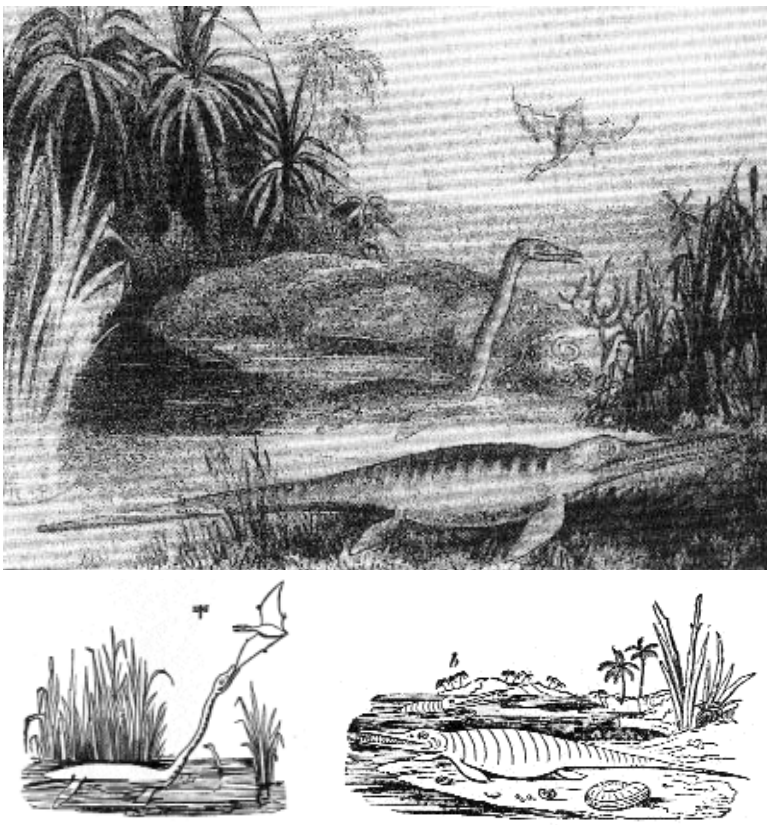
The Dorset and East Devon Coast acquired particular fame during the early part of the nineteenth century, at a critical time in the establishment of fundamental ideas which now underpin the modern science of geology. Major figures who visited, and in some cases lived near the nominated Site provide a roll-call of many of the leading scientists of the day, as summarised in Figure 6 (Page 26). They include William Buckland (1784-1856) of Oxford University, later Dean of Westminster who was born nearby at Axminster, Adam Sedgwick (1785-1873), Professor of Geology at Cambridge, William Conybeare (1787-1857), incumbent at Axmouth and later Dean of Llandaff, Gideon Mantell (1790-1852) the discoverer of the dinosaur *Iguanadon*, Sir Roderick Impey Murchison (1792-1871), President of both the Geological and Royal Geographical Societies, Sir Henry De la Beche (1796-1855), founder of the British Geological Survey, Professor John Stevens Henslow (1796-1861), Darwin's Tutor at Cambridge, Sir Charles Lyell (1797-1875), the pioneer of uniformitarianism, Professor Richard Owen (1804-1892), superintendent of the Natural History Museum, London and Louis Agassiz (1807-1873), the Swiss founder of modern glacial geomorphology. There are extensive records of the influence of the ideas of the day from the nominated Site in the body of scientific literature about the nominated Site. Extensive correspondence also survives, and a particularly good example is the catalogue of the De la Beche archive at the National Museum of Wales (Howe and Sharpe, 1999). Publications and correspondence extended the influence of the Dorset and East Devon Coast to major figures who did not visit it directly, such as Georges Cuvier (1769-1832) and Albert Oppel (1831-1865).

Lyme Regis was one of the main focal points for scientific inquiry during these times, in large measure because of the discoveries made there by the Anning family. The family were from Lyme Regis, and ran a fossil hunting and selling business in the town. Their work advanced science in a way without parallel in Europe, and has been summarised by Tickell (1995) and by Torrens (1995), and is the subject of writing by Stephen Jay Gould (Wolf-Purcell and Gould, 1992). Joseph Anning (1796-1849), was the likely finder, with his sister Mary Anning (1799-1847) of the famous early specimen of ichthyosaur, the first to come to the attention of scientists, which was described by Sir Everard Home (1756-1832) in 1814, and is still in the collection of the Natural History Museum, London.

The achievements of Mary Anning in her own right are remarkable. She took on the family business and devoted her life to the search for the finest specimens. She found the World's first complete plesiosaur, *Plesiosaurus dolichodeirus* in 1823, which was subsequently described by Conybeare

This sketch of Mary Anning by De la Beche may be a more accurate representation of her in real life than the better known portrait on page 27. Her original hammer made of wood clad in iron is displayed in Lyme Regis's Philpot Museum.

(1824). Her other finds include many complete ichthyosaurs, a further new species of plesiosaur *Plesiosaurus macrocephalus* Buckland, 1837, found in 1830, a new species of fossil fish, *Squaloraja* (found in 1828), and the first British pterosaur, *Dimorphodon macronyx* Owen found in 1828 and originally described by Buckland in 1829 (Tickell, 1995; Torrens, 1995). In addition to these, and other vertebrate finds, she also made important collections of invertebrate remains, including starfish, ammonites and belemnite ink-sacs, as well as correctly identifying coprolites as fossil faeces. She was well-known to the scientists of the day and frequently accompanied the likes of Owen, Agassiz, Buckland, Conybeare, Mantell, Murchison, Sedgwick, De la Beche and others on fossil hunting expeditions. She corresponded with many of them, and visited Murchison in London in 1829. She even attracted a visit by the King of Saxony in 1844, remarking to his physician that she was 'well known throughout the whole of Europe' (Torrens, 1995). Her achievements are all the more remarkable considering her circumstances. Not only was she collecting at a time when discussion of transmutation or the evolution of species was regarded as subversive, she was also a poor woman, a dissenter, uneducated and working class, in a field dominated by wealthy male amateur collectors. The list of her original discoveries places her in the highest rank of the pioneers of geological science. Her life story has been retold, sometimes inaccurately and particularly in children's books, and the scale of her contribution to science is now being widely recognised, and was recently marked by an international bicentenary conference held in Lyme Regis in 1999.



The American writer Samuel Goodrich (1793-1860) was one of the most prolific early children's authors. The illustration at the top from his Wonders of Earth, Sea and Sky (1837) is titled *Extinct animals which lived where Dorsetshire now is*. It was based on the two vignettes below by De la Beche. The text in the book includes the following: '*We are indebted for a good deal of what I have told you … to a lady, Miss Anning, who spends nearly her whole time in collecting fossils … No one ought to go near Lyme Regis without visiting her collection.*'

The great vertebrate palaeontologist, Georges Cuvier made use of important specimens from Dorset, mainly collected from near Lyme Regis. Some specimens of ichthyosaurs from the sale of the Birch Collection in London were bought for him. A plesiosaur collected by Mary Anning in 1824, with the French geologist Constant Prévost, is now exhibited at the Musée Nationale d'Histoire Naturelle in Paris. Cuvier used these Dorset specimens in his epoch making *Récherches sur les Ossements Fossiles* (1821-1824) (which includes a chapter devoted to the Dorset marine reptiles), and in his *Discours sur les Revolutions de la Surface du Globe* published in 1826 (Taquet, contribution to nomination, and in press; Rudwick, contribution to nomination).

Mary Anning's work was the inspiration for the world's first published palaeoecological reconstruction *Duria antiquior* (A more ancient Dorset) produced in 1830 by De la Beche, which was produced partly for the financial benefit of the family, and features within it the creatures which she had found. It is the first true scene from deep time to have had even a limited circulation, and its importance is identified by Rudwick, 1992, who comments thus: *'Cuvier had stopped at mere reconstructions of the body outlines of individual animals; Conybeare had merely distributed a cartoon making a joke of Buckland's detailed imagining of an antediluvial 'hyena den'. De la Beche's design, by contrast, depicted a whole range of extinct organisms in a landscape with some degree of realism, based on sober scientific analysis of the fossil remains. In that respect, its innovative character and historical significance can hardly be overestimated.'* It became very well known, and spurred the preparation of a more widely distributed scene by the German geologist Georg Goldfuss (1782-1848) based on the remains at Solnhofen. *Duria antiquior* provides the clearest illustration of the leaps in scientific imagination that resulted from the finds on the coast, and the interaction of the leading scientists of the day.

This lithograph shows the excavations at Durlston Bay. Samuel Beckles excavated a section of cliff and undertook the painstaking work of recovering many vertebrate remains, including the mammal fauna that was subsequently monographed by Sir Richard Owen. Beckles is probably the man shown wearing a top hat.

The work of the Anning family stimulated the activities of many, now famous collectors, including the Earl of Eniskillen (1807-1886), Sir Philip Egerton (1806-1881), Lt. Col. Thomas James Birch (1768-1829), and Thomas Hawkins (1810-1889). The three Philpot sisters were also important collectors who settled in Lyme in 1805, and collected with Mary Anning. Louis Agassiz was one of the many geologists to use the Philpot collection. Visiting in 1834, he wrote: *'The result of my search surpassed all expectations. At Lyme Regis itself, I saw in the collection of Miss E. Philpot thirty-four new species of fossil fishes from this locality alone.'* (Edmonds, 1976). He named one species, *Eugnathus philpotiae* (Agassiz, 1839) after her, and was also the only scientist to name a new species in honour of Mary Anning during her lifetime: the two fish *Acrodus anningiae* (Agassiz, 1841) and *Belemnostomus anningiae* (Agassiz, 1844).

The Philpot collection was presented to Oxford University in 1880, and is an example of the importance of material from the nominated Site to museums. The early collections of fossils from the Dorset and East Devon Coast, and those of later collectors such as Sir A.S. Woodward (1864-1944) and James Frederick Jackson (1894-1966) now form the basis of major museum collections such as those at the Natural History Museum, London, the Sedgwick Museum in Cambridge, the Bristol City Museum and the National Museum of Wales, Cardiff. The fame of the coast as a source of fine fossil material was also helped by the activities of the then world's largest natural history agency, built up by the Weymouth hosier and glover Robert Damon (1814-1889) and his son Robert Ferris Damon (1845-1929). Between the 1840s and 1914 they supplied museums throughout North and South America, Australia and Europe with much Dorset geological material.

Another example of an important early collection from the nominated Site comes from Durlston Bay, through the work of Samuel Beckles (1814-1890) encouraged by the great naturalist Sir Richard Owen (1804-1892). Beckles excavated a cliff section in the Bay in the search for the remains of early mammals, and discovered an immensely rich fauna, which remains at the forefront of contemporary study. The finds were monographed by Owen in 1866, and the collection is now held by the Natural History Museum, London.

William Buckland (1784-1856) made many studies of the coast; he was born nearby at Axminster in East Devon.

UNIFORMITARIANISM AND NATURAL PROCESSES

The river valleys of the East Devon and West Dorset coasts were one of the important exemplars for the debate between 'diluvial' and 'fluvial' interpretations of landforms. This in turn was an important part of the wider debate in the early nineteenth century between 'catastrophist' and 'uniformitarian' approaches to the history of the Earth, a debate which continues to be fundamental to the earth sciences to the present day (as shown for example by modern arguments over bolide impact events and their relation to mass extinctions).

Part of a series of coastal sections of the Dorset and East Devon Coast, drawn by Henry De la Beche in 1818-19, presumably from a boat.

In England the geological argument was complicated by what were widely perceived to be its links with issues of social stability at a time of radical political and cultural change. Some geologists identified the most recent of the alleged catastrophic events as none other than the Flood recorded in the first book of the Bible, thus linking human history on the end of earth history. Few geologists interpreted the story of the Flood literally, still less believed that the whole history of the earth had been very short. But catastrophist geology did come to be associated in the public mind with a belief in the authority of the Bible, and hence with political and social conservatism and the maintenance of the cultural supremacy of the established (Anglican) religion in England.

The work of the Reverend William Buckland (1784-1856), a native of Devonshire, illustrates this point; he became one of the most prominent geologists in early nineteenth-century Britain, and a leading catastrophist. In 1813 he was appointed Reader in Mineralogy at Oxford (the then new science of 'geology' was added later). His charismatic teaching persuaded some of his students to become the next generation of geologists, inspiring them to go into the field to test for themselves the validity of his arguments. Among these students was Charles Lyell, who began by supporting his teacher's catastrophism but later became the most prominent advocate of the alternative uniformitarian approach.

Buckland was the first scientist to recognize fossil animal faeces, coprolites, which he recorded from ichthyosaurs at Lyme Regis. De la Beche could not resist making this caricature of Buckland's 'Coprolitic Vision'.

Like all other geologists of his generation, Buckland assumed that the formations he studied on the Dorset and Devon coast, and many others elsewhere, had accumulated during unimaginably vast spans of time. But he believed that a sudden and violent 'geological Deluge' in the relatively recent past had caused many other features, such as the excavation of valleys and the deposition of boulder clay or till; he called the latter 'diluvial' to distinguish them from the subsequent 'alluvial' deposits. He did not believe that valleys could have been eroded by the streams that now flow in them, no matter how much time was allowed, or that till and erratic blocks could have been emplaced by any ordinary process. And he believed that the Deluge was the event that had been dimly recorded as Noah's Flood, in what was then regarded as the oldest extant human records.

He explained his diluvialist ideas in his inaugural lecture at Oxford (*Vindiciae Geologicae*, 1820) and more fully in a major prize-winning paper to the Royal Society, published in book form as *Reliquiae Diluvianae* (1823). The Dorset and East Devon Coast featured prominently in his argument:

'Some of the best examples I am acquainted with of valleys thus produced exclusively by diluvial denudation occur in those parts of the coasts of Dorset and Devon which lie on the east of Lyme, and on the east of Sidmouth; and the annexed views and map will illustrate, better than any description, the point I am endeavouring to establish. In passing along this coast… we cross, nearly at right angles, a continual succession of hills and valleys, the southern extremities of which are abruptly terminated by the sea; the valleys gradually sloping into it, and the beach or undercliff, with a perpendicular precipice. The main direction of the greater number of these valleys is from north to south; that is, nearly in the direction of the strata in which they are excavated: the streams and rivers that flow through them are short and inconsiderable, and incompetent, even when flooded, to move anything more weighty than mud and sand' (1823).

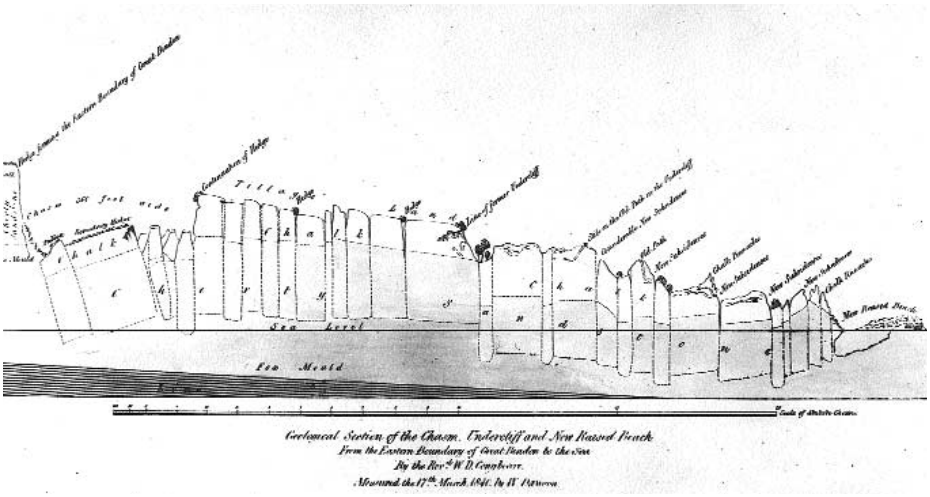
Henry De la Beche also occupies a pivotal role in the fluvialist-diluvialist debate. Using the River Char in West Dorset as an example, he was even more specific than Buckland about the origin of valleys:

'Valleys of the first class, which have been usually termed valleys of denudation, are very common in districts where rocks are not far removed from an horizontal position; these, to take examples from our own country, are very abundant in Dorsetshire and the east of Devon. In these valleys, the former continuity of the strata on either side is most apparent, and neither elevations nor depressions could have caused them: they are exclusively due to the excavation of the materials by which their sides are connected. The question then arises, what has excavated them? At the bottom of each of these valleys we find a small stream, the natural drain of the land. Could these streams have cut such valleys as they now flow through? If there be any true relation between cause and effect, they could not.' (De la Beche 1829)

AN EARLY SCIENTIFIC DESCRIPTION OF A LANDSLIDE

The Reverend William D Conybeare (1787-1857) was also a major opponent of the principle of uniformitarianism and argued strongly against James Hutton and Sir Charles Lyell. In particular he could not accept that streams carved the valleys they flowed in. Even, he said, if *'we will but throw all prejudice aside, and allow a sufficient number of millions (I should rather say infinit-illions) of ages '..'even if continued for ever and a day' .. rivers cannot create the features of the valleys they flow in'*. Such time was beyond reasonable comprehension.

Conybeare is a major but unappreciated figure in the history of geotechnical science. A convinced catastrophist and diluvialist he was a friend and field companion of William and Mary Buckland, who visited him in his parish at Axminster. Later Dean of Llandaff he was an outstanding scientist perhaps best remembered for his work on the river gravels of the River Thames and for the discovery and description of the Lyme Regis plesiosaur with De la Beche and Mary Anning. As a catastrophist, he had the singular piece of luck, to be one of the first to see the results of the most dramatic landslide ever to occur in Great Britain, the famous event of Christmas Eve 1839 at Bindon on the East Devon Coast (Conybeare et al., 1840).



One of the remarkable diagrams from Conybeare's description of the Bindon landslide, showing the landslide blocks in cross-section, settled into liquefied sands. This is the first description of liquefaction in the scientific literature.

In retrospect, this was a most exciting and influential study, for with Mary and William Buckland, he wrote what one of the two first scientific monographs on the mechanism of a landslide. Only the account of the Rössberg landslide in Switzerland may pre-empt it. The Bindon landslide is a massive block slide of approximately 4.2 million cubic metres that moved seaward to form a spectacular chasm and displaced block, known as Goat Island. Conybeare and Buckland noticed the way in which the block slid forward but with material in the chasm subsiding to leave a tilted floor and a number of detached pillars. They proposed a mechanism in which the fine Upper Greensand was liquefied and was squeezed out, and this is certainly the first scientific description of the process of lateral spreading. Together with Mary Buckland who made beautiful drawings of the failure, the two scientists made a wonderfully meticulous description of the event that remains as a landmark in attempts to explain and understand mass movements. The drawings are an important part of the history of scientific illustration (Brunsden, 2000 contribution to nomination).

William Daniel Conybeare (1787-1857).

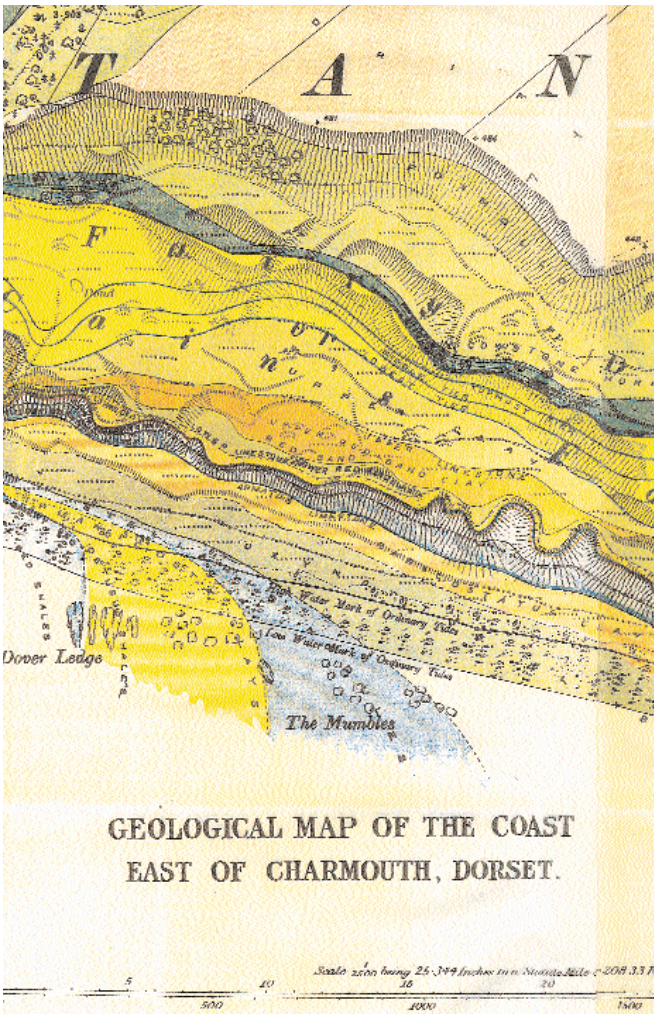
Other advances in specialised aspects of the earth sciences drew on evidence from the nominated Site. Osmond Fisher (1817-1914) a mathematician and pioneer geophysicist was born at Osmington and was curate at Dorchester. He carried out geological investigations that led to the first adequate description of the Purbeck Beds in 1852. He was inspired by this to write the first ever textbook on theoretical geophysics *The Physics of the Earth's Crust* (1881 and 1889). He was the first to propose that the crust beneath the oceans was younger

than that beneath the continents, anticipating ideas which would later become the foundations of modern plate tectonics theory (Wilding, 1988). The German palaeontologist Albert Oppel (1831-1865) used the ammonite succession of the Dorset coast within his pioneering studies of biostratigraphic zonation (Hallam, 1989), and a number of significant contributions to ammonite zonation have been made through studies of the Jurassic and Cretaceous faunas from the nominated Site. Stratigraphic investigations at Burton Bradstock and West Bay by Sydney Savory Buckman (1860-1929), helped lead him to the first proper demonstration of diachroneity in rocks of the same lithology. E. St. J. Burton's studies of the Purbeck Coast led him to the idea of substituting space for time in explanations of landscape evolution – a forerunner of the so-called 'ergodic hypothesis' of geomorphology (Brunsden, 2000 contribution to nomination).

THE CONTINUING IMPORTANCE TO SCIENCE

Since the earliest days of study, the nominated Site has provided inspiration for new generations of geologists and geomorphologists, representing many hundreds of scientists including those who have contributed to this nomination. The work of Joscelyn Arkell (1904-1958) is particularly notable. His *Jurassic Geology of the World* (1956) was the first example of a world-wide study of a system of rocks by a single person, and he began with a description of the Jurassic rocks of Dorset and East Devon, which he then took as the standard of reference. Many other leading scientists have been stimulated by the Dorset and Devon coasts. They include D.V. Ager, D.F.W. Baden-Powell, S.S. Buckman, Vaughan Cornish, J.F.N. Green, T.H. Huxley, A.J. Jukes-Brown, W.D. Lang, L.F. Spath, A. Strahan, F.B.A. Welch, and H.B. Woodward.

The pace of scientific study on the Dorset and East Devon Coast shows no signs of diminishing. The nominated Site is one of the best-documented geological and geomorphological sites in the World. From the earliest days of geology to the present day the coast has generated an enormous volume of high quality scientific study. *A geological bibliography of Dorset* (Thomas and Ensom, 1989) lists around 4,000 references, of which the majority draw on the coastal sections. The earliest geological mapping of the coast dates from the 1820s, and the geology of the nominated Site and its surroundings has been thoroughly re-mapped by the British Geological Survey during the last four years. A full series of modern maps at 1:50,000 scale will be published during 2000 and 2001 for the nominated Site. More detailed mapping at 1:10,000, is also publicly available from the Survey. There is exceptional sub-surface information as a result of onshore and offshore oil exploration since the 1930s. South Dorset has more deep boreholes, some with an extended reach in excess of 8 km, and a greater density of seismic reflection data than anywhere else onshore within the UK (Barton, 1999 contribution to nomination; Underhill, 1998).



The remarkably detailed mapping of the Lower Lias by William Dickson Lang illustrates the level of stratigraphic detail within these sections. The beautiful maps he produced reflect years of meticulous recording and collecting.

The nominated Site therefore provides a resource of immense and continuing research interest, and which is exceptionally well-used and important for education about geology and geomorphology for groups of all ages. It continues to be a venue for major symposia, for example three major events on geomorphological research, Purbeck environments and the life of Mary Anning

respectively, were held during 1999. It probably contains the most visited geological sections in Europe, attracting both professionals and amateurs. The section through an oil basin, and the level of sub-surface data is of particular value for training in petroleum geology. Formal educational groups from both schools and universities are also a major source of visits.

Leading edge earth science research continues within the nominated Site. A representative list of some of the projects which are currently in progress include:

- Vertebrate finds within Middle Triassic Otter Sandstone Formation, offering new correlations with Triassic of Russia
- Description of a new procolophonid from the Otter Sandstone Formation
- Triassic magnetostratigraphy
- Liassic plesiosaur phylogeny
- Studies on new specimen of *Scelidosaurus* from the Charmouth area
- Natural History Museum research project into the fauna and flora of the Purbeck Limestone Group
- Hettangian-Sinemurian ammonite stratigraphy
- Palynology of the Bathonian-Callovian boundary
- Bathonian-Callovian ammonite stratigraphy and taxonomy
- Description and analysis of Purbeck Group mammal faunas
- Jurassic/Cretaceous boundary definition in continental sequences
- Microvertebrate studies, particularly fish scales, teeth and spines in both carbonate and clastic formations
- Palaeoenvironmental studies of the Fleet
- Digital photogrammetry of Chesil Beach
- Side-scan sonar surveys of seabed morphology
- Landslide Studies and instrumentation of Lyme Regis
- Planktonic foraminifera assemblages from the Oxford Clay Formation

The Associated Landscape and Cultural importance of the Dorset and East Devon Coast

The coastal exposures and geomorphological features of the Dorset and East Devon Coast form distinctive features of a wider protected landscape. The natural beauty of the nominated Site lies within the landforms which lie within the site boundary, including the cliffs of East Devon, the Axmouth to Lyme Regis Undercliffs and other landslides, Chesil Beach and the Fleet and the coastlines of Portland and Purbeck. These extended stretches of attractive coastal features are enhanced, throughout most of the nominated Site, by their setting in undeveloped and attractive countryside, and afforded protection by the wider protective designations and planning policies which apply to it. The geology displayed within the nominated Site has underpinned the development of the wider landscape and cultural life of the coast and countryside. This section of the nomination identifies the landscape and cultural associations of the Dorset and East Devon Coast, which help to define the aesthetic importance of the nominated Site in its own right, within the context of the surrounding inshore waters and countryside.

View of Kimmeridge Bay in winter snow. Clavell's Tower on the eastern side of the bay is a folly built in 1817 by the then landowner.

View of White Nothe, looking east. Some of the most atmospheric views of the coast occur in hazy conditions.

THE WIDER PROTECTED LANDSCAPES

Most of the nominated Site lies within two Areas of Outstanding Natural Beauty (AONBs): the East Devon AONB, and the Dorset AONB. AONB status is a statutory designation of the UK Government, which recognises countryside of outstanding landscape quality. The designation was introduced in the 1949 National Parks and Access to the Countryside Act, as an equivalent designation to National Parks suitable for particularly beautiful landscapes where the opportunities for extensive outdoor recreation (an essential objective of National Parks) are limited.

The primary purpose of AONB designation is to conserve natural beauty. It has been acknowledged by the UK's Countryside Agency that natural beauty cannot simply be defined as the visual appearance of the countryside alone, but needs to include factors such as landform, vegetation, man-made features, aesthetics and historic and cultural associations. The Wildlife and Countryside Act, 1981, states that *'the natural beauty of any land shall be construed as including references to the conservation of its flora, fauna and geological and physiographical features.'* Portland has not been included within the AONB. It does however provide a dramatic cultural landscape, dominated by the evidence of quarrying the renowned Portland Limestone as a building stone. The Island's landscape, including that of the coastline included within the nominated Site, is protected through policies in the County Structure Plan and the Weymouth and Portland Local Plan.

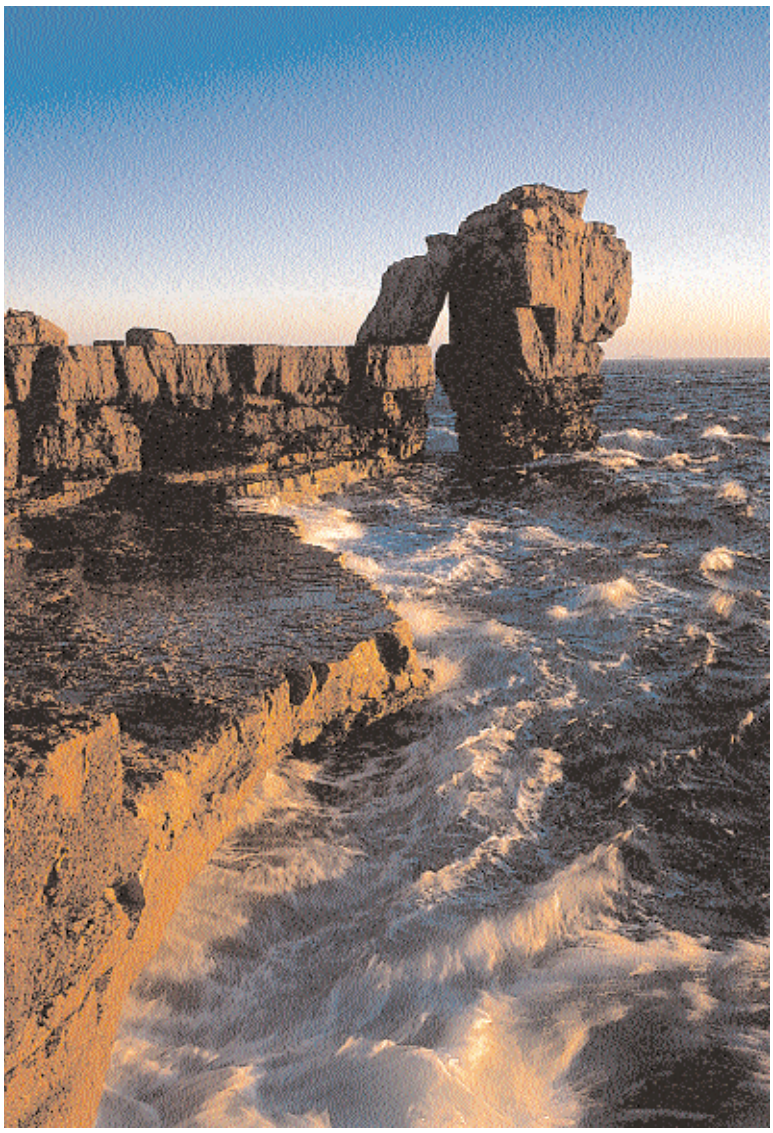
A further layer of protection is provided by the definition of three stretches of coastline as 'Heritage Coast'. This is a national, non-statutory definition has been applied to the most attractive undeveloped coastline in England and Wales. Heritage Coast definition has four objectives, summarised as follows:

- To conserve, protect and enhance natural beauty
- To facilitate and enhance the enjoyment, understanding and appreciation of the coast by the public
- To maintain and improve the environmental health of inshore waters
- To take account of local economic needs and promote sustainable economic development

These objectives are achieved through the protection of the landscape interests through the application of statutory planning policies produced by the local authorities, and by the funding of site-specific management. The boundaries of the AONBs and Heritage Coasts are shown in Figure 3 (page 10). The planning policies which apply to these areas are summarised in the Site Management Plan, and the management measures related to them are described in more detail below.

The landscape of both the East Devon and Dorset AONBs has been described in systematic landscape assessments carried out in 1993, and commissioned by the Countryside Agency (formerly the Countryside Commission). Further assessments of the whole of Dorset and Devon have also been carried out. Landscape assessment is a structured process whereby individual landscape units are described and analysed to determine their key characteristics and to map their distribution. Although it is tempting to base the landscape character areas on geology and landform, considerable emphasis has to be given to vegetation and land cover, land uses, health and age of elements comprising the landscape as well as cultural, historic and aesthetic aspects. Using an ordered approach means that one suitably trained surveyor will produce a very similar assessment to another (Burden & Le Pard 1995). Landscape assessments provide a record of the totality of the landscape at a particular date, they can therefore be used to identify landscape changes, as well as predict the effects of different types of landscape management.

Copies of the two relevant landscape assessments are provided in Appendix C to the nomination. The following distinctive elements of the coast were identified within them, and provide the landscape assessors' views of the landscapes of the nominated Site at that time.



Pulpit Rock near Portland Bill. This distinctive rock is formed of Portland Limestone.

East Devon Area of Outstanding Natural Beauty (all quotations from Countryside Commission 1993b)
The landscape assessment identified three landscape character areas (areas which share similar landscape characteristics) which include land lying within the nominated Site:

- Lower coastal cliffs of East Devon: from Exmouth to Budleigh Salterton and eastward to Ladram Bay. The relatively straight line of soft, red, cliffs, with few coves or trees to give shelter, creates a stark appearance, till at Ladram Bay, the stack and cliffs cut into the red sandstone provides nesting sites for numerous sea birds, and provide an unusually sculptural element to the landscape.

- Higher coastal cliffs of East Devon: from Ladram Bay to Seaton. The combination of high, steep cliffs and coombes forms a spectacular cliff edge, which falls and climbs steeply, making for vigorous walking on the coast path.

- The Undercliff: an overgrown wilderness of broken ground with naturally-established woodland and areas of tangled scrub and bracken. It is one of the last untamed wildernesses in southern England.

Dorset Area of Outstanding Natural Beauty and Isle of Portland (Statements from Countryside Commission, 1993a or Burden and Le Pard, 1995)
The landscape assessment identified seven landscape character areas, which include land lying within the nominated Site:

- West Dorset farmland: the West Dorset coast, from Lyme Regis to Burton Bradstock, is particularly beautiful and secluded. Whilst most of the coast has a wild and exhilarating feeling, tempting you to walk further and further along the coast path, at Black Ven, between Lyme Regis and Charmouth, the opposite can be the case. Here, at the site of the one of the largest mud flows in Europe, the dark, oppressive cliffs produce a feeling of insecurity, which is not just psychological, as the unstable ground can be dangerous.

- West Dorset Coastal grasslands: separated from the landscape inland by steep coastal ridges, this sparsely populated part of the Dorset coast, between Burton Bradstock and Abbotsbury, seems remote and windswept. There are spectacular views along Chesil Beach to the Isle of Portland and to the Headlands of West Dorset. The erosive force of the elements is very evident and evokes a strong sense of exposure while, at the same time, creating feelings of insecurity and vulnerability.

- Isle of Portland and Chesil Beach: the Isle of Portland is a slanting outcrop of limestone which forms a dramatic peninsula of rock jutting into the English Channel at the end of Chesil Beach. The cliffs are very dramatic and there is an exhilarating feeling of being on the edge of the country. The sea and sky become progressively more dominant towards Portland Bill where the buildings seem huddled and vulnerable on the final ledge before the slab of Portland Bill slips into the sea. This is not a landscape where scars can be masked so there is a strong sense of history and continuity with the industrial past. Chesil Beach, though clearly natural, has a very regular, almost artificial, appearance, which makes it one of the most unusual landscapes of the Dorset Coast, emphasised by the curious grading in pebble sizes, small at the north-western end, large at the south-eastern.

- South Dorset lowlands: on the western side, the South Dorset lowlands border the Fleet between Abbotsbury and Wyke Regis. This inner 'coastline' bordering the Fleet resembles the margins of a lake with the mosaic of fields and hedgerows extending right down to the water's edge. On the eastern side, the lowland coast runs from Weymouth to Ringstead, with low soft cliffs. This is a surprisingly remote part of the coast, given the proximity of Weymouth, with the views to the sea dominated by the bulk of Portland.

- Chalk uplands: the Chalk uplands meet the coast at White Nothe, and the high chalk cliffs continue almost uninterrupted until Worbarrow Bay. The stark white cliffs provide a dramatic backdrop to views along the coast, which includes the remarkable Lulworth Cove and Durdle Door.

- West Purbeck coast: the undulating west Purbeck coast, from Worbarrow to St. Aldhelm's Head, is underlain by the relatively soft Kimmeridge clay, forming a coastal vale backed by a steep limestone ridge. It stands as a dramatic horizon, notched at the summits of Swyre Head and Tyneham Cap, and forming abrupt crumbling cliff faces where Houns-tout Cliff and Gad Cliff meet the coast.

- Purbeck limestone plateau: this is a powerful, unrelenting landscape, which seems stripped to its bare essentials, accosted by the sea, stubbornly resistant, yet sculpted over centuries by the wind. Nothing is soft or pretty. The coast has been carved by man over the centuries, ancient field systems, and more recent quarries dominate the view along the cliffs.

THE CULTURAL INFLUENCE OF THE GEOLOGY AND GEOMORPHOLOGY

The associated cultural interests of the nominated Site relate to the influence of geology on the pattern of settlement and past use of the coast. East Devon and Dorset contain numerous archaeological and historic sites, many of which provide evidence of how people have used the sea and its resources over time, and exploited its rocks and minerals. Many sites and features are protected as Scheduled Ancient Monuments (under the Ancient Monuments and Archaeological Areas Act, 1979), Listed Buildings, or Conservation Areas (Planning (Listed Buildings and Conservation Areas) Act, 1990). These associated cultural interests generally lie outside the boundary of the nominated Site, but provide an important context for it.

Before the development of agriculture, people were hunter-gatherers, and the coast provided an invaluable resource of animals and plants. Excavations have show that the Mesolithic people of Portland (about 8000 - 4000BC) gathered limpets and other shellfish in large numbers for food. There is scattered evidence for the use of the coast and offshore waters during the Bronze Age (2000 - 700BC). This is most apparent in the numerous barrows and other sites just inland from the coast. Some finds point to early coastal trade. Excavations on a barrow on the Knoll, near Puncknowle, revealed slabs of Quarr stone, which must have been brought by sea from the Isle of Wight. The discovery of three bronze swords on the harbour bed by the Backwater Bridge, crossing Weymouth Harbour could indicate a ritual site of a type well-known from inland waters, but rarely met within estuaries or intertidal waters.

The Iron Age hill-fort at Flowers Barrow. The progressive, long-term change to the coast, as a result of coastal erosion is clearly shown.

There is clear evidence of the coast's importance during the Iron Age (700BC - 43AD). Large hill forts were built along the coast, sometimes overlooking small harbours. Sidbury Castle, just inland from Sidmouth, Hawkesdown Hill at Axmouth, Abbotsbury Castle, Chalbury Hill outside Weymouth, the unusual earthworks at Bindon Hill above Lulworth Cove and the impressive Flowers Barrow at Worbarrow Bay are good examples. Flowers Barrow is gradually being lost to the sea, illustrating clearly the inexorable process of coastal erosion.

There is evidence for Roman activity along the coast, in addition to the Kimmeridge shale industry, which is discussed below. There were small Roman settlements, probably ports, at Axmouth, Sidmouth and Weymouth; there are also the remains of a Romano-British temple, and settlements near Bowleaze Cove. Finally, there are scattered Roman finds on Chesil Beach and off Lulworth Cove which could be chance losses, but might equally be evidence of shipwrecks.

During late Saxon and Medieval times settlements along the coast began to develop on their present sites. Melcombe Regis (the precursor of modern Weymouth) and Lyme Regis developed into important ports. By the thirteenth century Lyme Regis harbour was protected by The Cobb, which in its present form is one of the most distinctive historic harbour constructions in the world. It was through the port of Melcombe Regis that the Black Death entered Britain in 1348, which was to kill over one third of the population of the country during the following two years. Despite such set-backs the various ports along the coast have developed, and all the towns along the coast have collections of historic buildings related to former trading activities.

The growing maritime trade, and the dangers of the coast to ships, led to the building of two chapels, on St. Aldhelm's Head and St. Catherine's near Abbotsbury, to act as sea marks for sailors and to provide accommodation for priests to pray for mariners. It was their value as sea marks that led to the survival of these very unusual buildings. In 1849 work began on the massive Portland Breakwater, which took twenty-three years to build, and created what was then the largest artificial harbour in the world. The breakwaters continue to provide protection for the harbour, and are a Scheduled Ancient Monument.

Mineral extraction

Mineral exploitation from the nominated Site and its surroundings has a long history. The earliest evidence comes from the Mesolithic, when people used the fine-grained chert from Portland for tools, probably collecting blocks of the stone as it eroded from the cliffs. Tools made from this stone have been found as far west as Cornwall, and as far east as Surrey.

Exploitation of the Kimmeridge Shale began during the Bronze Age (2000 - 700BC). This oil rich mineral was carved into various decorative objects, notably cups and bowls. The Caergwrle bowl, found in Clwyd, Wales is a particularly important Kimmeridge Shale object: it is carved to represent a large boat, which is the earliest representation of a boat known from Britain. Kimmeridge Shale continued to be exploited during the subsequent Iron Age, when it was carved into bracelets, first by hand and later on pole lathes. This form of shale-working continued through the Iron Age and was expanded by the Romans who not only made jewellery, but also items of furniture from the shale.

Owing to quantities of oil found in the shale it can be burnt as a fuel, though it gave off a particularly foul smell. In the seventeenth century it was used as fuel for an alum works and a glass furnace. Both of these enterprises failed but the remains of the glassworks were excavated in 1980-81, owing to their importance as one of the first oil-fired glassworks ever built. In the nineteenth century further attempts were made to exploit the shales, when it was mined and exported for refining into oil and tar. In 1859 oil from Kimmeridge even lit the streets of Paris, but all these enterprises failed though remains can be found around Kimmeridge Bay, now an important industrial archaeological site.

Quarrying

The most direct way in which the geological interests within the nominated Site have influenced the local cultural landscape is through the use of stone. Throughout the coast and countryside, local stone has been used within vernacular architecture, and the villages show a progressive change in colour related to the way in which the rock succession dictated the availability of local stone. The use of local stone in Dorset has been documented in detail by Thomas (1992-1995), and in East Devon is summarised by Butler (1986). An indication of the scale of activity is the existence in the coastal area of 132 recorded quarries for local stone between Lyme Regis and Portesham (Thomas, 1993).

Exeter Cathedral. Much of the cathedral is built of Beer Stone quarried and mined adjacent to the nominated Site.

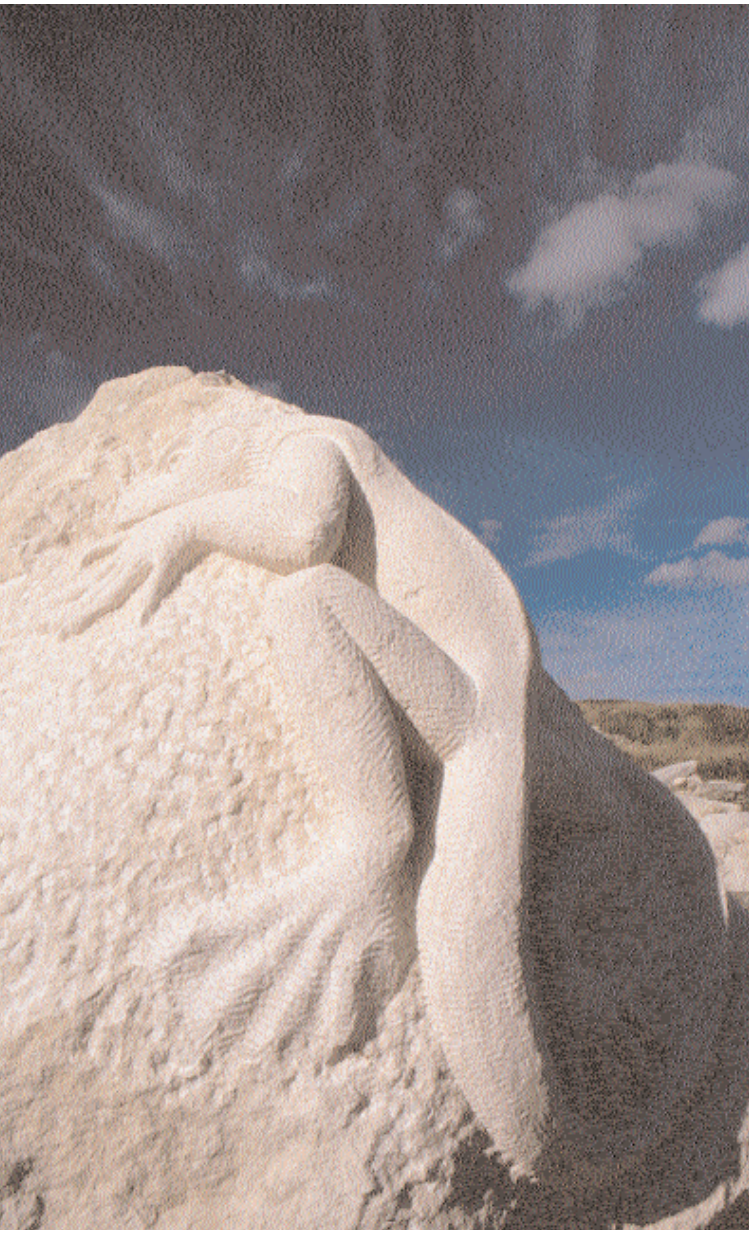
The major quarrying activity in the area is associated in particular with the fine building stones of Beer, Purbeck and, above all, Portland. Stone has been quarried and mined at Beer since Roman times, always by hand. The stone is beautiful and highly prized by stone-masons. It has been used on many famous buildings including St. Paul's Cathedral, Winchester Cathedral, Westminster Abbey, Exeter Cathedral, the Tower of London and Hampton Court. The original workings are now managed and conserved as exhibition caves. One ancient adit appears in the cliffs of Underhooken within the nominated Site.

Purbeck marble was first quarried by the Romans. It was used in quantity for ornamenting many of the great medieval cathedrals. Little trace of the marble quarries survives, although their products in churches the length and breadth of Britain. Purbeck freestone has been quarried for local use for many centuries, but it was not until the seventeenth century that it was quarried for export. The stone was usually dug from adits driven diagonally into the ground, or from cliff quarries or horizontal adits driven into sea cliffs. The sea cliff quarries, and associated adits, are first recorded in the early eighteenth century and remained in use until the 1960s. Extensive remains of the quarries survive: galleries, quarry ledges, remains of buildings, traces of old cranes and winches, docks and even graffiti.

View of the incline plane at Portland used to transport stone to the harbour. Portland is a fine example of an industrial landscape resulting from limestone quarrying.

The most famous building stone on the Dorset and East Devon coast is to be found on the Isle of Portland. The stone has been extensively quarried since the seventeenth century, and evidence of past quarrying can be found all over the island. The East Weares show traces of the earliest quarrying, where blocks of stone were tipped over the sides of the cliffs, then loaded into boats from piers, traces of which still survive. Portland Bill is still littered with waste blocks of stone, whilst two hand cranes survive, now used for launching boats, and the remains of others can be seen. There are several docks cut from the rock, and the remains of a railway. At Tout Quarry there is a wealth of remains, of

railways, of stone shelters and of the whole process of cutting the stone. Portland Stone has been used internationally for centuries on major public buildings. It first attracted public notice when Inigo Jones used it in the Banqueting House at Whitehall (c.1620). It was also extensively used by Sir Christopher Wren in St. Paul's Cathedral and other London churches after the great fire of London, 1666. Subsequently it has been used in many major public buildings and monuments. Notable twentieth century examples include the Cenotaph and Waterloo Bridge (London), Stormont Castle (Northern Ireland) and the Government Buildings (Dublin). Portland Stone was the choice of the UK Government as the contribution to the façade of the United Nations building in New York, USA.



Tout Quarry Park. This disused quarry is open to the public, and contains many fine in situ sculptures.

Artistic associations

In the late eighteenth century writers and artists discovered in the natural landscape, the wonder of the picturesque, and delighted in the forms of rock, sea and wild vegetation untouched by man. At the same time the benefits of sea-bathing were advocated for medical reasons, and places that could satisfy the physical benefits of sea-bathing with the aesthetic benefits of picturesque landscapes were soon developed as holiday centres. Artists of all descriptions were attracted to and inspired by the Dorset and East Devon Coast.

One of the first, and most distinguished visitors was Jane Austen, who visited Lyme Regis on several occasions at the very beginning of the nineteenth century. She included a description of the countryside around Lyme in her novel *Persuasion*, which was published posthumously in 1818. In it she wrote:

'Charmouth, with its high grounds and extensive sweeps of country, and still more its sweet retired bay, backed by dark cliffs, where fragments of low rock among the sands make it the happiest spot for watching the flow of the tide, for sitting in unwearied contemplation; - the woody varieties of the cheerful village of Up Lyme, and, above all, Pinny, with its green chasms between romantic rocks, where the scattered forest trees and orchards of luxuriant growth declare that many a generation must have passed away since the first partial falling of the cliff prepared the ground for such a state. This scene so wonderful and lovely is exhibited, and may more than equal any of the resembling scenes on the far famed Isle of Wight.'

The countryside around Lyme Regis must have made a very strong impression on Jane Austen as she rarely included any description of landscape in her novels. She also set one of the key scenes of the book on The Cobb, the harbour wall at Lyme Regis

Seventy years later, Thomas Hardy, the great Dorset writer, was fascinated by the coast of Portland. In *The Trumpet Major* (1880) he describes his heroine walking across Portland:

'[She] reached the base of Portland Hill. The steep incline before her was dotted with houses, showing the pleasant peculiarity of one man's doorstep being behind his neighbour's chimney, and slabs of stone as the common materials for walls, roof, floor, pig-sty, stable-manger, door-scraper and garden-stile. Anne gained the summit, and followed along the central track over the huge lump of freestone which forms the peninsula, the wide sea prospect extending as she went on. Weary with her journey, she approached the extreme southerly peak of rock, and gazed from the cliff at Portland Bill. The wild, herbless, weather-worn

promontory was quite a solitude, and, saving the one old lighthouse fifty yards up the slope, scarce a mark was visible to show that humanity had ever been near the spot.'

In the first half of the twentieth century, literature in Dorset was dominated by the remarkable Powys family several members of which lived at Chaldon Herring. Llewelyn Powys wrote numerous short descriptive pieces on the Dorset landscape, which frequently describe the coast near his home. In his *Dorset Essays* of 1935, he writes extensively about the Purbeck coast, describing Bats Head as:

'A remarkable headland. On afternoons of the wildest weather a man may rest here in tranquillity, some peculiarity in the structure of the cliff causing the rushing gales to cast themselves straight up from its sheer walls, so that the crest of the headland remains in absolute calm. Seated on this halcyon ledge it is possible to observe in peace the riot of the sea coast below; to look down upon great black-backed gulls flying in wide circles along the margins of the breaking waves.'

John Cooper Powys, on the other hand, was a great novelist, who used the landscape in his writings almost as Hardy did. In *Maiden Castle* (1937) he describes how the influence of the coast can be felt inland:

'The wind began to shift, blowing now from the south-south-west, straight across Maiden Castle from Chesil; and as its palpable but invisible form swept inland from the beach across the earthwork, there adhered to the substance of its presence particles and flakes, atoms and motes, gathered up from the surface of that huge parapet of pebbles and from the heaps of stranded seaweed left to perish there between its shelving ridges.'

More recently, John Fowles has lived at Lyme Regis for many years. His multi-layered novel *The French Lieutenant's Woman* (1969) is mostly set in Lyme Regis in the mid nineteenth century, with one of its chief protagonists being an amateur palaeontologist who searches the Undercliff of East Devon for fossils:

'The Undercliff - for this land really is the mile long slope caused by the erosion of the ancient vertical cliff- face – is very steep. Flat places are as rare as visitors. But this steepness in effect tilts it towards the sun; and it is this fact, together with the water from the countless springs, that lends the area its botanical strangeness – its wild arbutus and ilex and other trees rarely seen growing in England; its enormous ashes and beeches; its green Brazilian chasms choked with ivy and the liana of wild clematis; its bracken that grows seven, eight feet tall; its flowers that bloom a month earlier that elsewhere in the district. In summer it is the nearest this country can offer to a tropical jungle. It has also, like all land that has never been worked or lived in by man, its mysteries, its shadows, its dangers – only too literal ones geologically since there are crevices and sudden falls that can bring disaster, and in places a man with a broken leg could shout all week and not be heard.'

Other important authors associated with the nominated Site include J.R.R. Tolkien, who visited the area on several occasions, and as a child, found the jaw of an ichthyosaur at Lyme Regis; he described it as a 'petrified dragon' (Hammond and Scull, 1995), which may have fuelled the fascination with the mythology of dragons which led to his great fantasies such as *The Hobbit* (1935). The artist and author Beatrix Potter visited Lyme Regis in the early twentieth century. This visit which inspired the children's story *The Tale of Little Pig Robinson* (1930) (Hobbs, 1972). In this book, Stymouth, where Robinson embarks on his sea voyage, is located by Potter in Devonshire. The description of *'a pretty town…sheltered by red headlands, in a basin of hills slipping seaward into Stymouth harbour, which is surrounded by quays and the outer breakwater'* suggests an imaginative hybrid of Lyme and Sidmouth. There is good descriptive writing about the East Devon Coast in the minor classic *A poor man's house* written by Stephen Reynolds of Sidmouth in 1908 (Hoskins, 1954).

Mary Anning has been a source of literary inspiration in her own right. At least five different children's books have been written about her, including a story in Japanese (right).

Visual artists, too, have long appreciated the coast of Dorset and East Devon. Two of the greatest landscape artists of the nineteenth century, John Constable and J. M. W. Turner both painted and sketched along the coast. Turner visited the coast on several occasions between 1811 and 1824, making sketches and watercolours, which were later printed as *Picturesque Views of the Southern Coast of England*. John Constable visited Osmington near Weymouth several times, where his friend John Fisher was vicar. In 1816 he spent his honeymoon here, having been attracted by John Fisher's descriptions of fine hills and views. The artist and teacher Francis Newbery came from Bridport. His great student, the artist and architect Charles Rennie Mackintosh, lived for a time in Worth Matravers, painting several idiosyncratic landscapes of Purbeck. The famous Pre-Raphaelite painter John Everett Millais painted one of his major works, *The boyhood of Raleigh*, at Budleigh Salterton in 1870. He set the painting on the beach and the cliffs can be seen in the background. The artist Paul Nash, who lived in Dorset during the 1930's, depicted the coast in a wide variety of media. He painted a series of watercolours of the Purbeck Coast and Lyme Regis; the view of Kimmeridge Bay was later re-worked as a poster for the Shell oil company. He also extensively photographed the coast and used these pictures as illustrations in his book *Dorset: a Shell Guide* (1936) which includes this description of the shoreline at Kimmeridge Bay:

'A low wall of black cliffs, steely blue at some angles of the sun's light when they appear crusted with clots of emerald-green moss. The shores beneath present the wildest chaos. Stones and boulders of all sizes and forms seem to have been hurled and scattered over the smooth, gleaming platform of the shale. Fantastic seaweeds, wreckage and the flashing pools bewilder the sight.'

Associated Wildlife Interests of the Nominated Site

Although the nominated Site is proposed for inscription primarily on the grounds of its outstanding universal value to the earth sciences, it should also be noted that it also includes a series of important habitats, and is home to many rare species of plants and animals. The range and complexity of coastal wildlife habitats in Dorset and East Devon owe their existence to the rich geological and geomorphological setting. Climate and weather combine to maintain a variety of soils and exposures of hard and soft rocks, on which the wildlife habitats have evolved.

The Lulworth Skipper butterfly is one of a number of species unique to the area.

Almost the entire undeveloped coastline is rich in wildlife. Examples include the internationally important cliff-top habitats found between the River Sid and Seaton Hole. Special features here include a locality for rare purple gromwell, *Lithospermum purpureo-caeruleum,* and a seasonally-flooded pool containing the nationally rare fairy shrimp, *Chirocephalus diaphanus*. The ash woodland that has developed on the Axmouth-Lyme Regis Undercliffs represents one of the best examples of naturally regenerated woodland in Britain, with much of this established since 1905. Moving west, Chesil Beach and the Fleet are of recognised international conservation value, while the landslipped cliffs and cliff-top grasslands of West Dorset support important insect and plant communities. Portland's limestone outcrop is a haven for birds, plants and invertebrates that flourish along the natural sea cliffs, and in the abandoned quarries. The island supports Portland rock sea lavender, *Limonium recurvum portlandicum*, a unique sub-species, and the Portland ribbon wave moth, *Idaea degeneraria*, which is also found at one other site the Purbeck coast. At White Nothe, chalk cliffs and grasslands are home to the Lulworth skipper butterfly, *Thymelicus acteon*, virtually confined to this coastal stretch in Britain. The limestone cliffs from Durlston Head to St. Aldhelm's Head support substantial numbers of early gentian, *Gentianella anglica*, and the rare early spider orchid, *Ophrys sphegodes*.

Much of the surrounding cliff-top grasslands in Dorset and Devon is rich in wildlife. These flower-rich meadows are near Durdle Door.

On land, important sites and areas for wildlife receive protection from a range of different nature conservation designations, which have statutory weight at international, European and national levels. Protection is provided to these areas through protective planning policies, and through a range of consent procedures where English Nature, the Government's statutory nature conservation adviser, has an official role. The main designations which have been applied to the nominated Site, and the principal wildlife interests for which they are cited are set out below.

Special Areas of Conservation (SAC) identified under the European Council Habitats and Species Directive (92/43/EEC)

- Sidmouth to West Bay candidate SAC: the landslide vegetation is very varied and includes pioneer communities on recent slips, calcareous grassland and scrub on detached chalk blocks and extensive natural woodland dominated by ash, *Fraxinus excelsior,* or sycamore, *Acer pseudoplanatus*.

- Chesil and the Fleet candidate SAC: the Fleet lagoon supports extensive populations of two species of eelgrass, *Zostera* spp., and three species of tasselweed, *Ruppia* spp., including the rare spiral tasselweed, *R. cirrhosa*, and a diverse fauna that includes a number of nationally rare and scarce species. Chesil Beach supports the most extensive occurrences of the rare sea-kale, *Crambe maritima*, and sea pea, *Lathyrus japonicus*, in the UK.

- Isle of Portland to Studland Cliffs candidate SAC and St Alban's [St Aldhelm's] Head to Durlston Head candidate SAC: the cliffs support species-rich calcareous grassland with species that are rare in the UK, such as wild cabbage, *Brassica oleracea var. oleracea*, early spider-orchid, *Ophrys sphegodes*, and Nottingham catchfly, *Silene nutans*. These two sites form a single unit of cliffed coastline some 40 km long. They support important populations of early gentian, *Gentianella anglica*, numbering several thousands of individuals in botanically-rich limestone grassland.

Special Protection Areas (SPA) identified under the European Council Birds Directive (79/409/EEC), and Ramsar sites identified under the Ramsar Convention on Conservation of Wetlands

- Chesil & the Fleet SPA and Ramsar Site: the Fleet supports fifteen specialist lagoonal species - more than any other UK site - and five nationally scarce wetland plants as well as ten nationally scarce wetland animals. Chesil Bank is one of the most important UK sites for shingle habitats and species. It is a breeding site for little tern, *Sterna albifrons*, and is an over-wintering site for a variety of waterfowl and wading birds.

- Exe Estuary SPA and Ramsar Site: the estuary regularly supports over 20,000 waterfowl during the winter months. This includes internationally important populations of dark-bellied brent goose, *Branta bernicla bernicla,* avocet, *Recurvirostra avosetta,* and slavonian grebe, *Podiceps auritus.*

Full details of the SACs and SPAs, relevant to the nominated Site, are included in Appendix M of the nomination.

Sites of Special Scientific Interest notified under the Wildlife and Countryside Act, 1981

In addition to the earth science interests within the Sites of Special Scientific Interest (SSSI) the following wildlife interests which relate to land within the nominated Site are also noted in the relevant SSSI citations. The boundaries of the SSSIs and full details of the relevant citations are provided in Appendix B of the nomination.

- Exe Estuary SSSI: the waters, foreshore and low-lying land of the Exe estuary are of international importance for wintering wildfowl and waders. Many rare species of plants occur too, whilst the sandbanks and mudflats support communities of invertebrates that are of national significance.

- Otter Estuary SSSI: the estuary contains a wide range of saltmarsh communities which, together with additional species of tall herb and scrub, support high numbers of breeding and over-wintering bird species.

- Sidmouth to Beer Coast SSSI: this stretch of coastline supports the most westerly example of species-rich chalk grassland in England and a diverse invertebrate fauna, including the nationally scarce rufous grasshopper, *Gomphocerippus rufus*, grey bush cricket, *Platycleis albopunctata* and bog bush cricket, *Metrioptera brachyptera*.

- Axmouth to Lyme Regis Undercliffs SSSI: because of its isolation, plant and animal communities have developed virtually untouched by man. In particular, a species-rich, ungrazed, coastal ash woodland has developed.

- West Dorset Coast SSSI: the landslips, seepages and other cliff features provide varied conditions, which support a diverse insect fauna, particularly rich in rare species.

- Chesil and The Fleet SSSI: Chesil Beach has large and nationally important populations of sea-kale, *Crambe maritima*, yellow-horned poppy, *Glaucium flavum,* and sea pea, *Lathyrus japonicus*. The Fleet is extraordinarily rich in wildlife; outstanding communities of aquatic plants and animals are present, and it supports a large number of wildfowl and waders.

- Isle of Portland SSSI: the Island has a rich limestone flora, with a diverse range of plants. Portland is one of the richest coastal limestone sites for lichens in the British Isles.

- Portland Harbour Shore SSSI: extensive, rich maritime grassland adjacent to the nominated Site, similar to that in adjacent Chesil and the Fleet SSSI.

- South Dorset Coast SSSI: supports an outstanding array of local and maritime species, including the largest national populations of two rare species – early spider orchid, *Ophrys sphegodes*, and Lulworth skipper, *Thymelicus acteon*.

- Purbeck Ridge (east) SSSI: rich grassland flora including the scarce Early Gentian, *Gentianella anglica*, and Nottingham catchfly, *Silene nutans*. The site is of national importance for the scarce Adonis Blue, *Lysandra bellargus*, and supports other scarce and local species including small blue, *Cupido minimus*, and Lulworth skipper, *Thymelicus acteon*.

- Studland Cliffs SSSI: the cliffs are important for birds, with several species nesting. Rich cliff-top grassland.

Offshore, some areas of the marine environment adjacent to the nominated Site have been well studied including the Fleet, Durlston Marine Research Area and Purbeck Marine Wildlife Reserve. The rocky foreshore also supports notable communities, such as the honeycomb worm reefs (formed by polychaete worm, *Sabellaria alveolata*) at Ladram Bay. The Fleet is of outstanding marine conservation value, supporting rare or unique communities of fauna, and extensive sea-grass meadows. One tiny snail, *Caecum armoricum*, thrives here in a restricted habitat but has only one other known live colony (Seaward, 1989). Portland Harbour is of high scientific interest with sandbanks and sandflats in the intertidal and shallow subtidal, grading into extensive mud plains characterised by a diverse and rare marine fauna, particularly of sea anemones, molluscs and worms. At Kimmeridge Bay lives the rare black-face blenny, *Trypterigion atlanticus*, and Cranch's spider crab, *Achaeus cranchii*. Off Handfast Point there are well-developed maerl beds of rare coral algae. Large numbers of awks, seaducks, grebes and divers use the inshore waters along the Lyme Bay coastline, especially during the winter months.

A semi-resident bottlenose dolphin population is present at Durlston, and there are frequent sightings in Lyme Bay and elsewhere.

The wildlife of the marine environment adjacent to the Dorset and East Devon Coast has been identified as of national importance through the identification as non-statutory Sensitive Marine Areas by English Nature. The importance of these areas includes the following aspects, and full details of the citations and areas are provided in Appendix N.

- Lyme Bay Sensitive Marine Area: The reefs within the bay form one of the most easterly locations for a number of Mediterranean-Atlantic species, such as the pink sea fan, *Eunicella verrucosa*. These species are found in very high densities along with a very rich epifauna, including a high diversity of sponges. The Saw-tooth Ledges are one of only a few sites in Great Britain where the sunset star coral, *Leptopsammia pruvoti,* has been found.

- Portland and the Fleet Sensitive Marine Area: Portland Harbour is a sheltered, enclosed water mass, and is of high scientific interest for its marine communities and species, in particular it contains rich sediment communities, including mud plains dominated by the fragile sea pen, *Virgularia mirabilis*. The Fleet is the largest saline lagoon, a rare and important habitat, in Britain.

- Poole Bay & Isle of Purbeck Sensitive Marine Area: the coralline algae (maerl), *Phymatolithion calcareum* and *Lithothamnion corallioides*, with their rich associated fauna, occur in Poole bay in their most easterly known location in the English Channel. At Studland, the sheltered chalk coastline is an unusual feature supporting important algal communities and beds of eelgrass *Zostera* spp. A semi-resident population of bottlenose dolphins, *Tursiops truncatus*, is present at Durlston.

3 (b) HISTORY AND DEVELOPMENT

The history and development of the nominated Site has three different timescales. The first, the formation of the geological succession, took place in a time-frame of tens to hundreds of million years. The second phase, during which the present geomorphology and coastal processes became established, was a result of a phase of the Earth's history since the last Ice Age, over the last 10,000 years or so. The third essentially covers the last 200-300 years of human history, during which time the science of geology became established, and through which the historical and continuing scientific importance of the nominated Site have been recognised. These three aspects are described above.

Lyme Regis is one of the 'Gateway Towns' to the nominated Site. The upper view is from *Itinerarium Curiosum* (Stukeley, 1723). In the course of 280 years, the town's role has changed from an important trading port, to a busy, small tourist resort. Each of the towns has its own distinctive history.

During modern times, whilst the nominated Site itself has remained almost entirely undeveloped, there have been significant changes in the pattern of human activities in the surrounding countryside and adjacent towns and villages. These mirror similar changes in other rural coastal areas within western Europe, resulting from wider changes in society such as increased wealth and mobility, increased lifespan, greater leisure time and the progress of agricultural technology. The results of these changes can be seen in the countryside and in the Gateway Towns adjacent to the nominated Site, and are the concern of wider planning, management and conservation initiatives. The physical impacts of modern life on the nominated Site have been very limited. The most significant are coastal defences. Although these only affect a small amount of coast overall, and are generally outside the boundaries, they can have a direct impact through affecting either geological exposures or geomorphological features. In the totality of the nominated Site the impacts are minor, but they are significant at specific localities, including Lyme Regis east beach, West Bay, Ringstead and Durlston Bay.

The other particularly significant factor has been the growth of the modern tourism economy. Seaside tourism grew in popularity in the UK in the eighteenth century, and towns such as Lyme Regis, Sidmouth, Weymouth and Swanage have been established as holiday resorts since that time. During the mid-twentieth century the amount of visitor accommodation increased, particularly through the development of camping and caravan sites, holiday caravan and chalet accommodation. The nominated Site therefore lies within an area that is already very well visited, and benefits from an established infrastructure and management arrangements for visitors. This includes a number of museums, tourist information and visitor centres, car parks, footpaths and public transport services.

3 (c) FORM AND DATE OF MOST RECENT RECORDS OF THE PROPERTY

There are a range of records of the nominated Site, and the most significant include the following.

Ground levels

A complete digital ground survey of the coastline was carried out in 1998 by the Environment Agency using LiDAR, a laser imaging technique. The survey produced accurate data on the nominated Site in three dimensions, which is particularly useful for mapping landslide areas that are otherwise difficult to survey using traditional techniques. The coast has been subject to three resurveys and several revisions by the Ordnance Survey since 1887, and a range of earlier historical maps also exist and are held in the County Records Offices for Dorset and Devon, and elsewhere.

Aerial photography

Comprehensive vertical aerial photographic surveys of the coast at 1:10,000 scale is held by Dorset County Council (1972, 1986, 1997) and a 1:25,000 scale survey is held by Devon County Council (1992). Historical coverage of the site from the 1940s (Luftwaffe) and 1946 (RAF) is held by the National Air Photographic Archive. These are partial coverage sets at various scales held by District Councils and the Environment Agency. Monochrome satellite imagery is available from several different platforms.

Coastal Photography

Dorset County Council hold a survey of West Dorset from 1978. Other surveys were carried out the 1990s by Kerr McGee, Amoco and British Gas in the context of offshore oil exploration. The British Gas survey includes a continuous video survey of the intertidal area of Dorset. A photographic survey of parts of the Devon and Dorset Coast from the sea was carried out by the British Geological Survey in 1995-2000.

Geological Mapping

The geology of the nominated Site and the surrounding countryside was resurveyed in 1995-2000. Together with the offshore geology, the high quality modern maps are published 1:50,000 scale with release dates as follows: Dorchester (1999), West Fleet and Weymouth (1999), Swanage (2000), Bridport (2001) and Sidmouth (2001).

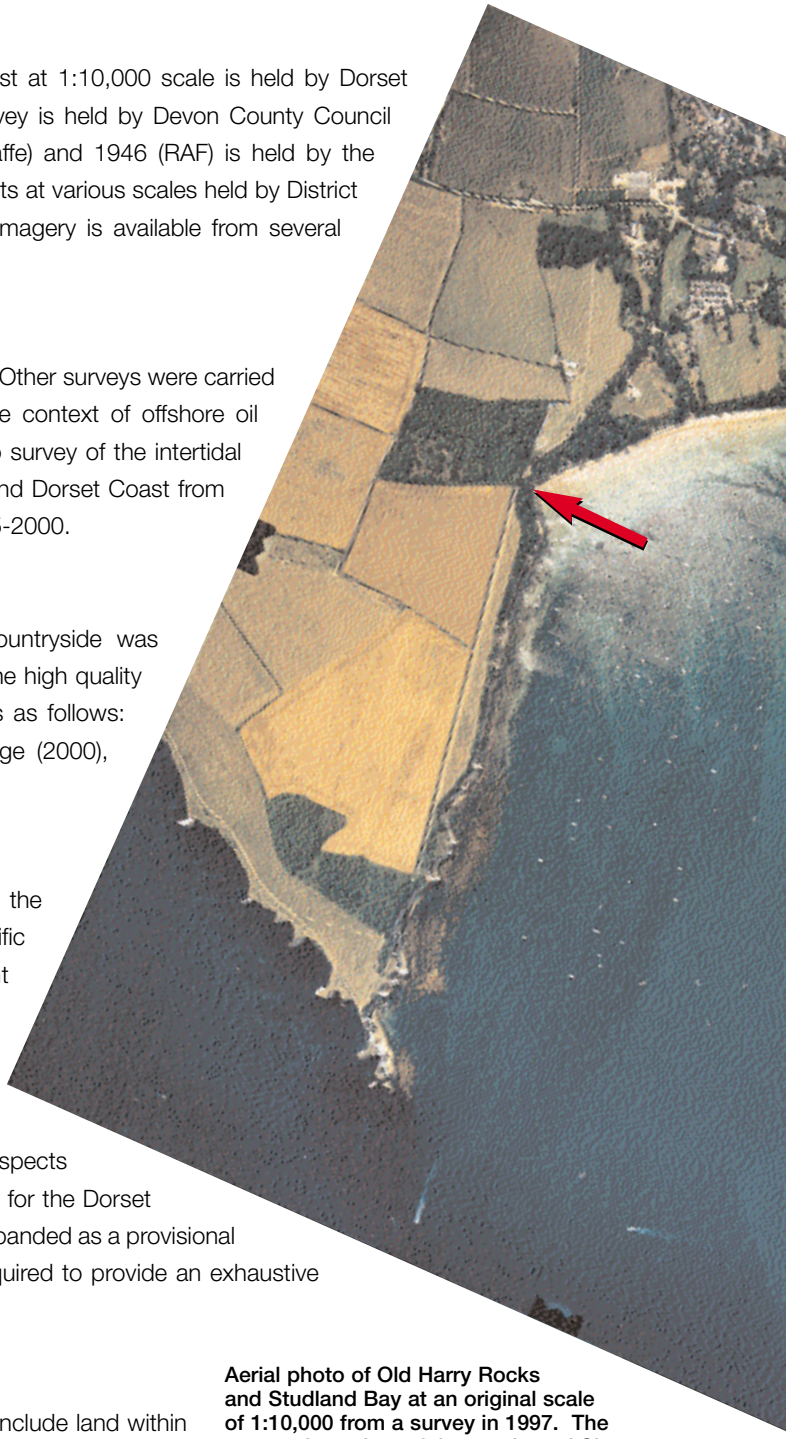
Geological and geomorphological studies

Detailed information on the geology and geomorphology of the nominated Site are included within a very large number of scientific papers and publications. However, several useful recent overviews have been published including: House (1993), Callomon and Cope (1995), Brunsden and Goudie (1997), Goudie and Brunsden (1997) and Underhill (1998).

A special memoir of the British Geological Survey, covering all aspects of the nominated Site is in preparation. A complete bibliography for the Dorset Coast was published in 1989, and this has been updated and expanded as a provisional bibliography of the nominated Site, although further work is required to provide an exhaustive listing of material from the last ten years.

Sites of Special Scientific Interest Citations

Citations for the thirteen Sites of Special Scientific Interest that include land within the nominated Site are maintained and published by English Nature. Copies of the citations are included in Appendix B of the nomination.



Aerial photo of Old Harry Rocks and Studland Bay at an original scale of 1:10,000 from a survey in 1997. The eastern boundary of the nominated Site is arrowed.

Geological Conservation Review

Surveying to identify significant Earth Science Sites throughout the UK was carried out through the Geological Conservation Review (GCR) between 1977-1990. It identified sixty-six GCR sites which lie within the nominated Site. More detailed statements on the interest within the GCR sites is provided within a series of forty-one thematic volumes which are to be published by the Joint Nature Conservation Committee. Volumes that include descriptions of GCR sites on the Dorset and East Devon Coast are as follows:

- Fossil Fishes of Great Britain [1999]
- British Lower Jurassic Stratigraphy [Due 2001]
- British Middle Jurassic Stratigraphy [Due September 2000]
- British Marine Lower Cretaceous Stratigraphy [Due 2001]
- British Permian-Triassic Stratigraphy [Due December 2000]
- British Upper Cretaceous Stratigraphy [Due July 2000]
- British Upper Jurassic Stratigraphy [Due June 2000]
- Coastal Geomorphology of Great Britain [Due 2001]
- Fossils Mammals and Birds of Great Britain [Due June 2000]
- Jurassic-Cretaceous Boundary Rocks in England [Due 2001]
- Mass Movements in Britain [Due 2001]
- Mesozoic-Tertiary Palaeobotany of Great Britain [Due August 2000]
- Quaternary of Southern England [Due 2001]
- Variscan to Alpine Structures in Britain [Due 2001]

A map and summary of the interests within the GCR sites within the nominated Site, and detailed statements where available have been provided within Appendix D of this nomination.

Surveyor in Black Ven carrying out measurements using a satellite positioning system. There are extensive datasets on many of the landslides, which enable the sometimes rapid changes in form to be tracked over many years.

Landscape Assessments

Structured landscape assessments of the nominated Site and the surrounding countryside have been carried out as follows:

- *East Devon AONB Landscape Assessment* (1993): an assessment by the Derek Lovejoy Partnership for the Countryside Commision.

- *The Devon Landscape: A Draft Strategy for Consultation* (1994, and in course of revision): divides the county into a number of zones, which are used to inform decisions on planning and land management.

- *Dorset County Landscape Assessment* (1993): an assessment by Landscape Design Associates for Dorset County Council and the Countryside Commission.

- *The Dorset Downs, Heaths and Coast Landscape* (1994): an assessment of the Dorset Area of Outstanding Natural Beauty.

- *A New View of Dorset* (Burden and Le Pard, 1996): a revision of the Dorset County Assessment, intended for a wider audience.

- *A Handbook of Landscape Management in Dorset* (1997): a description of the characteristics of each landscape character area, and the management guidance for those areas extracted from *A New View of Dorset*.

Copies of the two assessments of the Areas of Outstanding Natural Beauty are provided within Appendix C of the nomination.

Shoreline Management Plans

Three Shoreline Management Plans which set out strategic coastal defence policies for the whole of the nominated Site, and the surrounding coastline were prepared in 1998, as described below in Section 4 (e) and in the Site Management Plan (Appendix Q). The Shoreline Management Plans contain a considerable volume of material on the land-use, environmental value and coastal processes within and adjacent to the nominated Site.

3 (d) PRESENT STATE OF CONSERVATION

The nominated Site lies entirely within areas which have been subject to protection under UK national law (especially the Wildlife and Countryside Act, 1981, as amended) for many years. As an earth science Site, the conservation status of the natural features is assessed on the extent to which the geological exposures and geomorphological features and processes have been affected by human activity. This status is particularly described in the geological interests listed within the Site of Special Scientific Interest (SSSI) citations for the Coast (See Appendix B), the Geological Conservation Review statements (see Appendix D) and the landscape assessments for the Areas of Outstanding Natural Beauty (see Appendix C), and the information on coastal processes contained within the Shoreline Management Plans. The conservation status of the nominated Site is assessed as very good (the features of national and international significance being in favourable condition) owing to the overall lack of human activity or intervention within the nominated Site. Natural forces continue to shape the coastline within the nominated Site, and maintain the geological exposures through the ongoing erosional processes. Managed coastal defences exist within 3.25 km (0.125 per cent) of the nominated Site, principally at Budleigh Salterton, Beer, Seatown, Chiswell, Ringstead and Durlston Bay. Former permissions for pebble extraction from parts of Chesil Beach have been withdrawn for over ten years. There is a single planning permission for pebble picking within Devon (identified as Rousdon Beach) at Charton Bay, near Rousdon that is classified as 'dormant' under the Environment Act 1995. In the Deposit draft of the Devon County Minerals Plan, Devon County Council is proposing to serve a Prohibition Order on the site with planning permission. If this Order were to be confirmed it would remove the possibility of future pebble picking at this location. There is no active mineral extraction or quarrying within the nominated Site, although there is one extant permission on a small part of the south-east coast of Portland, which is currently undergoing a statutory review.

Coastal erosion continually exposes new fossil material throughout the nominated Site. At the important fossil localities between Lyme Regis and Charmouth such erosion is particularly rapid. The loss of material is minimised through professional and amateur collection which takes place within the context of a voluntary code of practice which promotes a responsible approach to continued fossil collecting, and has widespread agreement from all parties.

On the softer sections of the coast, landslides are rapidly eroded by the sea. These slides are a major source of fossil remains, and constant vigilance from experienced collectors is essential in order to ensure important material is not lost to the elements.

A full account of these aspects of the nominated Site and their management is provided within the Site Management Plan, provided as Appendix Q to the nomination.

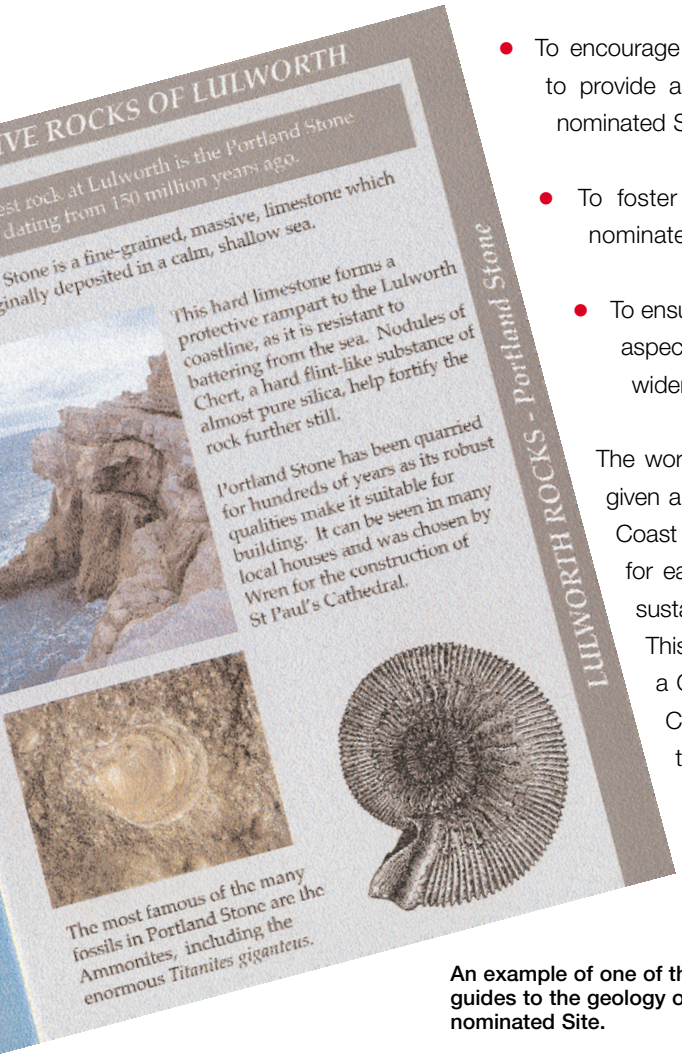
3 (e) POLICIES AND PROGRAMMES RELATED TO THE PRESENTATION AND PROMOTION OF THE PROPERTY.

The proper presentation of the nominated Site has a high priority within the existing management priorities of landowners and local authorities. One of the principal objectives of Heritage Coast definition is '*to facilitate and enhance their enjoyment, understanding and appreciation by the public by improving and extending opportunities for recreational, educational, sporting and tourist activities that draw on and are consistent with the conservation of their natural beauty and the protection of their heritage features'* (Countryside Commission, 1991). This has informed the approach to management throughout the site and surrounding countryside for over twenty years. Through the work of the countryside services managed by Dorset and Devon County Councils, the National Trust, private landowners and others there is an established series of interpretation and information panels at many of the main access points to the nominated Site. There are established visitor centres in a number

of locations, and a range of local and regional museums within the Gateway Towns, as summarised in Figure 8 (page 116). There is already a wide range of literature available for the nominated Site, ranging from the 'tourism geology' series produced by the British Geological Survey for the general public to the professional and detailed guides such as those produced by the Geologists Association and the Geographical Association.

There are established frameworks for tourism promotion through public-private partnerships in Dorset and Devon, and a range of tourism literature is focussing increasingly strongly on the recognition of environmental quality as a key part of the visitors experience. The Site provides one of the most highly significant venues for educational activities, at school, undergraduate and postgraduate levels. The importance of presentation and sustainable promotion of the nominated Site is therefore fully recognised within the Site Management Plan, which includes objectives:

A school party finding fossils at Charmouth. One of many such visits which occur every year. The Charmouth Heritage Coast Centre provides a ranger service, exhibitions and public advice on safe and responsible fossil collecting.



An example of one of the local guides to the geology of the nominated Site.

- To encourage safe use of the nominated Site by educational groups of all ages, and to provide a high quality range of educational information and services about the nominated Site.

- To foster the gathering and dissemination of scientific information about the nominated Site.

- To ensure that World Heritage Site status, if granted, will be used responsibly in all aspects of publicity in relation to the Dorset and East Devon Coast, and assists wider sustainable development objectives within Dorset and East Devon.

The work of interpreting the geology and geomorphology of the coast has been given a particular lead over the last three years through the work of the Jurassic Coast Project within Dorset. This project has involved the preparation of a strategy for earth science conservation, education, interpretation and the promotion of sustainable tourism based on the geology and geomorphology of the coast. This project is being continued from the year 2000 through the employment of a Geological Co-ordinator and Sustainable Tourism Officer hosted by Dorset County Council, and it is envisaged that these two posts would take on a role throughout the nominated Site. Detailed information on the management policies and project proposals are provided within the Site Management Plan (Appendix Q).

4. Management

The nominated Site is protected and conserved by an established framework of central government legislation and protective designations, and local planning policies, as described below. These arrangements are reinforced through a series of established local partnerships and planning documents, which are described in full within the appendices to the Site Management Plan. Four initiatives are particularly relevant to the nominated Site:

- The East Devon Area of Outstanding Natural Beauty, where management measures for the coast are identified within a wider set of countryside policies and proposals which are currently the subject of public consultation.

- The West Dorset Heritage Coast, which is protected and managed in the context of management plan published in 1983. A revised draft management plan is in preparation.

- The Purbeck Heritage Coast, managed in the context of the Purbeck Heritage Strategy, published in 1995, which is just beginning its formal revision process. Management of the Purbeck Heritage Coast has been recognised by a Council of Europe Diploma since 1984, the most recent review being completed in 1999.

- The Dorset Coast Forum, which draws together over 100 key organisations and interests and published its Dorset Coast Strategy in May 1999. This document sets a programme of policies and action for the coast and inshore waters of Dorset. The Strategy was awarded a commendation for planning achievement from the Royal Town Planning Institute in 1999, and is included, on CD-ROM as Appendix L of this nomination.

The World Heritage Site Management Plan produced by Dorset and Devon County Councils, and included as Appendix Q of this nomination, sets out agreed objectives, policies and programmes for the nominated Site, which have been the subject of local public consultation. The Plan shows how the existing planning and management initiatives will incorporate World Heritage objectives, and the additional roles that will be required to support the management of the nominated Site.

4 (a) OWNERSHIP

The nominated Site is in a range of public and private ownerships. Amongst the main institutional landowners the following are significant:

- The National Trust is a major UK charity, founded in 1895 to preserve places of historic interest or natural beauty permanently for the nation to enjoy. It owns approximately 33 km of coast within the nominated Site, with extensive holdings along the East Devon coast, at the Golden Cap estate and Burton Beach in West Dorset, on the south and east coasts of Purbeck, and at a number of smaller sites.

- The Crown Estate owns almost all of the intertidal area throughout the nominated Site, the south-eastern portion of Chesil Beach (c. 4 km), and most (c. 9 km) of the cliffs and undercliffs of the Isle of Portland.

- Dorset County Council owns approximately 3 km of coastline at Durlston Head, Purbeck, managed as a country park for conservation and public enjoyment.

- East Devon District Council has three holdings comprising about 6 km in total near Sidmouth and Budleigh Salterton.

- The Ministry of Defence owns approximately 5 km of coastline, used as the Lulworth Gunnery Ranges, and managed with conservation and controlled public access as secondary objectives.

Aerial view of the coast around Golden Cap. The Golden Cap estate is one of the major inalienable coastal landholdings of the National Trust.

The majority of the nominated Site is in private ownership, with the greater part owned by the following large estates: Clinton Devon Estate, the Weld Estate at Lulworth, and the Smedmore and Encombe Estates in South Purbeck. Together these cover approximately 26 km of the nominated coastline.

The entire bed of the Fleet lagoon (13 km in length) and some 9 km of Chesil Beach are owned by Ilchester Estates and managed as the Chesil and the Fleet Local Nature Reserve. Ilchester Estates also have extensive ownership on the landward shore of the Fleet (approx. 3 km).

In summary, approximately 95 km of the 155 km of the nominated Site are in the ownership of public bodies, conservation agencies or large estates which maintain close contact with the Dorset Coast Forum, participate in management initiatives within the nominated Site, and have been consulted on the Site Management Plan.

There are two significant commercial land holdings within the nominated Site, both on Portland, where the northern and north-eastern parts of the undercliff and coastline are owned by Portland Port, and by Hanson Bath and Portland Stone, respectively. In addition there are a number of other smaller land ownerships in various parts of the nominated Site. The Country Landowners Association and the National Farmers Union provide representative views on countryside and coastal issues.

Information on the extent of the main ownerships on the coast is held by Dorset and Devon County Councils, and by English Nature, and a digital map of the ownerships within the nominated Site is under preparation.

4 (b) LEGAL STATUS

As described above, the nominated Site lies entirely within areas which have status in national law as either Area of Outstanding Natural Beauty, as defined by the National Parks and Access to the Countryside Act 1949, as amended or Site of Special Scientific Interest (SSSI) under Section 28 of the Wildlife and Countryside Act 1981, as amended. Within the SSSI series additional statutory identification of important earth science features is achieved through the Geological Conservation Review sites. Both designations apply throughout most of the nominated Site. Most of the nominated Site is also defined as Heritage Coast by the Countryside Agency. Although the World Heritage nomination is made on the grounds of earth science, it is worthy of note that most of the nominated Site also lies within areas which are designated as of international importance for wildlife, as either Special Area of Conservation or Special Protection Area under the European Council Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC) respectively. In addition, Chesil and the Fleet is designated under the international Ramsar Convention on the protection of wetlands. Further details of these different designations are set out elsewhere in this nomination document, particularly in section 4 (f).

4 (c) PROTECTIVE MEASURES AND MEANS OF IMPLEMENTING THEM

A principal means of providing protection to the nominated Site is through the Town and Country Planning system, which has been established in the UK since 1948, and currently operates under the provisions of the Town and Country Planning Act, 1990. Under this, decisions on most forms of significant development and changes in land-use within the open landscape and towns require a planning application to be made to the local planning authority. Local authorities are comprised of democratically-elected local politicians, and their staff includes professionally qualified planning officers who oversee the process of plan production, and all aspects of development control. The local authorities are required to establish planning policies in relation to land use and development control within published Development Plans. These must include policies to protect areas designated for their natural beauty, including Areas of Outstanding Natural Beauty (AONB), or importance for nature conservation, including the Sites of Special Scientific Interest (SSSI). Planning applications are determined by the relevant Local Planning Authorities. Determination of applications will be considered in the light of government guidance and development plan policies. To back up these powers of development control, the local planning authority is empowered to take enforcement action against development that proceeds without planning permission. Enforcement action can be initiated against unauthorised development through legal proceedings with financial penalties against offenders where enforcement notices are upheld. Mining, quarrying and other mineral extraction is dealt with through a similar, parallel process, within the context of a specific Minerals Local Plan. The nominated Site has been placed on the United Kingdom's World Heritage Sites Tentative List, providing Government recognition of its international importance. Inclusion on the World Heritage List would be a material consideration in the future application of planning policies within the nominated Site. Further information on the relevant planning policies for the nominated Site are provided in the Site Management Plan (Appendix Q).

At a national level, general operational responsibility for SSSIs lies with English Nature, who therefore have an important role in safeguarding the nominated Site. English Nature is a statutory body created under the Environmental Protection Act, 1990, as the official adviser to the UK Government on all aspects of nature conservation within England. Its main duties and powers derive from this and other Acts, especially the National Parks and Access to the Countryside Act, 1949 and the Wildlife and Countryside Act, 1981 (Amended, 1985). English Nature is governed by an independent Council, appointed by the

Gad Cliff on the Purbeck Heritage Coast. The levels of protection here are typical of many other parts of the nominated Site. All of the land visible in this photograph is designated as Site of Special Scientific Interest and Area of Outstanding Natural Beauty. This area lies within the Lulworth Ranges, which are used for military training. Conservation and access within the ranges is managed by the UK Ministry of Defence.

UK Government. It employs over 600 staff nationally, organised within a series of County teams, Dorset and Devon being the relevant offices for the nominated Site. These locally-based officers operate within a consistent national policy framework, and their role is supported when necessary by specialist national advisers. English Nature is a statutory consultee on planning applications within SSSIs. It also works with owners of SSSIs and other interested parties to ensure effective protection and management of the earth science and wildlife interests for which these sites are designated. English Nature has legal powers to enforce proper care of SSSIs. The Countryside and Rights of Way Bill, published on 2 March 2000, is expected to receive Royal Assent in 2000-2001. It incorporates new legislation which will enable English Nature to address damage to SSSIs caused by third parties, and provide further powers to protect and manage any SSSI which owners are unwilling to conserve.

The Countryside Agency, formerly the Countryside Commission, is a sister body to English Nature, constituted in a similar way, and established under the Environment Protection Act, 1990 as the Government's statutory adviser on countryside matters. It employs over 250 staff, and operates a series of regional offices, with national policy advisers. It provides advice to relevant authorities on the management of AONBs and Heritage Coasts. The nominated Site is dealt with by the south-west regional office of the Agency.

A number of visitors to the Lias sections bring geological hammers. Safe and responsible use is encouraged through educational signs and the Charmouth Heritage Coast Centre, and the promotion of collecting from *ex situ* material on the beaches, rather than from the cliffs.

The established framework of protective designations is sufficient to protect the nominated Site from threats to its integrity, and will continue to be operated in the future. Positive management of the nominated Site is also an essential element of its future protection. Such work is currently achieved through positive partnership-based management, which is assisted by grant-aid powers of English Nature and the Countryside Agency, in relation to the designations for which they have responsibility. The main initiatives include the funding of, *inter alia*, countryside staff, environmental improvements, survey and research. Further details of these programmes are provided below and within the Site Management Plan (Appendix Q).

4 (d) AGENCIES WITH MANAGEMENT AUTHORITY

As described above, statutory authority for planning policy for the nominated Site rests with the local authorities through their development and minerals planning powers. English Nature has statutory powers to advise and influence management and planning decisions in relation to the parts of the nominated Site designated as Sites of Special Scientific Interest. It also has powers related to other relevant wildlife conservation designations, including Special Areas of Conservation and Special Protection Areas established under European Law. Responsibility for site management ultimately lies with the various owners, who have been consulted on the World Heritage nomination and the Site Management Plan. The Lulworth Ranges are owned and managed by the Ministry of Defence. Details of the activities of these organisations in relation to the different activities within the Site are provided in the Site Management Plan (Appendix Q).

Dorset and Devon County Councils have agreed to take on an overall co-ordinating responsibility for the management of the nominated Site, and have made provision for the identification of a specific officer to perform this role. The County Councils are well placed to perform this function in view of their existing involvement in the full range of management partnerships that exist in relation to the nominated Site.

Two key committees have been established to assist and advise the preparation of this nomination, and it is envisaged that these would form the basis of a management structure for the nominated Site, as described in the nominated Site Management Plan. The current membership of these two groups is as follows:

World Heritage Steering Committee

- Mr David Andrew, Devon County Council (Chairman)
- Mr Tim Badman, Dorset County Council (Secretary)
- Dr Clive Barton, British Geological Survey
- Mr Trevor Bolshaw, East Devon District Council
- Mr Derek Boyt, West Dorset District Council
- Prof. Denys Brunsden, Dorset Coast Forum
- Mr Nic Butler, East Devon Coast and Countryside Service
- Mr John Chaffey, Dorset Geologists' Association Group
- Mr Keith Cole, West Dorset District Council
- Mr Richard Edmonds, Jurassic Coast Project
- Mrs Doreen Franks, British Holiday Parks Association
- Mr Bryan Higgins-Wood, The Countryside Agency
- Mr Philip Jacobs, Waterside Holiday Group Ltd
- Mr David Jenkins, National Trust
- Dr Andy King, English Nature
- Mr Andrew Price, Dorset County Council
- Mr Ian Skinner, Defence Estates
- Mr David Sole, Dorset Fossil Collectors
- Mr Terry Sweeney, Dorset County Council
- Mr Malcolm Turnbull, Dorset County Council
- Ms Alison Turnock, Purbeck District Council
- Mr John Varley, Clinton Devon Estate
- Mr David Walsh, Dorset County Council
- Mr James Weld, Lulworth Estate
- Mr Dominic Whitmee, Department of the Environment, Transport and the Regions
- Mr Simon Williams, Weymouth and Portland Borough Council
- Mr Aiden Winder, Devon County Council

World Heritage Technical Working Group

- Mr Tim Badman, Dorset County Council (Chairman)
- Dr Clive Barton, British Geological Survey
- Professor Denys Brunsden, Dorset Coast Forum/King's College London
- Mr Richard Edmonds, Jurassic Coast Project
- Dr Andy King, English Nature
- Professor Vincent May, Bournemouth University
- Professor Michael House, University of Southampton
- Mr Aiden Winder, Devon County Council

4 (e) LEVEL AT WHICH MANAGEMENT IS EXERCISED

There is a complex range of responsibilities of powers and duties related to the nominated Site. These powers are exercised at a number of different geographical scales, and are described within the Site Management Plan (Appendix Q).

Management and day to day control of the nominated Site is exercised locally through the actions of the public and private landowners. Contact details of the various owners are maintained by the County Councils and English Nature. The main units within which co-ordination of management of the nominated Site and the surrounding countryside takes place are the East Devon Area of Outstanding Natural Beauty, West Dorset Heritage Coast, Weymouth and Portland and the Purbeck Heritage Area. The local authorities that currently employ the staff responsible for planning and management within these areas are as follows:

East Devon Area of Outstanding Natural Beauty	**Devon County Council** **East Devon District Council**
West Dorset Heritage Coast	**Dorset County Council** **West Dorset District Council** **Weymouth and Portland Borough Council**
Weymouth and Portland	**Dorset County Council** **Weymouth and Portland Borough Council**
Purbeck Heritage Area	**Dorset County Council** **Purbeck District Council**

Coastal defence policy is exercised through the co-ordination of Shoreline Management Plans by coastline groups of local authorities and the Environment Agency. The lead authorities for the three coastline groups with responsibilities that affect the nominated Site are as follows:

COASTLINE GROUP	SECTION OF SITE COVERED	LEAD AUTHORITY
Lyme Bay and South Devon Coastline Group	**Orcombe Rocks – Portland Bill**	**West Dorset District Council**
Portland Bill-Durlston Head Coastline Group	**Portland Bill – Durlston Head**	**West Dorset District Council**
Durlston Head to Hurst Spit Coastline Group	**Durlston Head – Old Harry Rocks**	**Bournemouth Borough Council**

The main co-ordinating responsibility for World Heritage Site Management will lie with the County Councils, under the management of the following senior officers:

Andrew Price
Head of Planning
Dorset County Council
County Hall
Colliton Park
Dorchester
Dorset DT1 1XJ
U.K.

David Andrew
Assistant Environment Director
Devon County Council
Environment Directorate, Lucombe House
County Hall, Topsham Road
Exeter
Devon EX2 4QW
U.K.

Dorset and Devon County Councils jointly support a project office for the nomination based within Dorset County Council and the initial point of contact for enquiries regarding the nomination and management plan is:

Tim Badman
Coastal Policy Officer
Dorset County Council
County Hall
Colliton Park
Dorchester
Dorset DT1 1XJ
U.K.
Tel: 01305 225132
Fax: 01305 224875
E-mail: t.badman@dorset-cc.gov.uk

The means of co-ordinating activity across the nominated Site is outlined below in sections 4 (j) and 4 (k). It will include the continued operation of the World Heritage Steering Group, and its supporting Technical Working Group, monitoring and reporting on the condition of the nominated Site, the implementation of the Site Management Plan, and the continued mobilisation of the necessary resources to ensure proper management of the nominated Site.

4 (f) AGREED PLANS RELATING TO THE PROPERTY

The Dorset and East Devon Coast is already extensively protected by a variety of conservation designations, and existing land use and management plans and other initiatives provide long-term protection of the nominated Site. The following are the principal initiatives that are relevant to the nominated Site

Land-use Plans
Statutory Development Plans are prepared by local authorities to meet the legal requirements set out by national government acts and planning policy guidance notes. The main classes of land-use plan, and the current plans, which are relevant to the nominated Site are as follows.

Structure Plans
Structure Plans are prepared by County Councils under powers and duties in the 1990 Town and Country Planning Act, as amended by the 1991 Planning and Compensation Act. They give strategic guidance for development, looking ahead about ten to fifteen years. Structure Plans go through an extensive process of consultation with the public and public agencies before being adopted. The Structure Plans relevant to the nominated Site are:

- The Dorset County Structure Plan, adopted in 2000
- The Devon Structure Plan First Review, adopted in 1999.

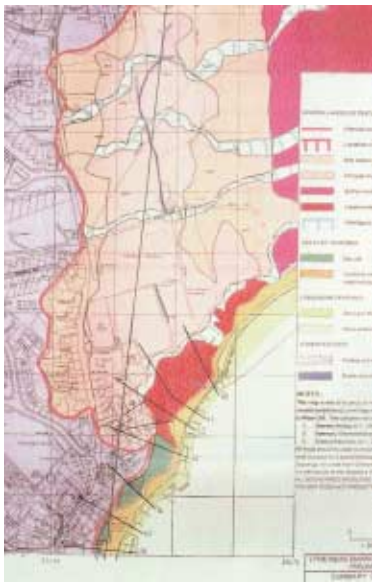
Both contain policies guiding development for housing, employment, tourism, shopping, community facilities and transport. They also provide a strategic framework for the care of the environment.

Local Plans
Local plans are prepared by District Councils under powers and duties in the same Act. They provide guidance for development at the detailed local level, looking ahead over a similar timescale to Structure Plans, with which they must broadly conform. They cover a similar range of topics, and undergo an equally extensive process of public consultation.

The Local Plans covering the area of the nominated Site are:

- East Devon Local Plan, revised deposit draft, published in 1997
- Sidmouth Local Plan, adopted in 1993
- West Dorset Local Plan, adopted in 1998
- Weymouth and Portland Local Plan, adopted in 1997
- Purbeck Local Plan, programmed for adoption in 2001-2002. (A revised draft plan, published in 1999, currently guides development in Purbeck).

A consultation draft of a new Local Plan for East Devon is due to be published in 2000, to replace the existing East Devon and Sidmouth Local Plans. The West Dorset and Weymouth and Portland Local Plans are currently under review, in order to extend their horizons to 2011.



The mapping and prediction of landslides is an important result of surveys of the coast. This information is critical to good decisions being taken about shoreline management and coastal development, particularly near the coastal settlements.

Minerals and Waste Plans

Minerals and Waste Local Plans are prepared by Minerals and Waste Planning Authorities under powers and duties set out in the Town and Country Planning Act 1990, as amended by the Planning and Compensation Act 1991. The Mineral Authorities for the nominated Site are Dorset County Council and Devon County Council.

Minerals and Waste Local Plans set out policies to control the extraction, transport and processing of mineral resources onshore, striking a balance between meeting society's needs for materials, and protecting the environment. They also contain policies governing methods and locations for disposing of wastes ranging from inert to clinical and toxic materials.

The plans relevant to the nominated Site are:

- Devon Minerals Local Plan, First Deposit Version, January 2000
- Devon Waste Local Plan – Consultation Draft, 1998
- Dorset Minerals and Waste Local Plan, adopted in April 1999.

A summary of planning policies relevant to the World Heritage Management Plan is provided in Appendix 4 of the site management plan.

Minerals Planning Authorities are currently undertaking a review of old minerals permissions under the requirements of the Environment Act 1995. This is relevant to the nominated Site on Portland where 50-year-old planning permissions affect land immediately adjacent to the coast.

Both mineral operators on the Island have submitted applications under the review, which indicate a reduced area of future working that would not include land within the nominated Site. In the south-east of the Island, however, the application still envisages a small area where land would be worked within a few metres of the cliff edge. The operator proposes to consider less intrusive methods such as mining if this area is ultimately worked; alternatively the working of this sensitive area may be given up if a suitable alternative site can be found. The applications will be subject to environmental assessment before a decision is made by the Mineral Planning Authority, and the operators are currently preparing their environmental statements.

Where quarried land is being restored on Portland, an informal group, the Restoration Advisory Group, has been established to advise on the method and type of restoration, and possible after-uses. The group includes representatives from the minerals industry, the local authorities and the local community. Further details of the process are available on request.

Environmental Assessment

Environmental Impact Assessment (EIA) is a requirement for certain projects under European Council Directive (85/337/EEC) as amended by Council Directive (97/11/EC). Projects that require EIA obtain consent through different statutory consent procedures. Most of the projects that require EIA are authorised under the Town and Country Planning system and are subject to the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (SI 1999 No 293). Projects wither fall under Schedule 1 of the Regulations, where EIA is compulsory, or under Schedule 2, where projects have to be screened by the local planning authority to see whether they are likely to have significant effects on the environment and require EIA. Further details of the environmental impact assessment process are available on request.

Sites of Special Scientific Interest

Sites of Special Scientific Interest (SSSIs) are notified by English Nature or its predecessors under the National Parks and Access to the Countryside Act 1949 or the Wildlife and Countryside Act 1981, as amended, because of their plants, animals or geological or physiographical features. SSSIs provide the core means of protection of the Earth science interest of much of the nominated Site. Site Management Statements for SSSIs are agreed between English Nature and landowners, indicating how the site will be managed to conserve its scientific interest.

Maps and citations for the SSSIs, and the generalised management advice provided by English Nature to landowners are provided in Appendix B of the nomination.

Geological Conservation Review Sites

In 1977 the Nature Conservancy Council (now English Nature) began a systematic and comprehensive review of key earth science localities. This was designed to identify, and help conserve, the sites of national and international importance in Britain. This review, known as the Geological Conservation Review (GCR), was completed in 1990 by the Joint Nature Conservation Committee. Details of the GCR are described above in Section 2b, and the sites selected which lie within the nominated Site are listed in Table 2 (pages 46-47). Copies of the statements of interest for GCR sites that lie within the nominated Site are provided in Appendix D.

Area of Outstanding Natural Beauty, Heritage Coast and other Countryside Plans

Wider countryside management within the nominated Site is co-ordinated within a context of landscape and countryside - designations: the Areas of Outstanding Natural Beauty, which are statutory national designations whose primary aim is to conserve the natural beauty of the area, and the Heritage Coasts, which are defined by the Countryside Agency, with local authorities, to secure effective management of nationally important coastal landscapes.

The East Devon Heritage Coast Service (now the East Devon Coast and Countryside Service) has been active since 1984, carrying out education, interpretation, conservation and access projects. There is a Joint Advisory Group of elected members from the County and District Councils, with representation also from the Countryside Agency and other interests.

Policies guiding the management of the Heritage Coast are set out in the East Devon AONB Draft Management Plan (1998), due to be adopted in slightly modified form early in 2000. At that time a Joint Advisory Committee is likely to be formed to take on the combined oversight of the AONB and the Heritage Coast.

Fossils are a source of fascination to children. The evidence of past life is often readily apparent in the rocks and pebbles on the beach.

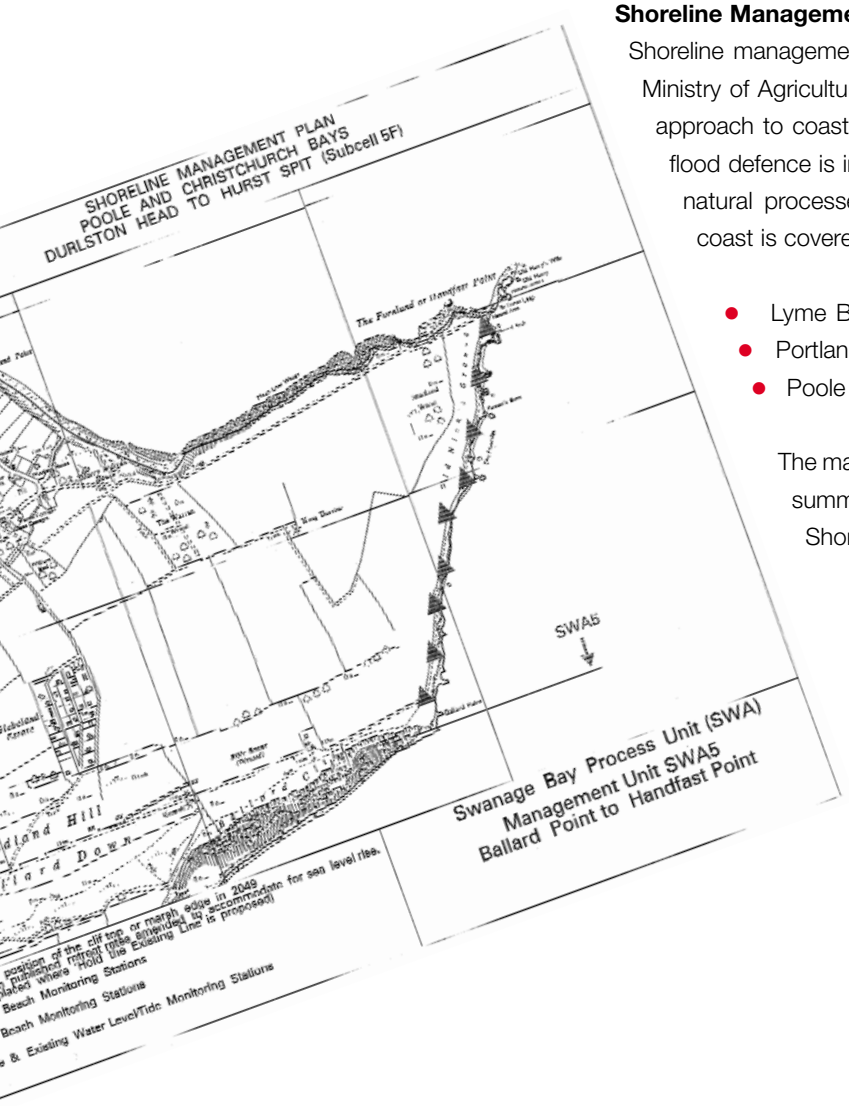
The *West Dorset Heritage Coast Management Plan* (1982) is currently under review. The new plan will address the management of landscape, public access, and interpretation and tourism promotion, covering both the West Dorset Heritage Coast and the undeveloped coast of Portland. The West Dorset Heritage Coast project is managed on a day-to-day basis by rangers of Dorset Countryside, employed by Dorset County Council, working within annual business plans and in co-operation with local landowners, tourist businesses and other public agencies such as the South West Coast Path team.

The Purbeck Heritage Strategy was published in 1995 setting out policies for joint action by a wide range of bodies with an interest in Purbeck. The policies deal with the environment, tourism and transport, and are designed to 'Keep Purbeck Special'. Implementation is overseen by the Purbeck Heritage Committee. This is a joint committee of Purbeck District Council and Dorset County Council, together with representatives of interested organisations, and has an independent chairman.

The Committee is supported by a full-time Purbeck Heritage Officer, based at Purbeck District Council and funded by a partnership of Purbeck District Council, Dorset County Council and the Countryside Agency. The Committee also receives advice from the Purbeck Forum, through which many other organisations, including parish councils, businesses and voluntary organisations, contribute ideas. The Heritage Strategy is revised every five years.

Copies of the following documents are provided as appendices to the Site Management Plan:

- *East Devon Area of Outstanding Natural Beauty Draft Management Plan* (1998)
- *West Dorset Heritage Coast Issues Report* (1996)
- *Keeping Purbeck Special: a strategy for the Purbeck Heritage Area* (1995)
- *2000 Onwards – charting a new course for the Purbeck Heritage Committee* (1999).



Shoreline Management Plans

Shoreline management plans have been promoted on a national basis by the Ministry of Agriculture Fisheries and Food as the means to ensure a strategic approach to coast defence. They aim to ensure that coastal protection and flood defence is implemented in a way that takes due regard for the overall natural processes operating on the coast. The Dorset and East Devon coast is covered by three plans:

- Lyme Bay and South Devon Shoreline Management Plan (1999)
- Portland Bill to Durlston Head Shoreline Management Plan (1999)
- Poole and Christchurch Bays Shoreline Management Plan (1999)

The main prescriptions within the shoreline management plans are summarised within the Site Management Plan. Copies of the Shoreline Management Plans are available on request.

Shoreline Management Plans are now in place for the whole of the nominated Site. These outline strategic defence options for the coastline. Different management units are identified based on a combination of coastal processes and land-use, and a long-term defence option is assigned to each. Virtually all of the nominated Site has been assigned to management units where no coastal defences are proposed.

Landowners' management plans

A number of landholding bodies have prepared management plans for parts of the nominated Site that they own.

The National Trust maintains plans to guide the management of its land holdings, normally dealing with issues such as wildlife, landscape and public access. In West Dorset these plans are being updated in 2000-2001. The Trust anticipates completing its management plan for Purbeck and Studland in 2000. Plans are also prepared on a regional or sub-regional basis dealing with certain specialist topics such as education and interpretation.

The National Trust has the power to declare areas of its land inalienable, and areas so declared must then remain under the Trust's protection in perpetuity for the benefit of the public. All of the land owned by the National Trust within the nominated Site has been declared inalienable.

School group at Lulworth Cove, being taught by the Lulworth Education Ranger. Lulworth is one of many parts of the coast that are in private ownership. The owners, The Lulworth Estate, maintain a visitor centre and car park, and provide an education service for visitors. Major path repairs were made during 1998-1999, and a programme of landscaping of the car park is now underway.

The Ministry of Defence (MoD) prepares plans for the management of its land holdings, including specific plans for nature conservation. It consults with English Nature and the relevant authorities on specific projects, and each MoD establishment has a conservation committee which meets twice a year and is comprised of relevant experts.

The Dorset and Devon Wildlife Trusts have coastal wildlife reserves at Weston Mouth and the Otter Estuary (Devon) and at West Bexington and Kimmeridge (Dorset). For each reserve there is a management statement or plan setting out aims and objectives, and the intended method of managing the reserve. The Trusts have agreements with the landowner of each reserve.

Some private landowners prepare plans for the stewardship and use of their land, with varying degrees of consultation with public agencies and varying levels of commercial confidentiality. A number of landowners have entered into Countryside Stewardship agreements, which involve the preparation of ten year management agreements for conservation purposes (and in places public access) which receive payments via the Ministry of Agriculture Fisheries and Food.

European and International Wildlife Designations

The European Council Habitats Directive (92/43/EEC) requires the establishment of a series of high quality Special Areas of Conservation across Europe aimed at conserving 169 identified habitat types and 623 species. The Habitats Directive is implemented in Britain through the Conservation (Natural Habitats, &c.) Regulations 1994.

The Government is bound by the European Council Directive on the Conservation of Wild Birds (79/409/EEC). Under this directive, the Government has to designate Special Protection Areas to conserve the habitat of certain rare or vulnerable birds (listed under the directive) and regularly occurring migratory birds. It has to avoid any significant pollution or disturbance to, or deterioration of, these designated sites. SPAs and SACs together form the European wide network of sites known as Natura 2000. The UK Government also signed the International Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) in 1973. Under the Convention the Government is committed to designate 'Wetlands of International Importance' (Ramsar sites) and to use the wetlands within its territory wisely.

The following European and international sites cover parts of the nominated Site:

- Exe Estuary Special Protection Area.
- Exe Estuary Ramsar Site.
- Sidmouth to West Bay candidate Special Area of Conservation
- Chesil and the Fleet candidate Special Area of Conservation, Special Protection Area and Ramsar Site
- Isle of Portland to Studland Cliffs candidate Special Area of Conservation
- St Alban's Head [St Aldhelm's] to Durlston Head candidate Special Area of Conservation.

The citations for the European wildlife sites are summarised in Section 3 (a) and included in Appendix M.

National Nature Reserves

National Nature Reserves (NNRs) are sites which have been declared by English Nature or its predecessors under Section 19 of the National Parks and Access to the Countryside Act 1949 or Section 35 of the Wildlife and Countryside Act 1981. They are either owned or controlled by English Nature or held by approved bodies such as the Wildlife Trusts. Axmouth to Lyme Regis Undercliffs is a National Nature Reserve, which lies wholly within the nominated Site. The Reserve is managed by English Nature. There is a management plan for the National Nature Reserve, prepared by English Nature in 1998.

The Bindon landslide in 1839. The broken and inaccessible land that resulted has since been colonised by unmanaged native woodland.

Port Management Plans

Part of the nominated Site overlooks the harbour authority areas of Portland Port and Weymouth Harbour. Within these areas the harbour authorities have statutory authority to provide port and harbour facilities, and to regulate and manage navigation. The World Heritage management issues in relation to port operations are limited, and are discussed in the management plan. Portland Harbour has recently been established as a commercial port, operated by Portland Port Ltd., following a long previous history as a military harbour operated by the Royal Navy.

Under the Portland Harbour Revision Order 1997, a statutory instrument, a new harbour authority was established, also operated by Portland Port Ltd. The Order is noteworthy for a number of unusual provisions which it makes including:

- Providing powers for the Harbour Authority to act 'for the conservation of the harbour's flora, fauna and geological and physiographic features of special interest
- A commitment to the publication of a management plan
- The formation of a consultative committee.

Port and harbour authorities are also required to prepare waste management and emergency plans. An initial management statement for the harbour has been published by the Portland Harbour Authority, and is available on request.

Local Transport Plans

Planning for investment in transport facilities and services is guided by Local Transport Plans prepared by the local highway authorities. For the nominated Site and its hinterland, Dorset and Devon County Councils are the highway authorities. Local Transport Plans review the authorities' transport strategies and indicate how they will meet government objectives of widening travel choices, protecting the environment and health, and reducing pollution. The plans relevant to the nominated Site are:

- Dorset Provisional Local Transport Plan, July 1999
- Devon on the Move, the Provisional Devon Local Transport Plan, July 1999.

These provisional plans, which cover the financial year 2000/2001, will be replaced by full Local Transport Plans to be submitted to the government in July 2000, which will set out a programme for 2001/2 to 2005/6. Copies of these plans are available on request.

Emergency Plans

Both Devon and Dorset County Councils have prepared plans for the clearance of coastal pollution. An additional plan is being prepared by Dorset County Council indicating how waste material arising from coastal incidents will be dealt with. These documents sit within a hierarchy of plans, from the national to the local level. The national contingency plan is currently being revised and is due for publication early in 2000. At the local level, all District Councils within the nominated Site except Purbeck District Council have prepared Oil Pollution Response Plans. The harbour authorities for Weymouth and Portland Harbours have also prepared oil spill plans, as they are required to do under International Convention. The harbour plans are awaiting approval by the UK Maritime and Coastguard Agency. Copies of the emergency plans are available on request.

Local Environment Agency Plans

Local Environment Agency Plans (LEAPs) are produced by the Environment Agency to set out action to improve the water environment of rivers and nearshore waters. The plans are prepared on a catchment by catchment basis and set out proposals for action by the Agency and partner organisations. LEAPs relevant to the nominated Site are as follows:

- Rivers Axe and Lim LEAP – Consultation Draft, December 1999
- Rivers Sid and Otter LEAP – Consultation Draft, November 1999
- River Exe LEAP – Consultation Draft, July 1999
- The West Dorset LEAP– Consultation Draft, 1997, and Action Plan 1999
- The Frome & Piddle and Poole Harbour & Purbeck LEAP – Consultation Draft, November 1999.

Copies of these plans are available on request.

Dorset Coast Strategy

The Dorset Coast Strategy was agreed by the Dorset Coast Forum in May 1999. It aims to set out a consensus view on the way in which the members of the Dorset Coast Forum will work together to improve the planning and management of the Dorset Coast. The Strategy's purposes are:

- Establishing integrated policy for the Dorset Coast
- Establishing guidelines for more detailed coastal management plans
- Identifying strategic opportunities for resource development
- Engaging and developing participation of a wide range of partners
- Developing a co-ordinated approach to strategy implementation
- Identifying solutions for sustainable coastal development and management
- Evaluating success and the reporting of results throughout Europe.

The Strategy is now being implemented by the Forum through a series of working groups, and the submission of this World Heritage nomination is supported by the policies within it. A copy of the Dorset Coast Strategy on CD-ROM has been provided as Appendix L of this nomination.

St Aldhelm's Head looking west. One of the aims of the Dorset Coast Strategy is to retain the tranquillity of the unspoilt Heritage Coast areas.

The Atlantic Living Coastlines Project

In Devon (and also covering the neighbouring county of Cornwall) a framework is being produced for integrated coastal zone management by the Atlantic Living Coastlines Project, based at the University of Plymouth. There has been extensive consultation with coastal managers and practitioners, with particular attention being focused on participation techniques, frameworks and networks for effective coastal management, sustainability indicators, information exchange and the interrelationship of coastal plans and projects. A draft framework was published in January 2000, and a final report is anticipated in June 2000 which is available on request.

Estuary Management Plans

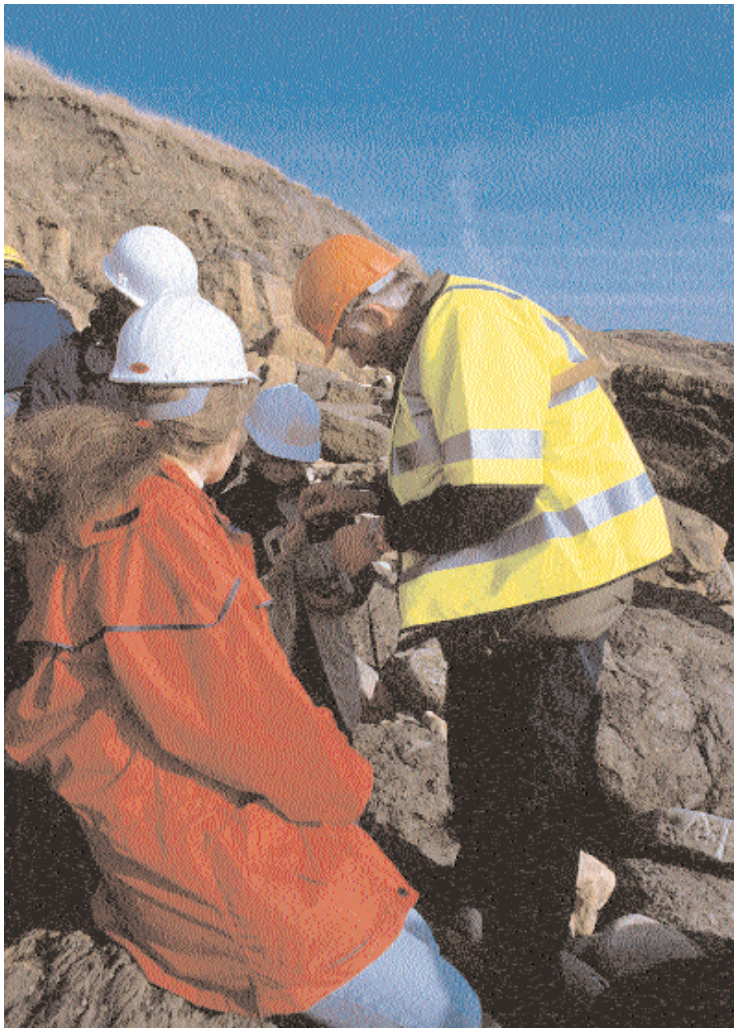
Estuary management plans are produced by local management groups. The only estuary with such a plan, which covers part of the nominated Site is the Exe Estuary, however the overlap is very slight. A copy of the management plan is available on request.

The South West Coast Path Strategy

The South West Coast Path is a 950 km long footpath which has been designated as a National Trail, one of thirteen long-distance paths in England and Wales which receive prioritised management at a national level. The Coast Path gives almost unbroken access to the coastline around England's south-west peninsula from Poole in Dorset to Minehead in Somerset. It is managed for the Countryside Agency by local authorities, the National Trust and private landowners. Co-ordination is provided by a South West Coast Path team, funded by the Countryside Agency. A strategy, *More than just a path,* was adopted in 1997 and sets out a vision, standards and actions for the period to 2005 to guide the management, promotion and conservation of the path and the coastal corridor through which it passes. The Coast Path team are working towards a manual which will contain more detailed guidance notes for management of the Path, and a marketing strategy. A copy of the Coast Path strategy is available on request.

The Jurassic Coast Project

The Jurassic Coast Project aims to demonstrate how Dorset's coastal geology can be used to promote special interest and sustainable tourism based on the earth science interest of the coast. The project is a partnership between local authorities, English Nature, the South West England Regional Development Agency, the Single Regeneration Budget and the EU KONVER II fund, and is supported by the Dorset Coast Forum. The project has produced a Jurassic Coast Strategy (1999), included as Appendix P of the nomination, which sets out priorities for action in relation to Earth Science conservation, interpretation, education and tourism. It has also instigated a number of related initiatives including a Code of Practice for fossil collectors on the West Dorset coast, which is set out in the Site Management Plan.



A group of young geologists from Rockwatch – a national club run by the UK's County Wildlife Trusts, on a guided walk with a local expert. This was part of week-long event held in early 2000, and illustrates the type of special interest visiting which the Jurassic Coast Project seeks to encourage.

4 (g) SOURCES AND LEVELS OF FINANCE

The overall range of planning and management skills available to assist Site management is wide and it is not possible to quantify the total budgets involved. The staffing budgets of the main organisations and partnership projects that deliver coastal and visitor management within the nominated Site and its surroundings are as follows:

	STAFF	EMPLOYER	APPROXIMATE BUDGET (STG£ PER ANNUM)
East Devon Coast	Coast and Countryside Officer	Devon County Council	£ 65,000 (1)
	2 Coast and Countryside Rangers		
	Rural Affairs Officer	East Devon District Council	£ 30,000 (1)
	Rights of Way Warden	Devon County Council	£ 20,000 (1)
	Axmouth-Lyme Regis National Nature Reserve Manager	English Nature	£ 20,000 (1)
West Dorset Heritage Coast Weymouth and Portland	Head Ranger	Dorset County Council	£ 80,200 (2)
	Coast Ranger West		
	Coast Ranger East		
	Portland Ranger		
	Portland and Weymouth Assistant Ranger		
	Charmouth Heritage Coast Centre Senior Warden	Charmouth Heritage Coast Centre	£ 44,500 (2)
	Warden		
	Warden		
	National Trust Golden Cap Estate Head Warden	National Trust	£ 10,000 (3)
	Dorset Area Warden		
	2 Wardens		
	Chesil and the Fleet Nature Reserve Warden	Ilchester Estate	£ 20,000 (1)
Purbeck Heritage Area	Purbeck Heritage Officer	Purbeck District Council	£ 6,000 (4)
	Tourism and Countryside Officer		
	Biodiversity Officer		
	Head Ranger	Dorset County Council	£ 131,500 (1)
	Heritage Coast Ranger		
	Lulworth Ranger		
	Durlston Country Park Senior Ranger		
	1.5 Durlston Rangers		
	Durlston Practical Support		
	Durlston Marine Project Officer		
	Durlston Marine Assistant		
	Lulworth Education Ranger	Lulworth Estate	£ 20,000 (1)
	Kimmeridge Warden	Dorset Wildlife Trust	£ 20,000 (1)
	National Trust Purbeck Estates	National Trust	£ 20,000 (3)
	Reserve Ecologist		
	Head Warden		
	Education Co-ordinator		
	4 Wardens		
South West Coast Path Project	Coast Path Co-ordinator	Devon County Council (100 per cent funded by Countryside Agency)	£ 18,000 (5)
	Assistant Co-ordinator		
	Path Development Officer		

NOTES

(1) Estimated staffing costs and overheads.

(2) From Dorset County Council; figures show staff costs only, including overheads, based on proportion of time spent working within the nominated Site.

(3) Estimates supplied by National Trust.

(4) Figure based on an estimated ten per cent of staff time spent on issues related to the nominated Site.

(5) Estimate based on standard project costs for Coast Path team, per km of coast path.

There are many additional professional staff involved in site management, whose roles are not quantified in detail. They include land agents, planners, coastal engineers, transport managers, tourism officers, staff within local offices of Government agencies and Government employees.

Funding of management of the nominated Site will remain on a partnership basis, through the employing organisations listed above, with grant aid support from the relevant government agencies. New posts required to help co-ordinate the management of the nominated Site will also be funded on a partnership basis. Opportunities to augment current funding through public and private sources will continue to be pursued.

4 (h) SOURCES OF EXPERTISE AND TRAINING IN CONSERVATION AND MANAGEMENT TECHNIQUES

The Dorset and East Devon Coast is well provided with trained staff in the conservation and management techniques required to ensure its long term conservation. English Nature have an existing role in providing advice on earth science conservation, and provide training to their regional staff backed by the advice of a national earth science conservation team. Advice and expertise on earth science within the voluntary sector is also available to the nominated Site through the Devonshire Association and the Dorset Geologists' Association and a West Dorset Geomorphological Research Group. There is also a particular focus on the co-ordination of scientific advice and opinion regarding Chesil and the Fleet through the Fleet Study Group, a voluntary organisation with a membership which includes leading researchers with interests in the Fleet.

It is envisaged that proper implementation of the World Heritage Management Plan will require the creation of two new staff posts based on the development of existing partnership arrangements. The appointment of a geological co-ordinator for the nominated Site will provide a focus for locally targeted advice on all aspects of earth science conservation, and will be a development of an existing post performing this role within Dorset. The appointment of a sustainable tourism officer will ensure that the tourism industry, including existing tourism professionals receive advice and guidance on the implications of World Heritage Site status, and that visitor management and promotion are maintained in proper balance with site conservation.

4 (i) VISITOR FACILITIES AND STATISTICS

The nominated Site is a long-established destination for visitors, since the origins of seaside tourism in the eighteenth century, followed by the boom brought by the railways in the nineteenth century, and then the growth of mass tourism in the twentieth century. Over the past two decades there has been a move away from mainly resort-based tourism towards more rural and activity-based experiences. It is therefore well provided with the necessary infrastructure required for visitors.

In keeping with the international nature of the proposal, access to the nominated Site for international visitors is good, with ready transport links from London, and more local passenger terminals at Poole, Weymouth, Portland and Plymouth ports and Bournemouth, Exeter, Plymouth and Southampton international airports.

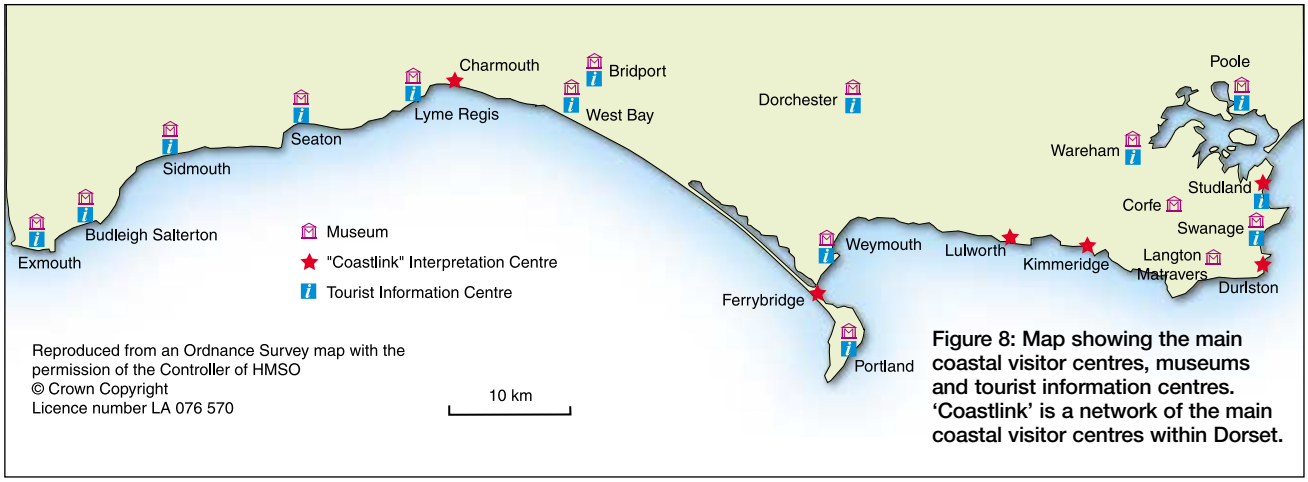


Figure 8: Map showing the main coastal visitor centres, museums and tourist information centres. 'Coastlink' is a network of the main coastal visitor centres within Dorset.

Interpretive and informative signs and guided walks are a vital part of the facilities provided for visitors. Care is taken in the design and location of signs, which are mainly located at the principal access points.

The nominated Site is served by a well developed and professionally managed infrastructure of visitor centres, museums and other attractions, accommodation, roads and public transport. The locations of the main information centres and museums are shown in Figure 8. There is no car parking provided within the nominated Site, but a large number of car parks exist within the adjacent towns and villages on the coast, operated by both local authorities and landowners, and small car parks are provided at a number of the other access points to the coast. The same is true of public toilets where facilities are maintained by the local authorities in all of the main towns and many of the villages, with other facilities are provided at a number of the access points to the nominated Site by landowners. It is considered that the provision of both toilets and car parking is generally adequate, although the scope for improvements will continue to be kept under review.

Facilities for public access within the nominated Site comprise access to beaches and clifftops via rights of way and permissive paths. A major means of access to it on foot is the South West Coast Path. This is one of thirteen designated National Trails, which have been identified by the Countryside Agency. The South West Coast Path runs on designated rights of way alongside, and in a few places within, the nominated Site (with the exception of the Isle of Portland). Responsibility for the management of the South West Coast Path lies primarily with the County Councils. Countryside Agency policy is to ensure that National Trails are maintained and managed to the highest standard, and a set of published standards was agreed in 1997. Further significant access to the Site is provided through the wider public rights of way network, which provides linking routes to the Coast Path, and opportunities for circular walks. The responsibility for the maintenance of rights of way rests with the County Councils. The County Councils are committed to nationally set targets to ensure that all rights of way are legally defined, available for use, signed and effectively promoted.

Military use within the 3,000 ha estate of the Armour School Ranges at Lulworth has a significant impact on public access to the nominated Site. The Ministry of Defence is committed to providing the maximum amount of safe public access, consistent with the operational requirements of military use. There are established arrangements to balance the needs of the MoD with the provision of regulated access within the ranges. At the present date a number of waymarked range walks, including a coastal route, are generally open for over 130 days each year, including forty-six of fifty-two weekends and the main school and public holidays.

The coast is a potentially hazardous environment for visitors. In addition to the normal range of hazards within the countryside, there are additional considerations such as possible cliff falls, landslides, tidal cut-offs and mudflows. The range of risks is well understood and has recently been documented in the context of preparations for the 1999 solar eclipse. The primary means of managing risks to visitors on the coast is through education and awareness raising. The most important safety management response is the provision of appropriate on-site signage at access points to the nominated Site. There are established arrangements for providing emergency cover on the coast. These include the Maritime and Coastguard Agency marine search and rescue centre at Portland, and Coastguard teams at Swanage, Kimmeridge, Wyke Regis, Portland, West Bay, Lyme Regis, Beer and Exmouth. Lifeboats are based at Swanage, Weymouth, Lyme Regis, Sidmouth and Exmouth, and Portland is the base for one of the Maritime and Coastguard Agency's search and rescue helicopters.

Visitor numbers

The Dorset and Devon Coasts are very well visited, with total annual visits estimated in excess of 14 million within the nominated Site and the adjacent coastal districts as a whole. Visitor figures are collected on a district-by-district basis, and baseline surveys of visitor statistics were carried out in Dorset and Devon in 1995. It is safe to assume that the majority of visitors to the coastal districts adjoining the nominated Site will have spent some time within its boundaries, although most time is spent within the towns, villages and other accommodation centres.

	TOTAL VISITOR NIGHTS	TOTAL VISITOR SPEND (STG£)
1995	22,751,900	869,894,000
1996	21,780,000	798,250,000
1997	23,109,000	943,957,000
1998	24,122,000	1,082,568,000

Summary of visitor statistics for the area surrounding the nominated Site. Based on aggregated data supplied by Dorset and Devon County Councils, for the whole of East Devon, West Dorset, Weymouth and Portland, and Purbeck Districts.

Key trends illustrated by the figures are that there is a trend for greater growth in day visitors over staying visitors, and that in real terms, the amount spent by day visitors is not increasing. Within the staying visitor sector the growth in international visits is greater than for domestic. There is also evidence of a growth of out-of-season markets, including short breaks and activity-based holidays. In this context it is considered that World Heritage Site status might assist the promotion of sustainable out-of-season visiting focussing particularly on special interest tourists, including international visitors. It may also assist in highlighting the importance of the coast to existing and new visitors, and by indicating the requirement for continued effective management of visitors to the coast. More detailed information on tourism figures is available on request.

4 (j) PROPERTY MANAGEMENT PLAN AND STATEMENT OF OBJECTIVES

A Management Plan for the nominated Site has been prepared and is included as Appendix Q to this nomination. The plan has been co-ordinated by Dorset and Devon County Councils with advice from the Steering Group listed above in Section 4 (d). The plan has involved a full programme of public consultation, and has taken account of the representations received. The objectives of the plan are as follows:

Draft Objective 1: to conserve the geology and geomorphology of the nominated Site by:

- Ensuring that there is minimal disturbance to natural coastal processes due to human activities
- Ensuring that human activities do not significantly reduce the quality of coastal exposures of geology within the nominated Site
- Promoting responsible collection of fossils and other geological specimens.

Draft Objective 2: to conserve, and enhance where appropriate, the quality of the landscape and seascape of the nominated Site.

Draft Objective 3: to welcome local people and visitors to the nominated Site at levels that it can sustain, by encouraging those with responsibilities to:

- Maintain a network of access on foot to the beaches within the nominated Site where practical
- Maintain access to the nominated Site via the South West Coast Path, the rights of way network and other paths
- Ensure that provision of public access and information helps to match visitor numbers to the capacity of the nominated Site, and maintains the tranquillity of remote areas
- Consider the safety of visitors to the nominated Site as a management issue
- Provide for visitor safety through appropriate education initiatives, and management where practicable
- Promote viewing of the nominated Site by boat
- Provide information on the nominated Site at local, national and international levels which encourages visiting to the nominated Site at levels which it can sustain
- Provide high quality information and interpretation about the nominated Site to both local people and visitors at the main access points and within the Gateway Towns
- Manage the transport impacts of visitors to the nominated Site.

Draft Objective 4: to encourage safe use of the nominated Site by educational groups of all ages, and to provide a high quality range of educational information and services about the nominated Site.

Draft Objective 5: to foster the gathering and dissemination of scientific information about the nominated Site.

Draft Objective 6: to ensure that World Heritage Site status, if granted, will be used responsibly in all aspects of publicity in relation to the Dorset and East Devon Coast, and assists wider sustainable development objectives within Dorset and East Devon.

4 (k) STAFFING LEVELS

Staffing levels for the nominated Site are described above in Section 4 (g), and the creation of two new posts is envisaged. The structure diagram for the proposed staffing of the nominated Site is shown in Figure 9.

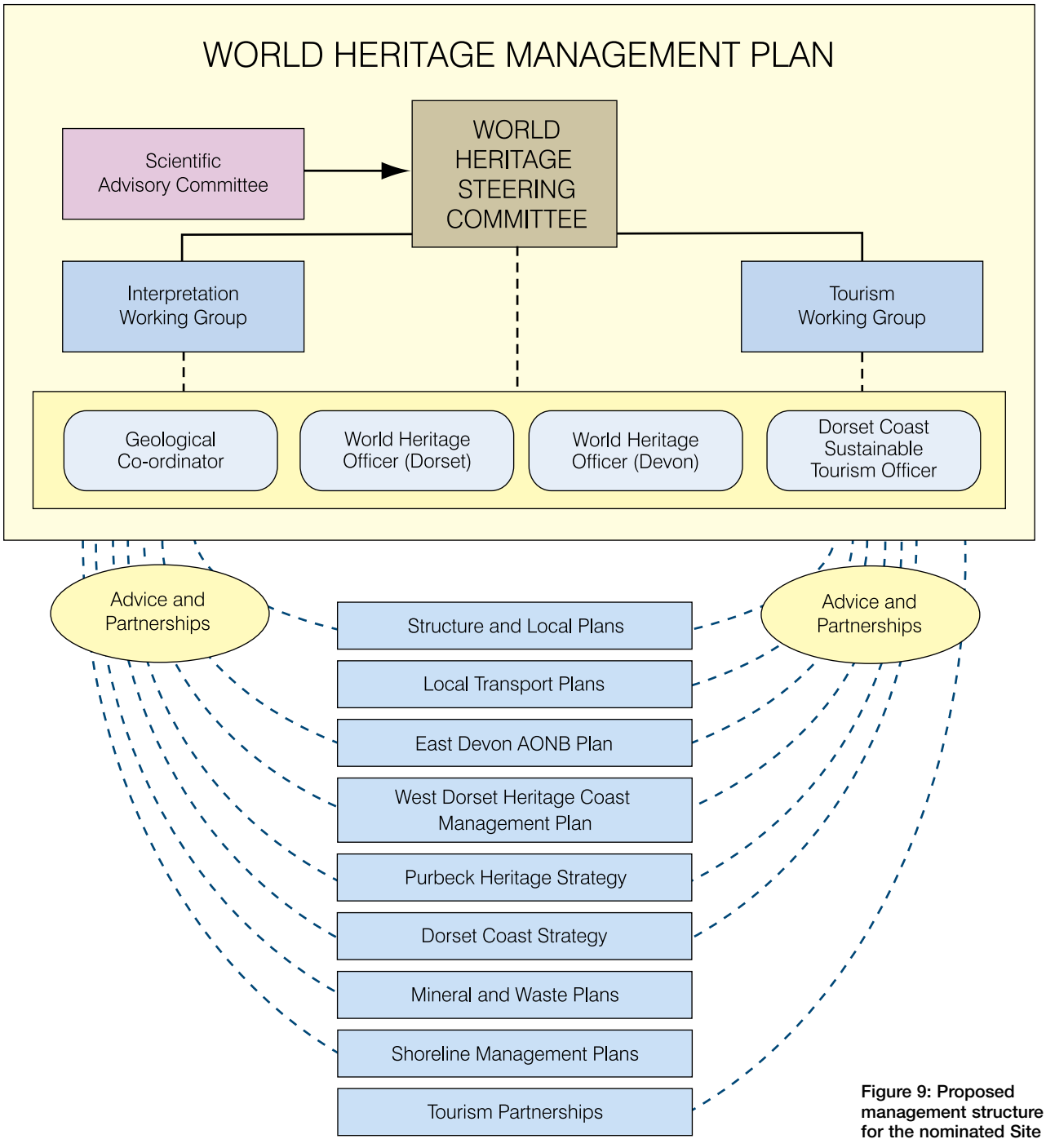


Figure 9: Proposed management structure for the nominated Site

5. Factors Affecting the Property

5 (a) DEVELOPMENT PRESSURES

The nominated Site comprises coastal areas that are both generally unsuitable for development, and are covered by a range of wider protective countryside and nature conservation designations, which are subject to restrictive planning policies. The result is that the nominated Site is not subject to significant development pressures. There are some localities, where coastal defences have been established or might be demanded in the foreseeable future, where pressures for construction within the nominated Site might occur. There are two areas within the nominated Site (Portland and Charton Bay) which lie within areas where there are permissions for mineral extraction, as described above, although the judgement of the local authorities is that they are unlikely to be reactivated. Both are being examined within an ongoing review of old minerals permissions, and are described within the site management plan. The countryside surrounding the nominated Site is similarly subject to restrictive planning policies, and planning applications mainly relate to amendments and alterations on land that has already been developed. All applications are examined within the context of an established range of restrictive planning policies as described in Sections 4 (b), 4 (c) and 4 (d) above, and set out in detail in Appendix 4 of the site management plan. The protection of the defined interests of the nominated Site will be a material consideration in the determination of applications within the nominated Site.

5 (b) ENVIRONMENTAL PRESSURES

The Site is the result of natural environmental pressures resulting from the sea's action upon the land. The coastal landforms and geological exposures rely on the continued operation of these processes for their future character. Global warming is predicted to have impacts on the nominated Site through both increased sea levels and a greater frequency of storm events. The precise nature of these impacts cannot be quantified at the present time. However, the primary character of the coast as a natural system responding to global environmental pressures will be unchanged.

The fossil resource of the nominated Site is continually refreshed by processes of coastal erosion. Where these rates are rapid, throughout much of the coast, the resource may also be threatened by loss to the elements. Active professional and amateur collection ensures that such losses are minimised, as described below (Section 5 (d)) and within the Site Management Plan.

5 (c) NATURAL DISASTERS AND PREPAREDNESS

It is not considered that the nominated Site is subject to natural disasters in the terms meant by UNESCO. The occurrence of major landslides within the nominated Site is part of its character, and brings with it a requirement to address issues of public safety, alongside other public safety issues which result from coastal access, including the potential for tidal cut-offs, cliffs, mud-flows and extreme weather. The Maritime and Coastguard Agency has carried out a detailed risk assessment of the coast, and maintain a search and rescue service to address the risks identified.

The County Councils, in partnership with the District Councils and emergency services, provide emergency planning functions, and maintain an overall contingency plan. There is a special contingency plan in place in the event of a major landslide on the West Dorset Coast (Lyme Regis-Burton Bradstock), an area that is particularly susceptible to such phenomena.

Past landslides have sometimes had major impacts on life in the area. In this slide from c. 1928 the road between Lyme Regis-Charmouth was lost.

Although not a natural threat, the risk of a major oil or chemical spill from shipping at sea is addressed through specific contingency plans, which are produced by professional emergency planning services within Devon and Dorset County Councils, and are exercised regularly. The plans set out provisions for the response of the emergency services in the event of an oil or chemical spill. They contain recommendations for clean-up response to minimise the environmental impact on the coast, and detailed practical information on the deployment of clean-up techniques and disposal of waste.

There are proposals for a ship-to-ship oil transfer area within UK territorial waters in Lyme Bay which create a particular focus for pollution risk, although this may also have benefits by regularising activity which is currently unmanaged and takes place in international waters. An exercise to identify the sensitivity of the coast and marine environment is currently being undertaken, prior to a decision on the location of this transfer area.

5 (d) VISITOR/TOURISM PRESSURES

There are established pressures on the nominated Site and in particular on its surroundings from visitors. With the countryside and towns surrounding it, the nominated Site already accommodates significant visitor numbers throughout the year. The pattern of visiting is strongly focussed around the main summer season. The anticipated trends in visiting to south-west England are upward, pointing to the continued need for an active approach to visitor management.

Regular maintenance of heavily used paths is required. This group of volunteers is repairing access steps at Man o'War Bay.

In general the impacts of visitors can include erosion of vegetation and path surfaces, and disturbance to wildlife. In detail the scale of impacts is variable throughout the coastal area, but tends to be focussed around the main access points to the coast. The pressures are well understood, and considerable work is already spent managing visitor activity by the countryside management services of the local authorities, the National Trust and private landowners. The primary interests for which the Site is nominated for World Heritage Site status are generally robust to visitor pressures.

Whilst the maintenance of existing access facilities is important, the way in which these are promoted, and the evaluation of the need for additional or improved facilities will be one of the most critical areas for ensuring continued sustainable use of the nominated Site by visitors. Matching visitor levels to the capacity of the coast has been a long-standing concern on the Dorset and East Devon coasts. World Heritage Site status, if granted, will be regarded as underpinning and supporting this existing work, and managed locally to avoid adding to unsustainable tourism pressures. The main principle of visitor management is that visitor numbers should be matched to the carrying capacity of the nominated Site. Such a concept can be hard to define, and will be best assessed by local managers, taking account of the following elements:

- Impacts on Earth Science: most earth science features within the nominated Site are robust, and unlikely to be damaged by visitors, however the possibility of such damage should always be considered.

- Impacts on the landscape: the facilities required to support visitor access can have visual impacts on the coast.

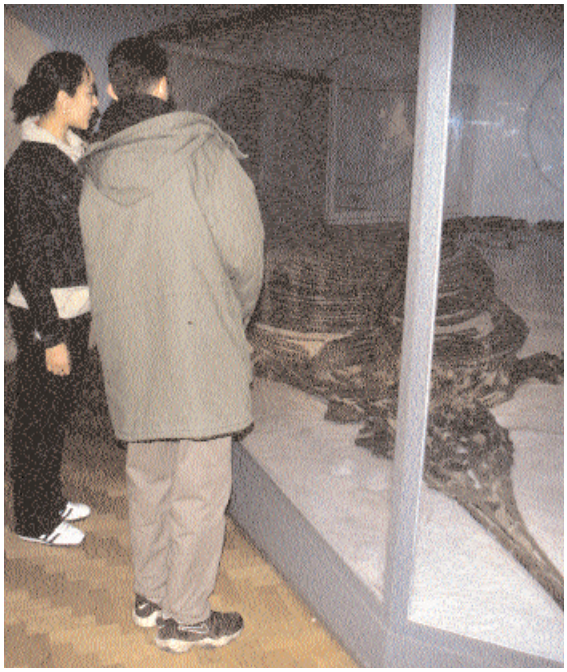
- Impacts on wildlife: these may arise from direct erosion of vegetation or disturbance to sensitive species.

- Quality of visitor experience: overall visitor numbers affect the experience of the nominated Site. This is particularly the case within many remote parts of the nominated Site where visitor numbers are limited due to the distance from access points. The balance between visitor numbers and the retention of remoteness needs to be carefully struck, with the emphasis in favour of remoteness.

- Impacts on traffic. Visitors to the coast make up a very significant part of the road traffic in Dorset and East Devon. The means by which visitors can get to the coast, and the capacity of the transport network to get them there are increasingly important considerations.

Professional and scientific collecting of fossils represents a strong part of the heritage of the nominated Site. Its importance to the history of science is primarily a result of such activity since the earliest days of geology, through the pioneering work of such people as Mary Anning, Henry De la Beche, Thomas Hawkins and others. The coastal nature of the nominated Site, and the fact that the most valuable areas are subject to continued erosion, create particular management issues in relation to fossil collection. In contrast to stable exposures at inland sites and in quarries, without active collection, the fossil resource of the nominated Site would be destroyed through coastal erosion. Continued responsible collecting is therefore vital to conserve important fossil specimens, which would otherwise be lost to the elements.

Responsible collecting is promoted at a national level by English Nature, and within the Geologists' Association's Code of Conduct for Geological Fieldwork. At a local level a voluntary code of practice has been established for one of the most important and popular fossil collecting localities within the nominated Site between Lyme Regis and Burton Bradstock. This section is very well studied and accessible, and contains scientifically important and valuable fossils at known horizons in an area subject to particularly rapid erosion. The code has the support of Charmouth Parish Council, English Nature, the National Trust, museums, local authorities, and the local collectors (including the professional collectors) as providing the best means of conserving the fossils and the scientific integrity of the nominated Site. The code promotes responsible and safe collecting, clarifies ownership of the fossils, aims to stop digging *in situ* in the cliffs without permission (already with considerable success), promotes better communication between landowners, collectors, museums and academics, and promotes the acquisition of key scientifically important specimens by registered museums.



The proper collection of fossils from the nominated Site involves a partnership between experienced collectors, landowners, conservation managers and museums. This series of pictures shows the discovery of *Leptopterygius solei*, a new species discovered by a local professional collector, David Sole, in 1986, and subsequently described by Professor Chris McGowan of the Royal Ontario Museum. The specimen when finally excavated and cleaned, was purchased by the Bristol City Museum where it is now displayed, with a reconstruction painted by John Sibbick. The Fossil Collecting Code of Conduct in West Dorset now gives an agreed, more formalised, framework to support responsible collection and the acquisition of important specimens by registered museums. Writing about the Lias, in support of this nomination, Chris McGowan makes the following point: *'If specimens are not collected soon after being exposed, they weather and are ultimately destroyed. The local collectors are the best and only safeguard against this natural attrition. The continuity of this locality as an internationally important source of new ichthyosaurs is therefore dependent on the continued activity of responsible local collectors.'*

Full details of the pilot code are set out in the site management plan. If management of fossil collecting is considered elsewhere in the nominated Site, it will be carried out in accordance with the spirit of the code as agreed, or as amended by agreement of the parties to it (together with relevant landowners). Responsible amateur collecting of fossils by visitors is also compatible with site conservation. The primary emphasis of site management is on promoting safe collecting at appropriate sites. This will generally involve informing and educating collecting by visitors towards appropriate material on beaches, and discouraging in situ collection from cliffs.

More information on visitor management is provided within the Site Management Plan (Appendix Q).

5 (e) NUMBER OF INHABITANTS WITHIN PROPERTY

The nominated Site is substantially uninhabited, although a few properties lie within its borders, including a number of beach huts and seasonally occupied chalets in places such as Monmouth Beach at Lyme Regis, West Weares and Church Ope Cove on Portland, and holiday parks at the Sea Shanty Holiday Chalets at Branscombe Mouth, and a caravan site at Dunscombe Manor to the east of Salcombe Regis. Also there are holiday chalets at Berry Barton Farm, Branscombe and private chalets on the beach and cliff at Weston Mouth. The total population living within the nominated Site is less than ten individuals. The population of the area surrounding the nominated Site (within the coastal towns and parishes) is over 166,000, with the breakdown within the different parishes as follows:

	POPULATION		POPULATION
Exmouth	32,436	Langton Herring	150
Budleigh Salterton	4,890	Fleet	100
Otterton	670	Chickerell	4,930
Sidmouth	13,372	Portland	12,620
Branscombe	518	Weymouth	53,900
Beer	1,454	Osmington	550
Seaton	6,513	Owermoigne	450
Axmouth	498	Chaldon Herring	180
Combyne Rousdon	308	West Lulworth	740
Uplyme	1,404	East Lulworth	180
Lyme Regis	3,830	Tyneham	0
Charmouth	1,360	Steeple	90
Stanton St Gabriel	100	Kimmeridge	110
Chideock	610	Corfe Castle	1,530
Bridport	7,180	Worth Matravers	750
Symondsbury	1,060	Langton Matravers	1,080
Burton Bradstock	1,030	Swanage	10,180
Swyre	100	Studland	520
Puncknowle	450		166,313
Abbotsbury	470		

The coast near Lulworth. Whilst there is some settlement near the nominated Site, there is virtually no population living within it.

6. Monitoring

6 (a) KEY INDICATORS FOR MEASURING STATE OF CONSERVATION

A series of indicators for measuring the state of conservation of the nominated Site, and the pressures upon it have been agreed within the Site Management Plan and are as follows:

ATTRIBUTE	INDICATOR (UNITS OF MEASUREMENT)	IDEAL STATUS	REPORT BY	REPORT FREQUENCY
Quality of earth science interest	Length of defended coastline within the Site, excluding repair of existing defences (metres since January 2000)	No increase	Coast Protection and Flood Defence Authorities	Annual
	Area of land developed within the Site (hectares since January 2000)	No increase	Local Authorities	Annual
	Removal of coastal defence at Durlston Bay (no units)	Removed (long term)	Purbeck District Council	Annual
	Re-exposure of geology at Ringstead Bay (no units)	Geology re-exposed (long term)	West Dorset District Council	Annual
	Operation of West Dorset fossil collecting code of conduct (Criteria have been established by the working group)	Reported operating successfully by parties to the code.	Dorset County Council	Annual -biannual
	Permissions granted for mineral extraction and quarrying within the Site (hectares)	No new permissions granted	Devon and Dorset County Councils	Annual
	Permissions granted for development within the Site (hectares)	No permissions contrary to Local Plan Policy	District Councils	Annual
	Damage to designated Earth Science interests (linked to stated conservation objectives) within the Site	No damage	English Nature	Annual
Quality of the setting of the World Heritage Site	Achievement of agreed work programme (no units)	N/A	Purbeck Heritage Committee Weymouth and Portland Ranger West Dorset Heritage Coast East Devon AONB	Annual
Tranquillity of remote coastline	Levels of use and disturbance at selected survey stations, noise measurements (methodology to be designed)	No decrease in tranquillity	Dorset Countryside, East Devon Coast and Countryside Service	Biannual
Visitors to the Site	Visitor numbers to key attractions	Stability (or increasing where capacity exists)	Dorset Tourism Data Project, Devon Tourism, Dorset Coast Forum (Tourism Officer)	Annual
	Seasonal distribution of visitors	Wider, within Site capacity	Dorset Tourism Data Project, Devon Tourism, Dorset Coast Forum (Tourism Officer)	Annual

Visitor Interpretation	Implementation of World Heritage Interpretation Programme	Progress with agreed work programme	Dorset and Devon County Councils	Annual
Visitor Experience	Visit satisfaction of visitors to the Site	No decrease in visitor satisfaction	Dorset Tourism Data Project, Devon Tourism, Sustainable Tourism Officer	Biannual
Educational Use	Number of educational visitors to Coastlink visitor centres	Stable, increase where capacity exists	Coastlink Centres	Annual
	Seasonal distribution of visitors	Wider, within Site capacity	Dorset Tourism Data Project, Devon Tourism, Sustainable Tourism Officer	Biannual
Transport	Visitor Numbers by mode of transport	Decrease in growth rate of car borne visits	Local Transport Plans, Dorset Tourism Data Project, Devon Tourism	Biannual
Access	Usage level of coast path (number of visitors)	Stability (or increasing where capacity exists)	South West Coast Path Project	Biannual
	Coast Path Maintenance Budget (£)	Stability (taking account of inflation)	South West Coast Path Project	Annual
Tourism Impact of World Heritage	Number of overseas visits	Within capacity of Site	Dorset Tourism Data Project, Devon Tourism	Biannual
	Number of visits prompted by World Heritage Site status	Within capacity of Site	Dorset Tourism Data Project, Devon Tourism	Biannual
	Number of visitors to programmes directly related to the Site Management Plan	Achievement of targets set for such programmes	Dorset and Devon County Councils	Biannual
Visitor Safety	Number of call-outs to visitors within the World Heritage Site (three year average)	Decrease	Maritime and Coastguard Agency	Annual
Science	Number of peer-reviewed papers published (3 year average of number of papers)	Stable or increasing	British Geological Survey	Annual
	Scientific conferences and seminars (number held, and numbers attending)	At least one national event every two years.	Dorset and Devon County Councils	Annual
	Geological budget of County Museums (proportion of total budget)	Stable or increasing	Dorset and Devon County Museums	Annual
	Number of visits to website	Increase	Dorset and Devon County Councils	Annual
Use of World Heritage logo	Use of logo outside of UNESCO guidelines	No instances	World Heritage Steering Group	Annual
	Inappropriate promotion of World Heritage in tourism literature (number of reported incidents)	No instances	World Heritage Steering Group	Annual
Staffing	Employment of full-time World Heritage co-ordinator (none)	Officer employed	Dorset and Devon County Councils	Annual
	Employment of World Heritage Tourism Officer (none)	Officer employed	Dorset and Devon County Councils	Annual

6 (b) ADMINISTRATIVE ARRANGEMENTS FOR MONITORING PROPERTY

The responsibility for co-ordinating the monitoring of the nominated Site will be undertaken by Dorset and Devon County Councils. The frequency of monitoring the various indicators and the responsibility for doing so is indicated above (pages 124-125), and the priority indicators will be monitored on an annual basis, and reported on the World Wide Web. It is envisaged that a monitoring report will be published as a bound report at a frequency of no less than every five years.

6 (c) RESULTS OF PREVIOUS REPORTING EXERCISES

English Nature has the organisational responsibility for monitoring and reporting on the condition of Sites of Special Scientific Interest (SSSI) that cover most of the nominated World Heritage Site. This ongoing monitoring programme involves assessment of site condition against specified conservation objectives, and includes biological and botanical features as well as the geological and geomorphological interests. In addition, SSSI owners are contacted to discuss management and conservation of the interest features of the sites that they own, at least once every three years. In certain circumstances, especially if the nature conservation (including earth science) interests are deemed to be 'sensitive' or 'fragile', then monitoring may be undertaken at more frequent intervals. To date, the results of these exercises indicate that the geological and geomorphological features of national or international importance within the nominated Site are overall in very favourable condition, due largely to the continuation of the natural, erosive coastal processes.

The most recent landscape assessments date from the 1990s, and are described in section 3 (c) (page 98).

7. Documentation

7 (a) PHOTOGRAPHS ETC.

A representative set of 35 mm slides of the nominated Site is provided in Appendix H. A further list of images used within the nomination, including details, where relevant of the copyright holders is included in the acknowledgements.

7 (b) COPIES OF PROPERTY MANAGEMENT PLANS, ETC.

A copy of the Site Management Plan is included as Appendix Q. This includes relevant details of other land-use and management plans for the nominated Site, and copies of the most relevant current management plan documents.

A complete list of the supporting documentation provided within the Appendices to the nomination is as follows:

Appendix A: Details of the boundaries of the nominated Site, and maps at 1:50,000 scale

Appendix B: Designated Sites of Scientific Interest in relation to the nominated Site

Appendix C: Designated Areas of Outstanding Natural Beauty in relation to the nominated Site

Appendix D: Geological Conservation Review sites identified within the nominated Site

Appendix E: Geological Maps of the nominated Site and its surroundings at 1:50,000 scale

Appendix F: Ordnance Survey Maps of the nominated Site and its surroundings at 1:25,000 scale

Appendix G: Provisional Bibliography of the nominated Site (on CD-ROM)

Appendix H: Set of colour slides 35 mm

Appendix J: Selected reprints of key references about the nominated Site

Appendix K: Selected letters received in support of nomination

Appendix L: CD-ROM of the Dorset Coast Strategy

Appendix M: Designated European Wildlife Sites which include land within the nominated Site

Appendix N: Sensitive Marine Areas adjacent to the nominated Site

Appendix P: The Jurassic Coast Strategy

Appendix Q: Dorset and East Devon Coast, proposed World Heritage Site: Management Plan.

7 (c) BIBLIOGRAPHY

A list of references for this nomination is provided below. This is a small part of the large scientific literature which exists for the nominated Site. A provisional bibliography for the nominated Site, containing over 5,000 references is provided on computer disc as Appendix G to this nomination.

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7 (d) ADDRESS WHERE INVENTORY, RECORDS AND ARCHIVES ARE HELD

Important records for the Site are held at the following locations:

Dorset County Council
Environmental Services Directorate
County Hall
Colliton Park
Dorchester
Dorset DT1 1XJ
U.K.

Devon County Council
Environmental Services Directorate
Lucombe House
County Hall
Topsham Road
Exeter
Devon EX2 4QW
U.K.

English Nature
Dorset Team
Slepe Farm
Arne
Wareham
Dorset BH20 5BN
U.K.

English Nature
Devon Team
The Old Mill House
37 North Street
Okehampton
Devon EX20 1AR
U.K.

Joint Nature Conservation Committee
Monkstone House
City Road
Peterborough PE1 1JY
U.K.

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham NG12 5GG
U.K.

The Fleet Study Group hold an important and comprehensive archive of reports relating to Chesil and the Fleet which is held in the library of Weymouth College, Cranford Avenue, Weymouth, Dorset DT4 7LQ. U.K.

8. Signature

Signed (on behalf of State Party)

Full name

Title

Date

Glossary of Earth Science Terms

Aalenian - Stratigraphic stage name for the top of the Lower and base of the Middle Jurassic in Europe
Aeolian - Sediments deposited after transport by wind
Alpine - Mountain building episode from the early to mid Tertiary
Ammonite - Extinct spiral shelled mollusc
Ammonite zonation - Divisions of geological time identified by the presence or absence of specific fossils. Ammonites evolved rapidly through time. Certain species lived for specific periods of time and these define the zones that are named after the species of ammonites that define them
Angular discordance - A break in sedimentation (see also unconformity)
Archosaurs - 'ruling lizard': a member of a major grouping of diapsid reptiles including dinosaurs, pterosaurs and crocodiles

Bajocian - Stratigraphic stage name within the Middle Jurassic
Belemnites - Extinct squid-like mollusc with pencil shaped shell
Benthic - Bottom dwelling
Biostratigraphic - Strata identified as the same age through the fossils they contain
Bivalves - A class of the Molluscs with many modern examples
Bolonian - A proposed regional stage name within the Upper Jurassic, equivalent to the lower Tithonian
Boreal - 'Northern' or 'cold' region or fauna
Bryozoans - Microscopic colonial animals related to corals

Callovian - Stratigraphic stage name within the Middle Jurassic
Cap rock - Impermeable rock that traps oil and gas
Carboniferous - Period of geological time between 355 and 290 my ago
Cartilaginous - Sharks and rays lacking a bony skeleton
Cambrian - Period of geological time between 570 and 510 my ago
Cenomanian - Sandy Lower Chalk found in the west of the Wessex Basin
Cenozoic - A time in the Earth's history including the Tertiary and Quaternary periods
Cephalopods - Molluscs with well defined head including ammonites and squid
Charophyte - A class of algae
Chronostratigraphy - Identification of strata on the grounds of geological time units
Concordant - Where the strike or grain of the rocks is parallel to the coastline (also see discordant)

Coprolites - Fossilised faecal pellets
Coprology - Study of coprolites
Cornubia - Palaeo-geographical area including Cornwall and the Southern Approaches
Cretaceous - Period of geological time between 135 and 65 my ago
Crinoid - A plant like animal belonging to the echinoderms
Cycadophytes - Large tree ferns

Denudation - Erosion of the land surface
Devonian - Period of geological time between 410 and 355 my ago
Diapsid - A major reptile group than includes dinosaurs, other extinct reptiles, crocodiles and snakes
Discordant - Where the strike or grain of the rocks is at ninety degrees to the coastline (also see concordant)

Echinoderms - A group of animals that display five fold symmetry and have spiny skin. They include sea urchins and starfish
Eocene - An epoch within the Tertiary Period
Exposures - Sites where the underlying rocks are accessible

Facies - The sum total of the features that characterise a sediment

Faulting - A fracture within the rocks along which displacement has taken place. Normal faults generally occur under extension, when the rocks are being pulled apart. Reverse faults usually occur under compression. Several of the major faults in Dorset started as normal faults but were later reactivated under compression

Fluvial - Sediments deposited under moving water

Foraminifera - A unicellular animal belonging to the Protozoa and usually microscopic in size

Gastropods - Snails and slugs from the phylum Mollusca

Geomorphology - The study of land forms

Geology - The study of the earth as a whole

Gondwana - The southern hemisphere super-continent including the present continents of South America, Africa, India, Australia and Antarctica

Hettangian - Stage name within the Lower Jurassic

Holocene - The latest period of geological time

Holothuroid - A group of echinoderms known as the sea cucumbers

Holotype - A specimen which displays the main characteristics of a species

Horizon - A time plane recognisable in rocks by some characteristic feature or features

Hydrocarbons - Organic matter trapped within rocks in the form of oil and gas

Hypoxic shale - Muds deposited in a low oxygen environment

Ichthyosaur - A dolphin-like marine reptile now extinct

Invertebrates - Animals without backbones

Jurassic - Period of geological time between 205 and 135my ago

Kimmeridgian - Stratigraphic stage name within the Upper Jurassic

Lagerstätten - A deposit which contains exceptional preservation and/or assemblages of fossils

Lamellibranch - Little used term for bivalves

Laurasia - The northern hemisphere super-continent including the present continents of North America, Europe and Asia

Lithology - The general characters of a sedimentary rock particularly as observed in the field

Lusitanian - Palaeogeographical area including Spain and Portugal

Magnetostratigraphic - The study of the earth's magnetic changes as recorded in the sediments

Marine - Referees to rocks deposited under the sea

Mass extinction - A heightened rate of extinction in the fossil record

Mass movement - Landslides and cliff falls

Microfauna - Fauna consisting of microfossils

Microfossils - Microscopic fossils, typically planktonic animals or vertebrate material such as bones and teeth

Microvertebrate - Typically bones and teeth from reptiles, amphibians and mammals

Mesozoic Era - A time in the Earth's history including the Triassic, Jurassic and Cretaceous Periods

Nannofossils - Fossil material of ultra-microscopic size that can only be viewed using the most powerful optical and electron microscopes

Oolite - A limestone composed from small spheres of calcium that formed in warm, shallow waters. Each oolith is composed from concentric layers of calcium that have built up around a grain of sand or shell fragment

Orogeny - Mountain building episode

Ostracods - Small crustaceans with a bivalve shell

Outcrop - A site where rocks are accessible on the surface Oxfordian - Stratigraphic stage within the Upper Jurassic

Oxic shale - Muddy sediments that were deposited on a sea floor in the presence of oxygen

Palaeogeography - The reconstruction of presumed geography from the past

Palaeontology - The study of ancient life

Palaeozoic -	An era in the Earth's history from the Cambrian to Permian Periods
palaeosol -	A fossilised soil or layer exposed to weathering
Palynological -	The study of fossil plant pollen and spores
Palynomorph -	A micro resistant, walled organic body including both plant and some animal remains
Pangaea -	The super-continent formed when all continents were fused together at the end of the Permian
Pelagic -	Animals that live in open water
Perisphinctids	Distinctive group of ammonites
Permian -	A Period of geological time between 290 and 250 my ago
Photogrammetric -	The use of photography in mapping and surveying
Phylogenetic studies -	The study of evolution of species
Playas -	Ephemeral lakes subject to flooding and evaporation
Pleistocene -	A division of the Tertiary Period
Pliensbachian -	Stratigraphic stage within the Lower Jurassic
Plesiosaur -	Large marine reptile typically with long neck and tail
Pliosaurs -	Large marine reptile of heavy build
Portlandian -	Stratigraphic stage name within the Upper Jurassic now largely overtaken by modern nomenclature
Pterosaurs -	'Winged lizard' the Flying reptiles
Purbeckian -	Stratigraphic stage name within the Upper Jurassic now largely overtaken by modern nomenclature
Quaternary -	Period of Earth history from 2 my to the present day
Reservoir -	Porous rock containing oil (also see source and cap rocks)
Rhynchosaurs -	'Snout lizard' a member of pig-like late Triassic reptiles
Rotational landslides -	Landslides in which the slipped material, typically the cliff top) rotates, creating a back tilted block
Sabkha -	Arid coastal flats typified by the Trucial coast of Saudi Arabia
Sedimentology -	The study of sedimentary processes
Sedimentary basin -	Large, gently subsiding areas in which thick sequences of sedimentary rocks can accumulate. They often occur in areas between major plate boundaries where they are known as intra plate basins
Source rocks -	Typically thick sequences of dark, organic rock clays that, through heat and pressure, produce oil (also see hydrocarbons, reservoir and cap rocks)
Stage -	Divisions of geological time of the forth order: Era, System, Series, Stage and Substage
Stratigraphy -	The study of stratified rocks (sediments and volcanic)
Strata -	Layers or bedding in sedimentary rocks
Synapsids -	A basal group of reptiles to which the mammals are related
Taxonomy -	The classification of life
Taphonomy -	The study of decay and burial
Temnospondyl -	An extinct group of tetrapod amphibians
Tethys Ocean -	A large ocean that covered what is now the Mediterranean, N Africa and through to the Himalayas
Tertiary -	Period of geological time between 65 and 2 my ago
Theropod -	Members of saurischian dinosaurs including all carnivorous dinosaurs expect staurikosaurs
Tithonian	Stratigraphic stage within the Late Jurassic
Toarcian -	Stratigraphic stage within the Lower Jurassic
Transgression -	A rise in sea level leading to deposition of marine strata
Triassic -	A period of time between 250 and 205 my ago
Turonian -	Stratigraphic stage name within the Upper Cretaceous
Type specimen	Specimen or specimens that define a new genus or species
Unconformity -	A gap in the stratigraphic record
Ventifact -	A pebble faceted by the abrasive effects of wind blown sand
Zonation -	See ammonite zonation

Glossary of Place Names Mentioned in the Text, and Maps of the Site at 1:100,000 Scale

Maps of the nominated Site at a scale of 1:100,000 are provided on pages 139-146. A checklist of all of the principal localities mentioned within the text, together with grid reference for each of them is set out below and on pages 137 and 138. The grid reference location for each site comprises eastings and northings which locate the nominated Site in relation to the national grid of the UK Ordnance Survey. The eastings are shown along the bottom of each of the map pages, and the northings are shown up the side of each map page. Where a locality appears on two or more pages, only the first is noted.

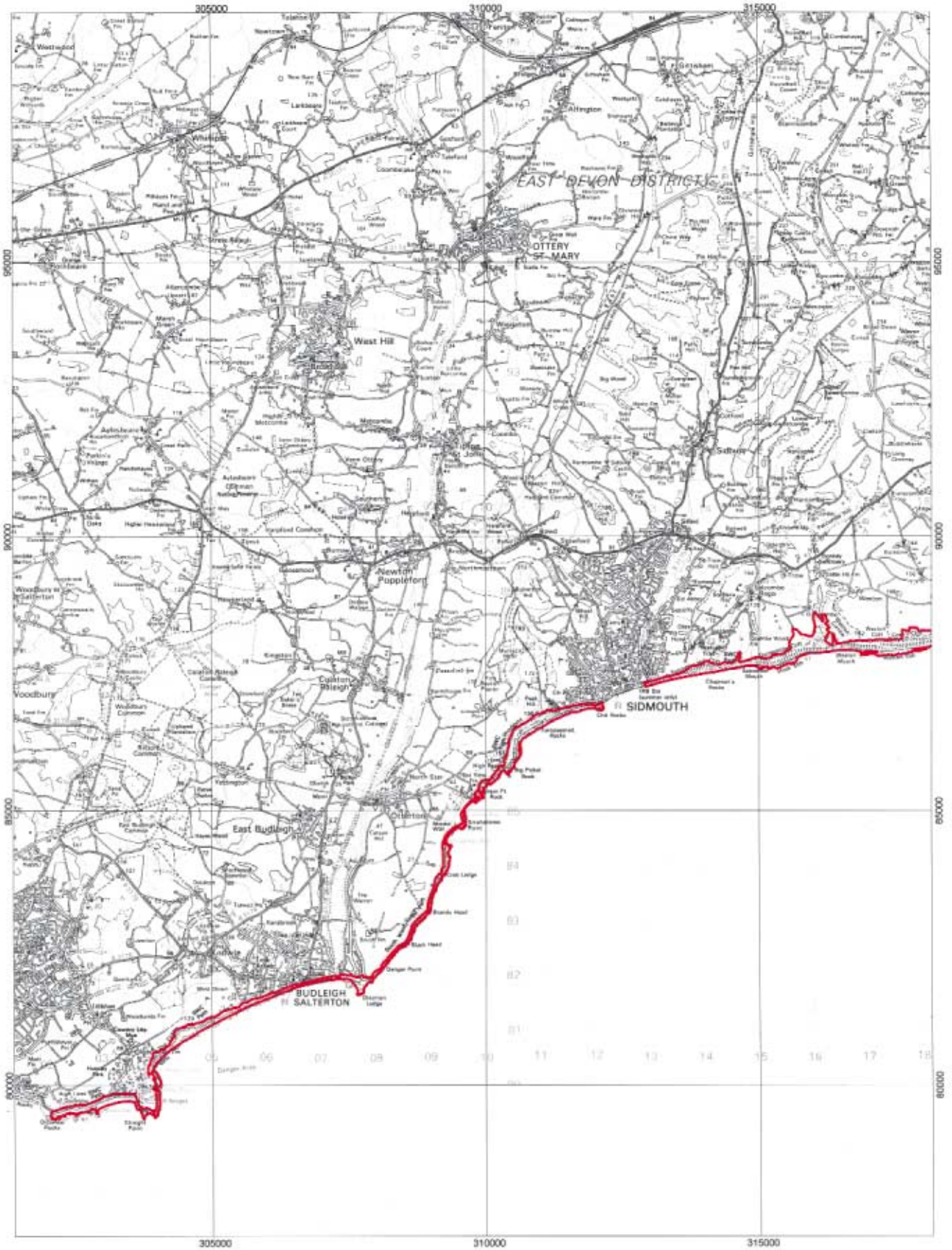
Location details for the Geological Conservation Review (GCR) sites are also provided in the table. Please note the following points:

1. Some are linear sites, in which case the start and finish points are shown
2. Some GCR Sites comprise more than one section
3. Some different GCR Sites have the same name (the interests cited within them are different).

Location	GCR Site Code Number (where applicable)	Page on which shown	Point location, or start point of linear sites		End point of linear sites (where applicable)	
			Easting	Northing	Easting	Northing
Abbotsbury		142	357700	85400		
Abbotsbury Castle		142	355500	86500		
Axmouth		140	326100	91300		
Axmouth to Lyme Regis GCR Site	800	140	325400	89900	333700	91700
Balaclava Bay		143	369800	74100		
Ballard Down GCR Site	1843	146	404100	82500	403400	80400
Ballard Head		146	404800	81300		
Ballard Point - Studland Bay GCR Site	2288	146	404800	81300	403800	82700
Bats Head		144	379500	80300		
Beer		140	323300	89300		
Berry Knap		142	358000	82000		
Bindon		140	327000	90500		
Black Head		139	308600	82600		
Black Head GCR Site	1300	144	372300	82000	373500	81700
Black Ven		141	335700	93200		
Black Ven GCR Site	1321	141	334700	92700	336300	93100
Blacknor GCR Site	1285	143	367800	71400		
Bowleaze Cove		143	370300	81900		
Bran Point		143	374300	81400		
Brandy Bay		145	388900	79300		
Branscombe		140	320000	88400		
Broad Bench Cuddle GCR Site	915	145	389800	78900	390900	78900
Budleigh Salterton		139	306600	82000		
Budleigh Salterton GCR Site (1)	1507	139	305500	81500	307300	82000
Budleigh Salterton GCR Site (2)	1837	139	304100	82500	307900	81900
Burning Cliff		144	376100	81700		
Burton Cliff & Cliff Hill Road Section GCR Site	51	142	347800	89500	349200	88700
Buton Bradstock		142	349000	89000		
Castletown		143	369200	74100		
Chaldon Down		144	378000	81000		
Chaldon Herring		144	379000	83000		
Chapmans Pool		146	395500	77000		
Charmouth GCR Site	794	141	335900	93100	349600	89200
Chesil Beach		142	358000	84700	367000	74000
Chesil Beach GCR Site	1800	142	346200	90300	368200	72900
Chesilton		143	368200	73500		
Chickerell		143	364200	80800		
Chideock		141	342000	92000		
Chiswell		143	368200	73500		
Cliff House GCR Site	725	144	376200	81500		
Combpyne		140	329000	92400		
Corfe Castle		146	396800	81700		
Culverhole		140	327000	89000		
Culverhole Point		140	327600	89300		
Culverhole Point GCR Site	1263	140	327500	89300		
Dungy Head - Mupe GCR Site	1006	145	381500	80000	384300	79700
Durdle Door		144	380400	80200		
Durdle Door	2627	144	380700	80300		
Durdle Pier		143	370400	71900		
Durlston Bay		146	403700	77900		
Durlston Bay GCR Site (1)	547	146	403500	77200	403900	78600
Durlston Bay GCR Site (2)	724	146	403500	78000		

Durlston Bay GCR Site (3)	793	146	403500	78000		
Durlston Bay GCR Site (4)	914	146	403500	78000		
Durlston Bay GCR Site (5)	2900	144	380700	80300		
Durlston Head		146	403600	77200		
East Cliff GCR Site	253	142	346300	90200	347500	89600
East Cliff to White Cliff GCR Site (part 1)	632	140	320900	88000	322800	89800
East Cliff to White Cliff GCR Site (part 2)	632	140	323200	89200	323500	89600
East Fleet		143	363800	80100		
East Fleet - Small Mouth GCR Site (part 1)	1298	143	365900	76700	366700	76300
East Fleet - Small Mouth GCR Site (part 2)	1298	143	366700	76500	367200	77200
East Lulworth		145	386000	82000		
East Weares		143	370300	73000		
Encombe Bay		146	394500	77200		
Exmouth		139 (part)	300000	81000		
Eype Mouth		141	344600	91000		
Flowers Barrow		145	386800	80400		
Freshwater Bay		143	369000	70100		
Freshwater Bay GCR Site	996	143	369100	70000		
Furzy Cliff		143	369900	81800		
Furzy Cliff - Peveril Point GCR Site	1863	143	369700	81600	404100	78600
Furzy Cliff, Overcombe GCR Site	163	143	369700	81700	370300	81900
Gad Cliff		145	388490	79700		
Gad Cliff GCR Site	1628	145	387100	79700	389200	79500
Golden Cap		141	340600	92200		
Golden Cap - Lyme Regis GCR Site	2109	141	338000	92700		
Great Southwells		143	369500	70500		
Ham Cliff		143	371000	81800		
Hand Fast Point - Ballard Point GCR Site	206	146	404300	82400	404800	81300
Haven Cliffs		140	326200	89800		
Hawkesdown Hill		140	326300	91400		
High Peak GCR Site	814	139	310400	85800	312100	86900
Hooken		140	321000	88100		
Hooken Cliff GCR Site	204	140	320900	88100	322700	87800
Houns - Tout GCR Site	726	146	394600	77300	396900	75500
Houns-tout Cliff		146	395000	77400		
Humble Point		141	330800	89900		
Isle of Portland		143	370400	57000		
Isle of Purbeck		146	395200	82600		
Kimmeridge		145	391900	79900		
Kimmeridge Bay		145	390700	79000		
Kings Pier		143	370200	73300		
Knoll		142	353500	87800		
Ladram Bay		139	309700	85000		
Ladram Bay GCR Site	1839	139	310000	85500		
Langton Matravers		146	400300	78500		
Lulworth Banks (offshore reef)		144	377000	77300		
Lulworth Cove		145	382600	79800		
Lulworth Cove	2625	145	382900	79800	382300	79800
Lyme Regis		141	334000	92100		
Lyme Regis GCR Site (1)	916	141	332100	90800	337300	92800
Lyme Regis GCR Site (part 1)	2952	141	332700	90900	334100	91500
Lyme Regis GCR Site (part 2)	2952	141	334500	91900	336300	92900
Lynch Cove GCR Site	432	143	364900	78100	364800	77400
Man O War Cove		144	380800	80200		
Mupe Bay		145	384400	79900		
Mupe Bay - Worbarrow Bay GCR Site (part 1)	2626	145	384300	79700	384300	80100
Mupe Bay - Worbarrow Bay GCR Site (part 2)	2626	145	386400	80300	387100	79700
Nothe Fort		143	368700	78700		
Old Harry Rocks		146	405600	82600		
Orcombe Rocks		139	302100	79400		
Orcombe Rocks	1506	139	301800	79700	302300	79500
Osmington		144	372400	82900		
Osmington GCR Site (part 1)	910	143	369700	81600	372800	81800
Osmington GCR Site (part 1)	910	144	373400	81700	375200	81300
Osmington Mills		144	373500	82700		
Otterton Point		139	307700	81700		
Otterton Point GCR Site	813	139	307700	81900		
Overcombe		143	369600	81600		
Owermoigne		144	376900	85300		
Peveril Point		146	404100	78600		
Pinhay		141	331700	91200		
Pinhay Bay		141	331800	91300		
Pinhay Bay GCR Site	1264	141	332000	90800		
Pinhay Bay Fault Corner GCR Site	87	141	331700	90700	345300	90700
Portland Bill		143	367900	68400		
Portland Bill GCR Site	1643	143	367500	68500	368800	69200
Portland East Beach		143	368000	68800		
Portland West Beach		143	367500	68600		
Preston Beach		143	369800	82500		

Location	GCR Site Code Number (where applicable)	Page on which shown	Point location, or start point of linear sites		End point of linear sites (where applicable)	
			Easting	Northing	Easting	Northing
Puncknowle		144	384200	86500		
Punfield Cove GCR Site	636	146	403700	80700	403900	80900
Purbeck		145	395000	81000		
Purbeck Ridge		145	391300	81800		
Ridgeway		140	327600	94900		
Ringstead		144	376000	81500		
Ringstead GCR Site	1297	144	375100	81300	376600	81100
Ringstead Bay		144	376000	81280		
Rousdon		140	329500	91400		
Sandsfoot GCR Site	828	143	368400	79700	367100	77100
Seacombe		145	398500	76600		
Seaton		140	324900	90200		
Seaton Hole		140	324900	90300		
Seatown		141	342050	91800		
Seatown - Watton Cliff GCR Site	252	141	342300	91500	345200	90800
Seven Rock Point		141	332700	90800		
Shipmoor Point		142	357600	83600		
Shipmoor Point - Butterstreet Cove GCR Site (part 1)	1603	142	357600	83600		
Shipmoor Point - Butterstreet Cove GCR Site (part 2)	1603	142	359600	62200		
Shipmoor Point - Butterstreet Cove (part 3)	1603	143	360800	82200		
Shipmoor Point - Butterstreet Cove (part 4)	1603	143	361200	80800		
Shipmoor Point - Butterstreet Cove (part 5)	1603	143	363300	79900		
Sidmouth		139	312500	87300		
Smallmouth Sands GCR Site	1064	143	366900	76400	367200	77200
Smallmouth Sands		143	366800	76300		
St Aldhelm's Head		145	396100	75200		
Stair Hole		145	382100	79800		
Stanton St Gabriel		141	339900	92300		
Steeple		145	391000	81000		
Studland		146	404330	82600		
Studland Bay GCR Site	522	146	404500	82400	403700	82900
Swanage		146	402980	79100		
Swanage GCR Site	2629	146	403100	79700	403800	80000
Swyre Head		144	379600	80500		
Swyre Head - Chapman's Pool GCR Site	1060	145	393700	77300	395500	77100
Symondsbury		141	344500	93600		
Tar Rocks GCR Site	997	143	368100	72500		
The Fleet		143	363220	79200		
Thorncombe Beacon		141	344000	91500		
Tidmoor Point		143	364400	78600		
Tidmoor Point - East Fleet Coast GCR Site	2380	143	364300	78500	363500	79800
Tout Quarry		143	368900	72200		
Tyneham		145	385500	80500		
Tyneham Cap		145	389200	79500		
Tyneham Cap - Houns Tout GCR Site	998	145	388800	79600	395600	76800
Uplyme		141	332500	93500		
Ware		141	332800	91800		
Wareham		145	392000	82000		
Watton Cliff GCR Site (1)	546	142	345100	90800	345300	90700
Watton Cliff GCR Site (2)	1330	142	345400	90700		
Watton Cliff GCR Site (3)	2901	142	345100	90800	345300	90700
West Bay		142	346400	90500		
West Bexington		142	353400	86800		
West Cliff GCR Site	1000	143	368500	72900	367600	68400
West Cliff GCR Site (part 1, coastal section only)	1198	143	368500	72900	367600	68400
West Cliff GCR Site (part 2, coastal section only)	1198	143	369100	72900	370200	71800
West Lulworth		140	322500	80200		
Weymouth		143	368000	79500		
White Nothe		144	377200	80600		
White Nothe GCR Site (1)	208	144	376400	81300	378800	80600
White Nothe GCR Site (2)	635	144	376200	81400	377200	81600
White Nothe - Bacon House GCR Site	2289	144	378000	80700	384300	79700
Whitlands		141	330700	91100		
Winspit - Seacombe GCR Site	1001	146	397600	75900	398600	76600
Worbarrow Bay		145	386500	80000		
Worbarrow Bay GCR Site	634	145	386100	80300	386500	80100
Worbarrow Tout		145	386870	79400		
Worth Matravers		146	397400	77400		
Wyke Regis		143	366400	77100		



Dorset and East Devon Coast nominated World Heritage Site

Map 1 of 8

Scale 1:100000

Dorset County Council
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Devon County Council
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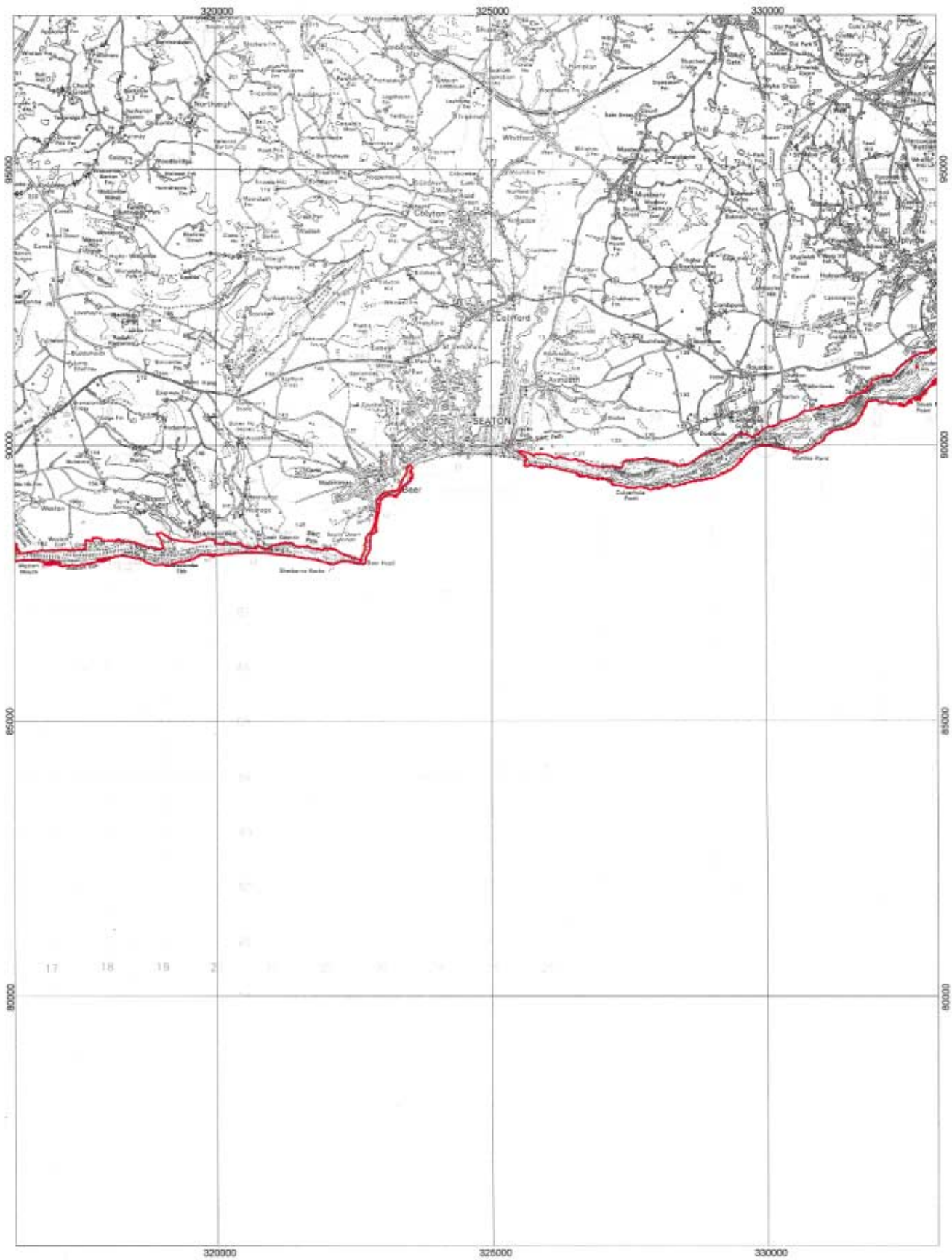
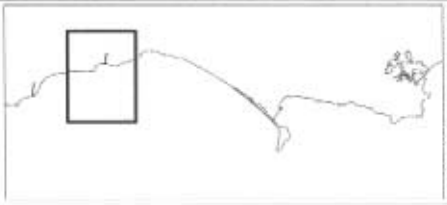


Dorset and East Devon Coast nominated World Heritage Site

Map 2 of 8

Scale 1:100000



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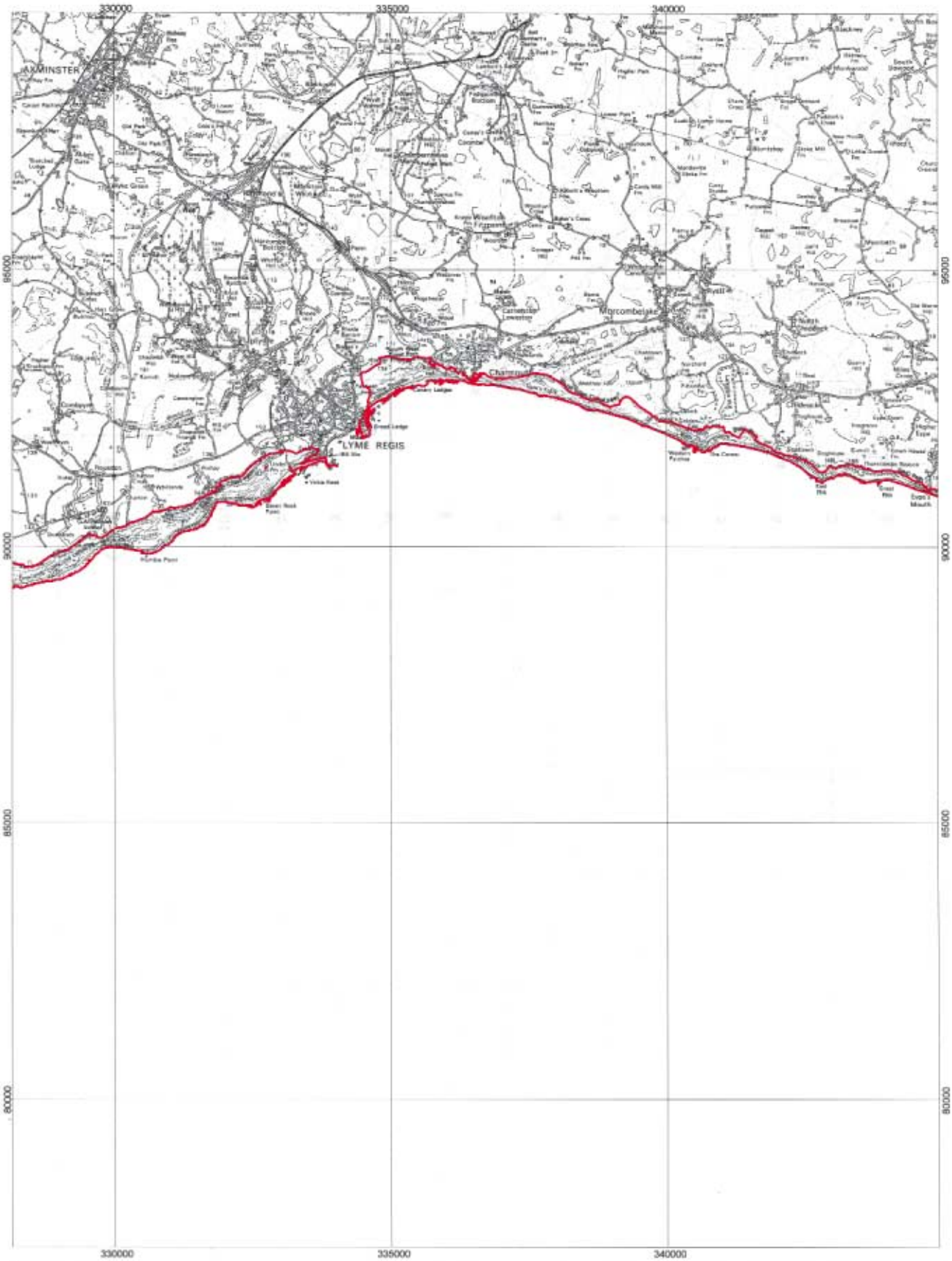
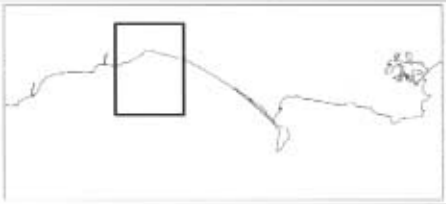


Dorset and East Devon Coast nominated World Heritage Site

Map 3 of 8

Scale 1:100000



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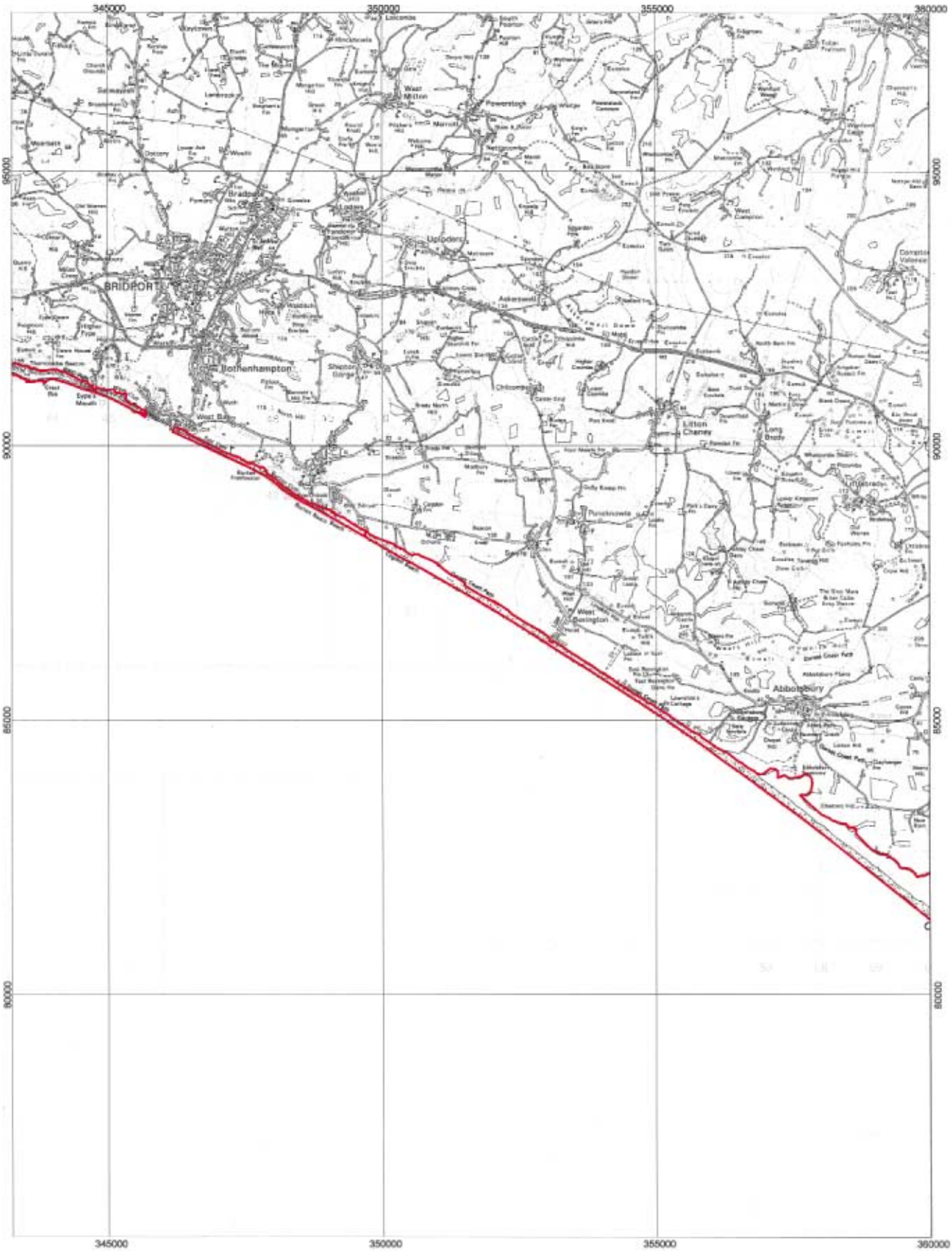
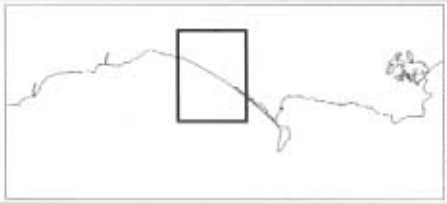


Dorset and East Devon Coast nominated World Heritage Site

Map 4 of 8

Scale 1:100000



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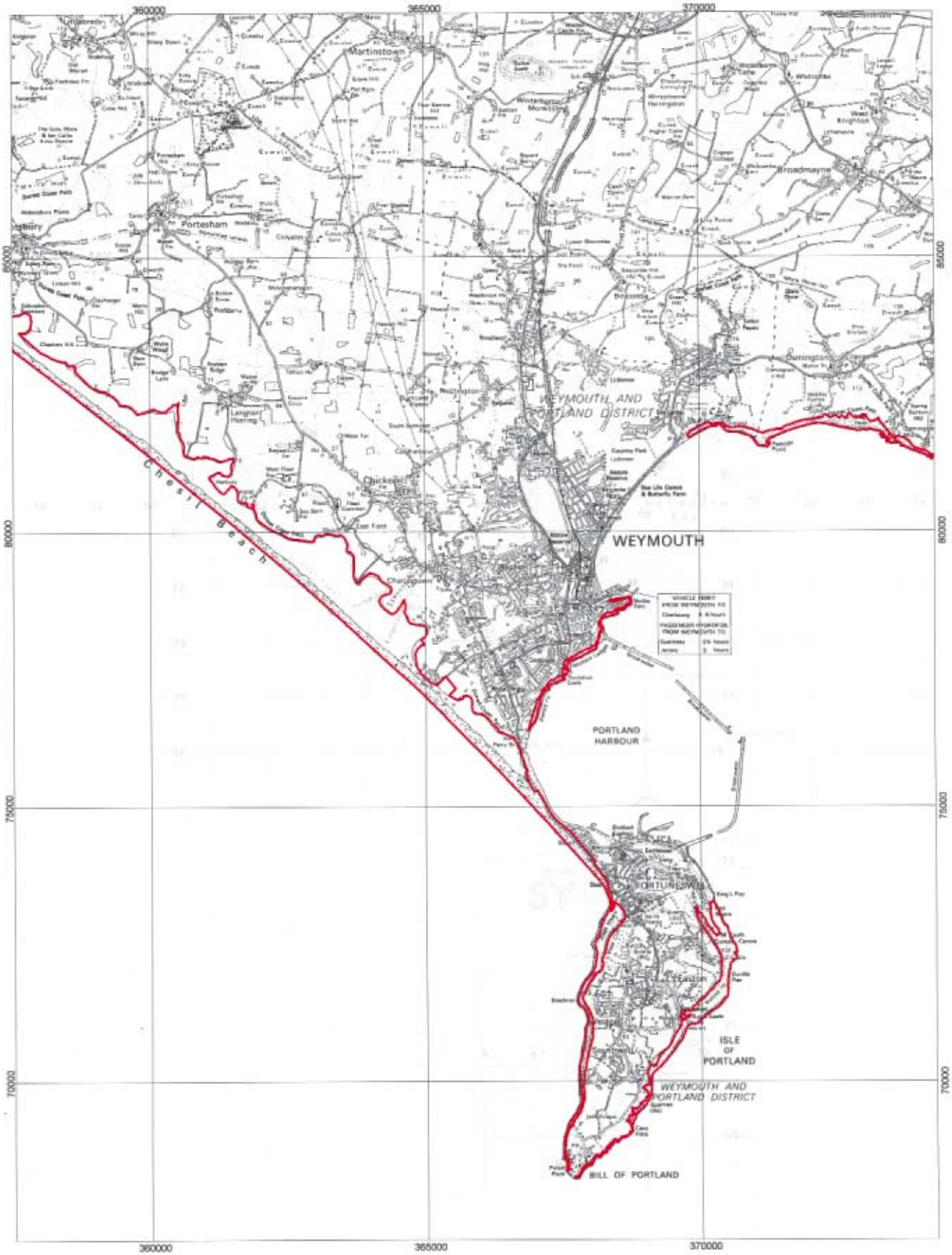

Dorset and East Devon Coast nominated World Heritage Site

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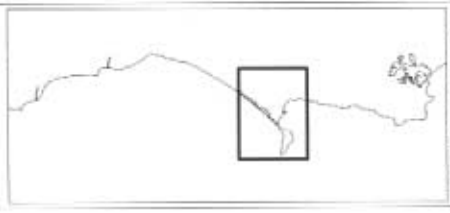

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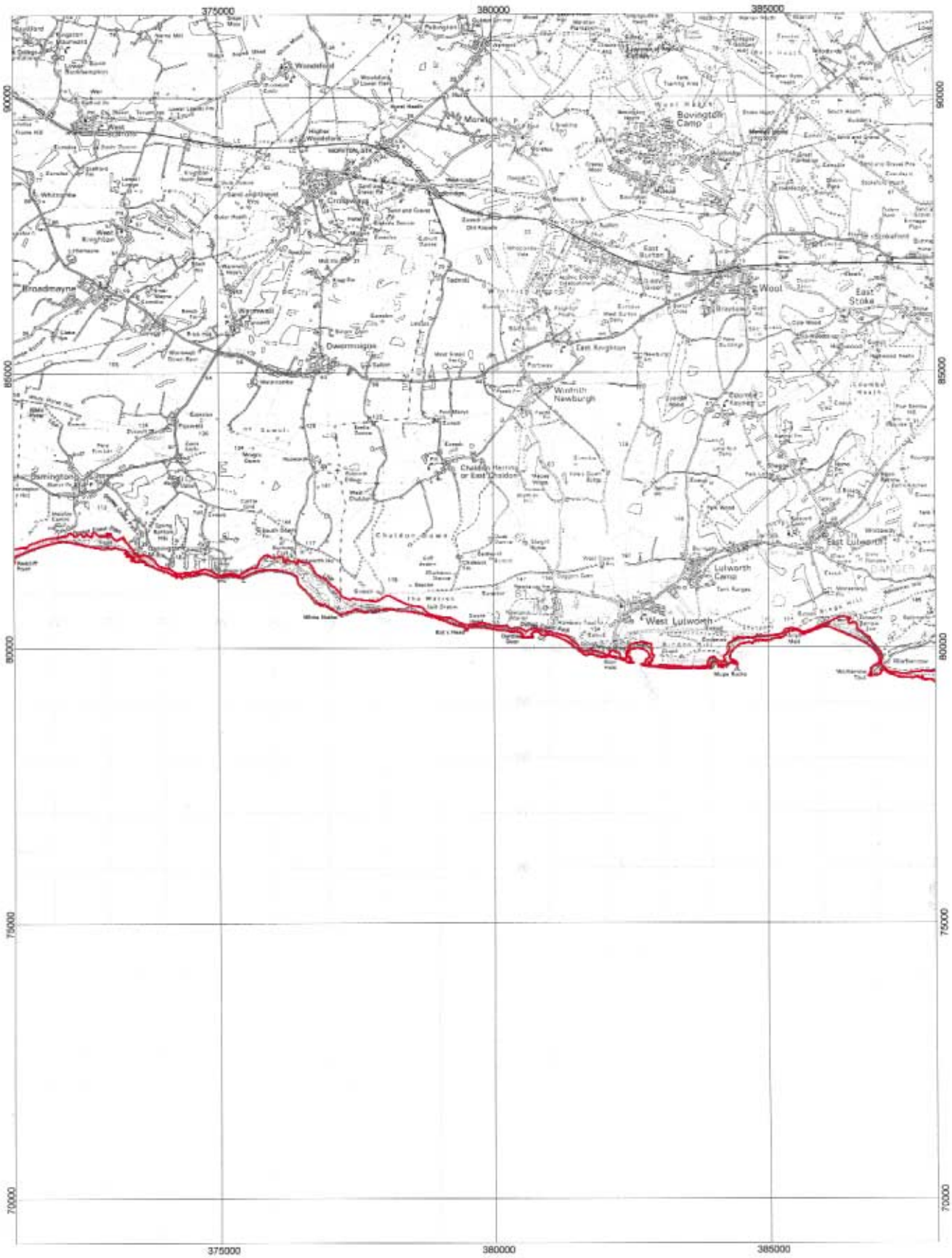

Dorset and East Devon Coast nominated World Heritage Site

Map 6 of 8

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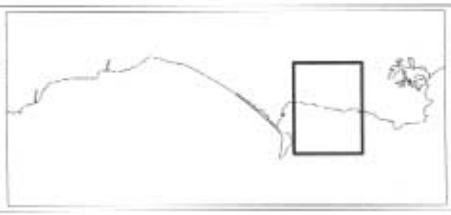

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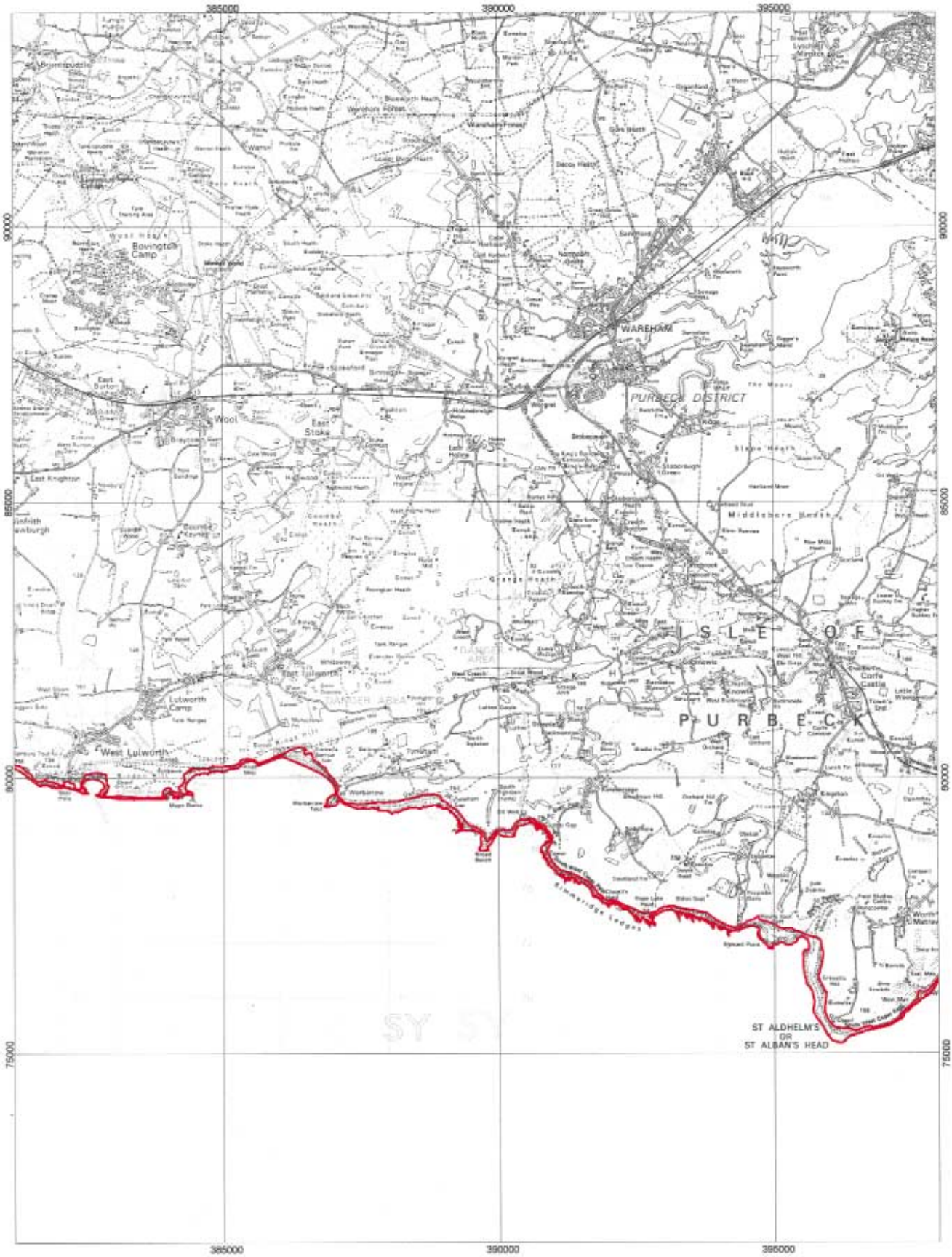

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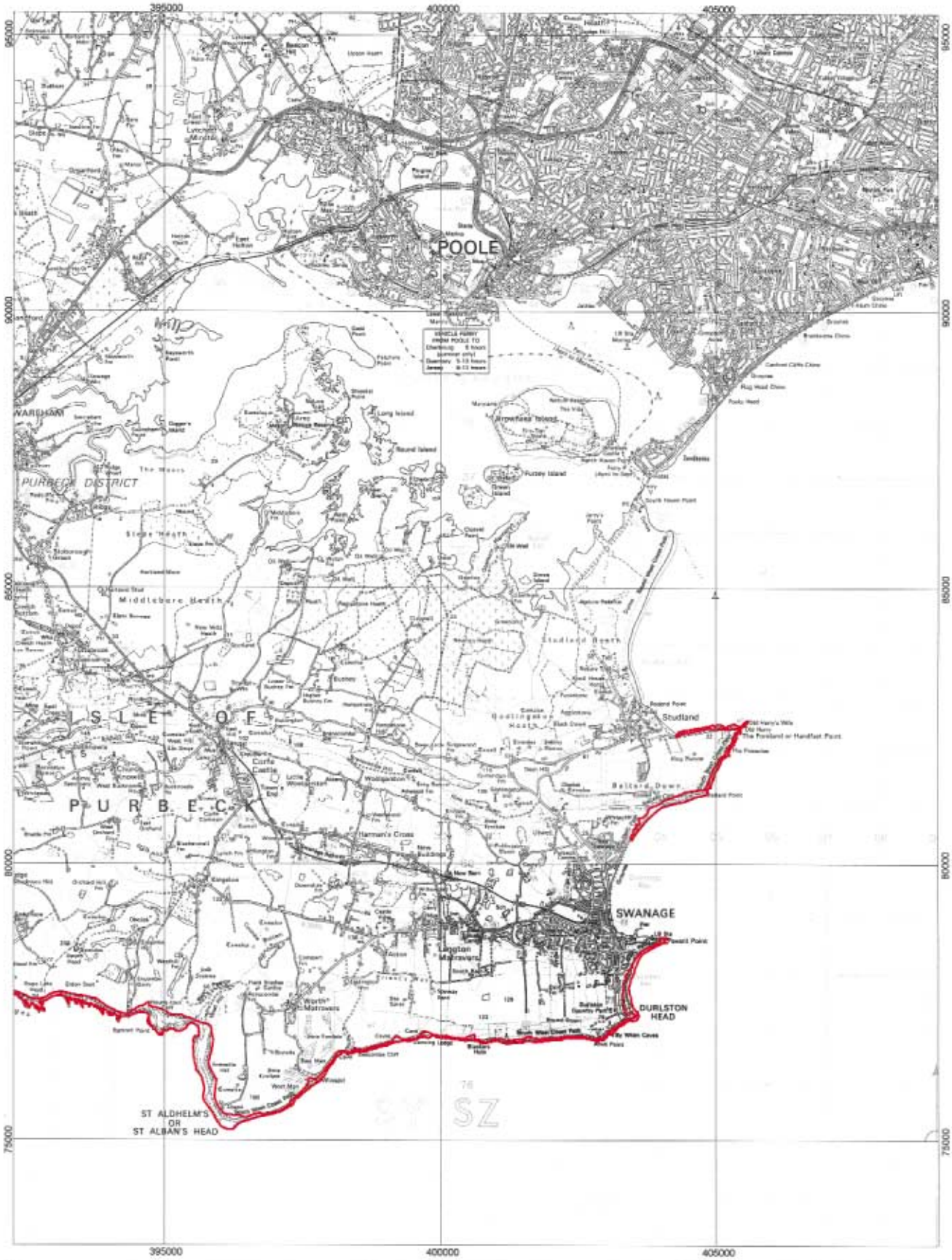

Dorset and East Devon Coast nominated World Heritage Site

Map 8 of 8

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Acknowledgements

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- Professor Robert Allison, Department of Geography, University of Durham, UK (B)
- Sir David Attenborough CH FRS, UK (B)
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- Mrs Liz-Anne Bawden, former Curator, Philpot Museum, Lyme Regis, UK (B)
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- Dr John Cope, Department of Earth Sciences, Cardiff University, UK (B)
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- Dr W Wimbledon, Countryside Council for Wales, UK (A)
- Dr John K Wright, Geology Department, Royal Holloway University of London, UK (B)

Key to codes
A = Original contribution which has been incorporated into nomination in whole or part
B = Review of final draft/letter of support
C = Member of Technical Working Group

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- Mr Derek Boyt, West Dorset District Council
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- Mr David Sole, Dorset Fossil Collectors
- Mr Terry Sweeney, Dorset County Council
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- Mr Simon Williams, Weymouth and Portland Borough Council
- Mr Aiden Winder, Devon County Council.

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- Mr David Andrew, Devon County Council
- Professor Denys Brunsden, Dorset Coast Forum
- Mr Ed Chorlton, Devon County Council
- Ms Joan Edwards, Devon Wildife Trust (now the Wildlife Trusts Partnership)
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- Professor Vincent May, Bournemouth University
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- Mr Malcolm Turnbull, Dorset County Council
- Mr Aiden Winder, Devon County Council.

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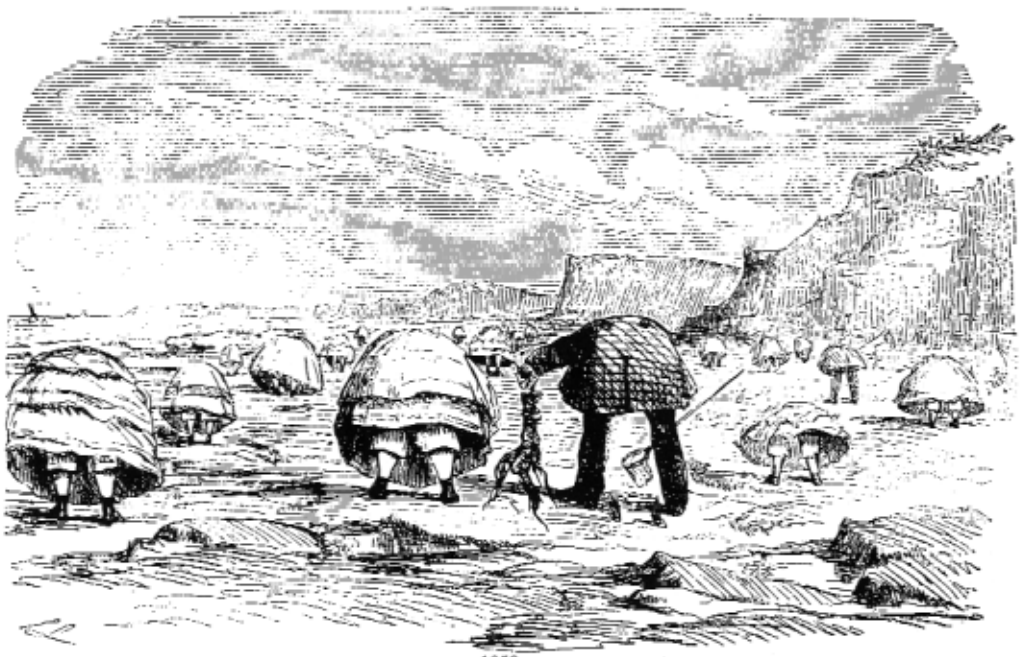

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COMMON OBJECTS AT THE SEA-SIDE—
GENERALLY FOUND UPON THE ROCKS AT LOW WATER

DORSET AND EAST DEVON COAST WORLD HERITAGE SITE

WORLD HERITAGE SITE MANAGEMENT PLAN

FIRST REVISION 2003

Foreword

by The Rt Hon Tessa Jowell MP, Secretary of State for Culture, Media and Sport, and
The Rt Hon Margaret Beckett MP, Secretary of State for Environment, Food and Rural Affairs

We are delighted to present this Management Plan for the Dorset and East Devon Coast World Heritage Site.

The Dorset and East Devon Coast is one of the most significant earth science sites in the world. Its coastal exposures provide a near continuous, accessible sequence of rocks that document nearly 190 million years of earth history. It includes a remarkable range of internationally important fossil localities which continue to produce superbly preserved remains, many unique or without equal elsewhere. It also displays an exceptional range of classic coastal geomorphological features. Many major contributions to science, including numerous first discoveries have been made on the Dorset and East Devon Coast and it has been a crucible of earth science investigations for almost 300 years. This importance continues to the present day inspiring leading researchers, and providing a teaching and training resource of the highest quality.

The natural beauty of the Site has inspired many fine works by some of the of the world's most prominent novelists, poets and artists, including Thomas Hardy, Jane Austen, John Fowles, John Keats, Joseph Turner, and John Constable. It has attracted many visitors from both this country and overseas down the years, and this continues to the present day.

This Management Plan also sets out an exciting challenge to secure positive benefits for the community and economy from the educational potential that this site offers, whilst at the same time conserving and protecting the outstanding beauty and importance of this area.

The Government is accountable to UNESCO and the wider international community for the future conservation and presentation of this important site. It is a responsibility we take seriously. This Management Plan has been developed in close co-operation with the organisations responsible for the day-to-day care of the Site, together with the local community and others with a special interest in it. The Plan aims to ensure that the conservation and management of the Site is undertaken in a sensitive and appropriate manner. It highlights the key issues affecting the Site both now and in the future, and outlines how these will be addressed.

We are extremely grateful to all those bodies and individuals who have worked so hard to produce this Plan, in particular Dorset and Devon County Councils, and the members of the Dorset Coast Forum. We feel sure that this document will prove to be an invaluable management tool to all those involved in the ongoing presentation and conservation of this very special place.

TESSA JOWELL **MARGARET BECKETT**

Introduction

We are delighted to endorse this Site Management Plan for the Dorset and East Devon Coast World Heritage Site. The plan was originally submitted to UNESCO as part of the nomination, which was accepted on 13 December 2001 in Helsinki. Its proposals were developed through an extensive programme of public consultation, and have attracted a high degree of consensus amongst local people, organisations and interests, including those with the lead responsibilities for managing the area. The plan has been updated following the award of World Heritage Status by UNESCO under natural site category (i). It will be updated in future every three years.

Through its inscription on the World Heritage List, the Dorset and East Devon Coast World Heritage Site is internationally recognised as a Site of outstanding universal value, and ranks with the most famous and exciting heritage Sites in the world. World Heritage brings with it a responsibility to ensure that a Site, identified as of global importance, should be conserved for future generations. The UK Government is committed fully to meeting the UK's obligation to ensure that our World Heritage Sites are managed to the highest standards.

Apart from being a requirement of the nomination, a Management Plan also provides an excellent focus for a co-ordinated approach to the Site's future management. The Site Management Plan demonstrates how we will ensure the World Heritage values of the Dorset and East Devon Coast are conserved in the long term. We are fortunate that the management measures necessary to protect our coast are mostly well established already, and the plan in many ways provides a directory of how these existing initiatives will continue to operate. World Heritage will benefit Dorset and East Devon, particularly by creating new opportunities to improve the educational use of the coast, support scientific study, and increase our capabilities in visitor management. The Site Management Plan shows how we will ensure that these opportunities will be managed responsibly to benefit the local environment and economy.

There is now a high level of local awareness of the importance and requirements of World Heritage Site status, and the strongest commitment to ensuring that management of the coast remains of the highest quality, in keeping with its importance. This plan sets out how we will put that commitment into practice.

SIGNED BY:

_____

Mr John Peake MBE
Chairman, Dorset County Council

_____

Mrs Mary Strudwick
Chairman, Devon County Council

_____

Mrs Ann Liverton
Chairman, East Devon District Council

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Mrs Mary Penfold
Chairman, West Dorset District Council

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Mr Doug Hollings
Mayor of Weymouth and Portland

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Mr John Hyde
Chairman, Purbeck District Council

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Professor Denys Brunsden
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Submitted to UNESCO, 2000; This revision published: 2003

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Further information on the World Heritage Nomination and Management Plan may be obtained from:

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U.K.
Tel: 01305 225101
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Contents

Note: Whilst the main body of the plan has been updated since the success of the nomination, only appendices AO, AI, A10 and A11 have been fully revised in this draft. The remaining appendices are those submitted to UNESCO in 2000. The plans relevant to the Dorset and East Devon AONBs were also submitted to UNESCO at the time of nomination. New management plans for both AONBs are currently under preparation and will be completed in 2004. For more information about these plans please contact:

- East Devon AONB Service, The Knowle, Sidmouth, Devon EX10 8HL, U.K.

Dorset AONB Service, County Hall, Dorchester, Dorset DT1 1XJ, U.K.

Executive Summary

PURPOSE OF THIS MANAGEMENT PLAN

This Site Management Plan has been prepared for the Dorset and East Devon Coast World Heritage Site. The site was inscribed on the World Heritage list by UNESCO (the United Nations Educational, Scientific and Cultural Organisation) on 13th December 2001.

THE BASIS OF THE DESIGNATION

The Site was granted World Heritage status because of the internationally important geology and geomorphology of the coast. The Site contains one of the best exposures of Mesozoic rocks anywhere in the World and a superlative range of geomorphological phenomena. It has also had an extremely influential role in the formative debates of earth science, and retains an exceptional importance for modern earth science studies. Its importance is heightened because it is accessible, and set within attractive countryside. A detailed statement of significance of the Site is set out in Chapter 2 of the Management Plan.

The Site was designated because it met the following UNESCO criterion:

- Criterion (i) The Site should be an outstanding example, representing major stages of Earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features

AIMS OF THE SITE MANAGEMENT PLAN

The Site Management Plan has two aims:

- to demonstrate how the management required to protect and properly conserve the Site in the long-term will be implemented.
- to set out the local implications of World Heritage Site status, and identify appropriate policies and actions which will achieve benefits from the designation for the public understanding of the Site, and to the local economy.

SITE BOUNDARY

The boundaries of the Site have been defined to closely follow the interests designated as being of World Heritage Interest. The landward boundaries are as follows:

- On cliff coastline, the boundary is taken at the break in slope at the top of the most landward cliff-scarp
- On coastline with no cliffs, the boundary is taken at the back of the beach
- The Site includes the Fleet lagoon and the boundary will be taken at the top of the low cliffs that lie on its northern shore.

The seaward boundary of the Site is taken as Mean Low Water Mark.

WORLD HERITAGE SITE MANAGEMENT

The objectives of management for the Site are set out in Chapter 3 of the Management Plan and, in summary are as follows:

1: to conserve the geology and geomorphology of the Site

2: to conserve, and enhance where appropriate, the quality of the landscape and seascape of the Site.

3: to welcome local people and visitors to the Site at levels which it can sustain.

4: to encourage safe use of the Site by educational groups of all ages, and to provide a high quality range of educational information and services about the Site.

5: to foster the gathering and dissemination of scientific information about the Site.

6: to ensure that World Heritage Site status:

a) is used responsibly in all aspects of publicity in relation to the Dorset and East Devon Coast, and
b) assists wider sustainable development objectives within Dorset and East Devon.

PRINCIPLES OF SITE MANAGEMENT

Four principles, which will guide management of the World Heritage Site, are set out in Chapter 3, and in summary are as follows:

- The World Heritage Site Management Plan fully recognises that the Site is set within a well-visited coast where people will continue to live and work.
- The World Heritage Site Management Plan confines itself to addressing only issues directly related to World Heritage Site status.
- Management in relation to World Heritage will remain locally driven.

- World Heritage Management will be delivered through existing, established initiatives and mechanisms wherever possible.

MANAGEMENT POLICIES

Management policies for the Site, in relation to each of the defined World Heritage Objectives are set out in Chapter 4 of the Site Management Plan. This sets out how the existing range of conservation management and planning policies will provide protection to the Site in the long term. The chapter includes policies on the following subjects:

- Marine Aggregates
- Cliff Climbing
- Coastal Defence
- Development Within The Site
- Fossil Collecting
- Pebble Extraction
- Rock-Sample Collecting
- Military Activity
- Oil Exploration And Production
- Oil And Chemical Pollution
- Ports Activity
- Quarrying
- Landscape Management
- Public Access
- Carrying Capacity
- Safety
- Visitor Interpretation
- Sustainable Transport
- Sustainable Tourism
- Promotion Of The Site
- Tourism And Visitor Management
- Use Of The World Heritage Emblem
- The Role Of The Gateway Towns

MONITORING AND REVIEW

Provision must be made for monitoring and reporting on the condition of a World Heritage Site. Chapter 5 sets out monitoring criteria for the Site and the responsibilities for undertaking monitoring and the reporting of results. It is anticipated that reporting will be carried out on an annual basis, with the results being made publicly available.

IMPLEMENTATION

Implementation arrangements, and a timetable of development for the World Heritage Site Management Plan are set out in Chapter 6.

NEW MANAGEMENT STRUCTURES

Although much of the work of implementing involves action by existing initiatives, three groups have been established to manage implementation of the Site Management Plan

- A World Heritage Steering Group with overall responsibility for ensuring that the management objectives of the Site are achieved, and for monitoring and reporting on the state of the Site.
- A Science and Conservation Advisory Group which will advise the Steering Group on earth science conservation, and be responsible for achieving an effective Science and Conservation Advisory Network to support implementation of the Management Plan.
- A World Heritage Tourism Working Group tasked with providing ideas and advice on the integration of site management with the tourism industry, development of special interest tourism, co-ordination of information and interpretation and influencing sustainable tourism promotion to be sympathetic to World Heritage objectives
- Other groups may be established to support implementation in other areas, such as education, according to need.
- A World Heritage Site Trust will be established to assist with fundraising activities.

STAFFING

Staff resources will be identified in Dorset and Devon County Councils with responsibility for World Heritage matters within each County. Three new posts have been established to support management of the Site: An Earth Science Manager, a Visitor Manager and an Earth Science Adviser. Other posts may be established as required.

Chapter 1: Introduction and Aims of the Plan

1.1 This management plan has been prepared for the Dorset and East Devon Coast, which was designated as a World Heritage Site by UNESCO (United Nations Educational, Scientific and Cultural Organisation). World Heritage Site status is a recognition of globally important sites – defined by UNESCO as being of outstanding universal value. Sites may be accepted as of World Heritage Site status if they meet at least one of four criteria set by UNESCO. The Dorset and East Devon Coast was inscribed because it meets the following UNESCO criterion:

- Outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.

The Site was inscribed on the World Heritage list by UNESCO in December 2001. Further details of the application and assessment process are available from UNESCO's site on the World Wide Web at:

- http://www.unesco.org/whc/nwhc/pages/doc/main.htm

1.2 Achievement of World Heritage Site status also requires a commitment to the protection of the Site to be clearly demonstrated. This management plan was originally submitted as part of the successful World Heritage application to UNESCO, in order to demonstrate that commitment. It has been revised and updated following their decision. It is designed to provide a clear statement of the measures needed to conserve the Site for future generations. **The primary aim of the Site Management Plan is, therefore:**

- **to demonstrate how the management required to protect and properly conserve the Site in the long-term will be implemented.**

1.3 The existing and established management initiatives for the coast already provide the necessary management for the Site in most cases, and any areas where this is not the case are identified and addressed by this plan.

1.4 In addition to this core aim, a management plan is also needed to ensure that the way in which the Site is managed, and any implications, are understood and accepted locally. This extends to measures to ensure its World Heritage features are protected. It also relates to the potential for World Heritage Site status to support research, interpretation, sustainable economic development, tourism and the rural economy. The latter issues apply particularly to the land surrounding the Site, but not included within it, and to the towns and villages that provide the 'gateways' to the Site. **The second aim of the Site Management Plan is, therefore:**

- **to set out the local implications of World Heritage Site status, and identify appropriate policies and actions which will achieve benefits from the designation for the public understanding of the Site, and to the local economy.**

1.5 As in the case of site protection, World Heritage management objectives are already addressed by national legislation (such as Areas of Outstanding Natural Beauty and Sites of Special Scientific Interest) and existing site management, such as the activities of the various local and national earth science research groups, countryside managers, landowners, local authority tourism and economic development organisations and the Dorset Coast Forum. The management of the Site will continue to be an important focus of their future work.

1.6 This World Heritage Site Management Plan has been written to set out clearly the way in which the Site will be protected in the future. It does this through the following chapters:

- **Chapter 2** provides a summary of the World Heritage Interest of the Site
- **Chapter 3** sets out World Heritage Management Objectives, which provide the long-term guide to successful management of the Site, and a series of key principles as to how they will be implemented.
- **Chapter 4** sets out detailed policies and proposals for management of the Site. Because of the wide range of well-established local initiatives that exist, much of this chapter acts as a pointer to the policies, plans and management arrangements that are in place to conserve and enhance the superb geology and geomorphology of the coast.
- **Chapter 5** sets out the arrangements for monitoring and reporting on the condition of the Site, and for a regular review of the Management Plan
- **Chapter 6** provides details of the arrangements for staffing and organisations that will be required to ensure that the Site Management Plan is implemented.
- A series of **Appendices** provide more detailed information on the designation. They include a details of the Site boundaries, and information on existing planning policies and key management initiatives.

Chapter 2. The World Heritage Interest of the Dorset and East Devon Coast

2.1 The Dorset and East Devon Coast was inscribed on the World Heritage List following its acceptance as a Site of 'outstanding universal value' by the UNESCO World Heritage Committee on 13 December 2001. The Committee recommended that the Site be accepted under natural criterion (i) for World Heritage Sites:

- outstanding examples representing major stages of the earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features.

2.2 The official statement on the interests for which the Site is inscribed on the World Heritage List is the paper that was considered and approved by the World Heritage Committee. This report was made to the World Heritage Committee by IUCN, the World Conservation Union, and its conclusion in relation to the meeting of criterion (i) is as follows:

Natural site criterion (i): Earth's history and geological features.

In relation to this criterion, the site's claim to outstanding universal value is based on the following significant values:

- *The coastal exposures within the site provide an almost continuous sequence of Triassic, Jurassic and Cretaceous rock formations spanning the Mesozoic Era and document approximately 185 million years of Earth history;*
- *The site includes a range of internationally important fossil localities – both vertebrate and invertebrate, marine and terrestrial – which have produced well preserved and diverse evidence of life during Mesozoic times;*
- *The site contains a range of textbook exemplars of coastal geomorphological features, landforms and processes;*
- *The site is renowned for its contribution to earth science investigations for over 300 years, and has helped foster major contributions to many aspects of geology, palaeontology and geomorphology; and*
- *The site has continuing significance for many aspects of earth science research and is a high quality teaching and training resource for the earth sciences.*

Critical examination of these elements, complemented by field inspection, discussions with protected area managers and scientists, and consideration of the views of independent reviewers and prominent scientists who have written in support of the nomination, lead to the conclusion that these claims can be fully substantiated. The site is also unlike any other geological site currently accorded World Heritage status, and it has both a scientific and conservation significance ranking it among these existing sites. IUCN considers that the nominated site meets this criterion.

2.3 UNESCO also considered whether the Site met World Heritage natural site criterion (iii) which relates to natural beauty, and considered here that the values of the Site were of national significance rather than of 'outstanding universal value'.

2.4 The full text of the UNESCO report is provided as Appendix 0 to this management plan. More detail on the Site may be obtained from the World Heritage Nomination document, which is the official submission on the Site that was considered by UNESCO. This is available for sale at the price of £25.00 from the World Heritage Team.

THE BOUNDARIES OF THE SITE

2.5 The boundaries of the Site have been drawn to include the continuous exposure of Triassic, Jurassic and Cretaceous geological strata within the coastal cliffs, and the coastal geomorphological features including beaches, lagoons, landslides, bays, stacks and raised beaches. The coast is highly dynamic: the profile of cliffs and beaches is constantly changing, and in places the rates of change are rapid. The Site's boundaries need to accommodate the natural processes of coastal evolution, and will therefore be kept under review.

In detail the landward boundary of the Site has been defined as follows:

- On cliff coastline, the boundary is taken at the break in slope at the top of the most landward cliff-scarp
- On coastline with no cliffs, the boundary is taken at the back of the beach
- The Site includes the Fleet lagoon and the boundary will be taken at the top of the low cliffs that lie on its northern shore.

2.6 The seaward boundary of the Site is taken at the Mean Low Water Mark, as defined by the UK Ordnance Survey. Under UK law, this boundary is also the legal limit of the extent of statutory planning responsibilities of local authorities under the town and country planning acts of the United Kingdom. Low Water Mark also generally forms the offshore boundary for Sites of Special

Scientific Interest (SSSI) and Areas of Outstanding Natural Beauty (AONB). These protective designations, established under UK law, are important, established means through which legal protection is provided to the Site. The SSSIs include, within the Site, sixty-six statutory Geological Conservation Review (GCR) sites. These are part of a series of sites selected within Great Britain as being of national or international importance, following a comprehensive national assessment carried out between 1977-1990 (Ellis et al, 1996).

2.7 The boundaries of the Site are summarised in Map 1, and detailed boundary maps at 1:50,000 are available separately from Dorset and Devon County Councils. A detailed statement on the interest within the boundaries is provided as Appendix 1. A separate process of notification and discussion of the boundaries of the Site with land managers has been carried out.

PROTECTION OF THE WIDER INTERESTS OF THE SITE

2.8 Paragraph 17 of the Operational Guidelines for the Implementation of the World Heritage Convention states that:

- *'Whenever necessary for the proper conservation of a cultural or natural property nominated, an adequate "buffer zone" around a property should be provided and should be afforded the necessary protection. A buffer zone can be defined as an area surrounding the property which has restrictions placed on its use to give an added layer of protection; the area constituting the buffer zone should be determined in each case through technical studies. Details on the size, characteristics and authorised uses of a buffer zone, as well as a map indicating its precise boundaries, should be provided in the nomination file relating to the property in question.'*

2.9 Paragraph 1.3 of the UNESCO document: Format for the nomination of cultural and natural properties for inscription on the World Heritage List states that:

- *'In considering whether to propose a buffer zone it should be borne in mind that, in order to fulfil the obligations of the World Heritage Convention, properties must be protected from all threats or inconsistent uses. These developments can often take place beyond the boundaries of a property. Intrusive development can harm its setting, or the views from it or of it. Industrial processes can threaten a property by polluting the air or water. The construction of new roads, tourist resorts or airports can bring to a property more visitors than it can absorb in safety. … In some cases national planning policies or existing protective legislation may provide the powers needed to protect the setting of a property as well as the property itself. In other cases it will be highly desirable to propose a formal buffer zone where special controls will be applied. This should include the immediate setting of the property and important views of it and from it. Where it is considered that existing zones of protection make it unnecessary to inscribe a buffer zone, those zones also should be shown clearly on the map of the property.'*

2.10 In the case of the Dorset and East Devon Coast the UK Government have already put in place appropriate conservation measures for the Site and a wider surrounding area, through existing systems of protective designation, and in particular the Sites of Special Scientific Interest (SSSI) and Areas of Outstanding Natural Beauty (AONB). These areas are afforded strong protection, particularly through the UK's statutory planning system, and the powers and duties of English Nature, the Government's statutory adviser on nature conservation. Further protection is also provided through established statutory planning policies in relation to defined Heritage Coasts, the undeveloped coastline of Portland, and Devon County Council's Coastal Preservation Area. The Site also lies almost wholly within sites separately identified and protected under European Law (the Habitats Directive and the Birds Directive) for their wildlife value. This range of conservation designations, ensures statutory protection for a greater area than any possible buffer zone for the Site, and protects its setting adequately. The identification of a separate buffer zone for the Site is therefore unnecessary. Further information on the range of protective designations for the Site is provided elsewhere in the management plan.

FUTURE REVISION OF THE WORLD HERITAGE BOUNDARIES

2.11 The criteria used to establish the initial boundary will remain the basis for review of the boundaries in the future. It is implicit within these criteria that the precise boundaries of the Site will change in the future as the physical form of the coast evolves, or if new evidence of the scientific importance of additional areas of the coast comes to light. For the most part the boundary criteria provide a 'common-sense' basis for defining the extent of the Site.

2.12 There will be the need to define the precise location of the Site boundary from time to time. It is therefore considered that there should be a regular revision of the formally established

boundaries of the Site, primarily to reflect changes to the coastline and the movement of the clifflines and beaches that define the extent of the Site. There are also a small number of sites that should be considered for inclusion in relation to the extent of Earth Science interests notified within the SSSI network, and these are listed in Appendix 1.

2.13 The formal process of revision of the boundaries will be driven primarily by the survey timetables of the Ordnance Survey and the process of review and renotification of SSSIs by English Nature in relation to earth science interests. The first review of the boundaries will be carried out not earlier than five years after UNESCOs decision on the Site, and not later than ten years (i.e. the revision would take place between 2007-2012. After that time reviews will be carried out at a frequency of at least once every fifteen years). The process of notification of revised boundaries will need to be clarified and agreed with UNESCO.

2.14 The responsibility for co-ordinating the review of boundaries will rest primarily with Dorset County Council and Devon County Council in consultation with the UK Government. The County Councils will continue the commitment to widespread consultation with all interests including user groups and scientists, and detailed discussion with landowners over revisions which are proposed to the Site at all stages in the future.

Chapter 3. World Heritage Management Objectives and Principles

3.1 The following objectives have been agreed as those which will form the long-term basis for the management of the World Heritage Site, taking a time frame of 30-50 years:

World Heritage Site Objective 1: to conserve the geology and geomorphology of the Site by:

a) ensuring that there is minimal disturbance to natural coastal processes due to human activities
b) ensuring that human activities do not significantly reduce the quality of coastal exposures of geology within the Site
c) promoting responsible collection of fossils and other geological specimens.

World Heritage Site Objective 2: to conserve, and enhance where appropriate, the quality of the landscape and seascape of the Site.

World Heritage Site Objective 3: to welcome local people and visitors to the Site at levels which it can sustain, by encouraging those with responsibilities to:

a) maintain a network of access on foot to the beaches within the Site where practical
b) maintain access to the Site via the South West Coast Path, the rights of way network and other paths
c) ensure that provision of public access and information helps to match visitor numbers to the capacity of the Site, and maintains the tranquillity of remote areas
d) consider the safety of visitors to the Site as a management issue
e) provide for visitor safety through appropriate education initiatives, and management where practicable
f) promote viewing of the Site by boat
g) provide information on the Site at local, national and international levels which encourages visiting to the Site at levels which it can sustain
h) provide high quality information and interpretation about the Site to both local people and visitors at the main access points and within the Gateway Towns
i) manage the transport impacts of visitors to the Site.

World Heritage Site Objective 4: to encourage safe use of the Site by educational groups of all ages, and to provide a high quality range of educational information and services about the Site.

World Heritage Site Objective 5: to foster the gathering and dissemination of scientific information about the Site.

World Heritage Site Objective 6: to ensure that World Heritage Site status:

a) Is used responsibly in all aspects of publicity in relation to the Dorset and East Devon Coast, and
b) assists wider sustainable development objectives within Dorset and East Devon.

PRINCIPLES FOR MANAGEMENT OF THE SITE

3.2 The future of the Dorset and East Devon Coast is based on the achievement of sustainable development, balancing long-term conservation and sustainable use of coastal resources with the promotion of quality of life and prosperity. Principles have already been established for the long-term future of the Dorset Coast through the Dorset Coast Strategy and these principles are also relevant to the East Devon Coast. The principles are set out in Appendix 2

3.3 The World Heritage Site Management Plan also deals with more detailed aspects of the future management of the coast. Four additional principles are proposed to guide how it will be developed, as set out below.

Principle 1: The World Heritage Site Management Plan fully recognises that the Site is set within a well-visited coast where people will continue to live and work. Many natural World Heritage Sites are wilderness areas, identified for their important natural landscapes and habitats. The proposed Dorset and East Devon Site is different in being designated primarily on the basis of its earth science interest. Site management needs to recognise that the Dorset and East Devon Coast is, and will remain, fundamentally a place where people live, work and enjoy their leisure. The landscape surrounding the Site is farmed, visited and subject to a number of important other uses. Site management needs to be placed firmly within this context.

Principle 2: The World Heritage Site Management Plan confines itself to addressing only issues directly related to World Heritage Site status. The plan will address those issues that flow from the World Heritage Management Objectives. In relation to possible threats, the Site Management Plan will confine itself closely to the conservation of the interests for which the Site was designated for World Heritage Site status.

Principle 3: Management in relation to World Heritage will remain locally driven. World Heritage

designation will bring a new international expectation regarding the long-term conservation of the Site, but it will not bring increased statutory requirements or powers. The plan recognises that the delivery of long-term sustainable management of the Site will remain primarily the responsibility of its owners, occupiers and managers.

Principle 4: World Heritage Management will be delivered through existing, established initiatives and mechanisms wherever possible. One of the key strengths of the Dorset and East Devon Coast is that there are many existing land use and management plans covering different aspects of the Site. These provide an established means of ensuring its long-term conservation, and mean that the necessary protection of the World Heritage interests of the Site is already largely in place. There is a well established statutory policy framework of regional, structure and local plans, and of national and international protective designations which already provides protection for the Site, and sets the context for many of the management policies within this Plan. The implementation of the World Heritage Site Management Plan will primarily be achieved through existing conservation mechanisms, most notably in relation to Sites of Special Scientific Interest, Heritage Coasts and Areas of Outstanding Natural Beauty. A statement on the existing initiatives that are in place to protect the Site is provided in Appendix 3 and a statement of the main planning policies that are relevant is provided in Appendix 4. Parts of the Site are designated as Special Protection Areas (SPA) or Special Areas of Conservation (SAC) under European Council directives on account of their importance for wildlife. Within these areas, in addition to planning policies, there are legal requirements for development proposals to be subject to an 'Appropriate Assessment'. Details of the relevant areas of the Site, which are designated under these Directives are provided in Appendix 5.

Where additional management measures are required in relation to World Heritage Site status they will be fully integrated with existing initiatives and avoid duplication of effort. Since a separate buffer zone to the Site is not designated; the Site Management Plan also demonstrates how planning and management of the surrounding countryside provides for long-term protection of the Site from external damage and for positive management where necessary.

3.4 Many ideas related to the themes of the World Heritage Site Management Plan were developed by the Jurassic Coast Project, which operated within Portland and West Dorset between 1997-2000. Details of the Jurassic Coast Project are provided in Appendix 3.

Chapter 4: Management Policies and Proposals

4.1 This section of the Site Management Plan sets out the proposals for management to achieve World Heritage objectives. The proposals are described in relation to each of the management objectives put forward in Section 3 above.

World Heritage Site Objective 1: to conserve the geology and geomorphology of the Site by:

a) ensuring that there is minimal disturbance to natural coastal processes due to human activities
b) ensuring that human activities do not significantly reduce the quality of coastal exposures of geology within the Site
c) promoting responsible collection of fossils and other geological specimens.

4.2 The following activities are relevant to the achievement of this objective. A description of the main management issues, and policies designed to address them are set out in relation to each aspect.

4.3 MARINE AGGREGATES

4.3.1 Extraction of marine aggregates below the Low Water Mark (Under review, summer 2003) is controlled through a licence system operated by the Office of the Deputy Prime Minister, Minerals and Waste Planning Division,. There are no current proposals for commercial extraction that could affect the Site, and there is not believed to be a commercial resource offshore from the Site. Marine dredged aggregates from elsewhere are a possible source of aggregates to be used within coastal defence schemes, and this issue is discussed overleaf.

4.3.2 **Management policies in relation to the Site are as follows:**

P1 The Office of the Deputy Prime Minister will ensure, through its licensing powers, that any proposals for marine aggregate extraction will not have an adverse environmental impact in the Site.

4.4 CLIFF CLIMBING

4.4.1 Limestone cliffs within the Site are popular with climbers, particularly at Durlston and on the Isle of Portland. A Coastal Cliff Climbing Management Policy covering both these sites was agreed in 1994 and access agreements have been concluded with the British Mountaineering Council that restrict those parts of the cliffs which are used, and the timing of climbing to protect both cliff vegetation and cliff-nesting birds. Climbing is not permitted within the Army Ranges, and is discouraged by the Lulworth Estate to avoid disturbance to wildlife and erosion of soft chalk cliffs. The National Trust generally discourages cliff climbing, which is allowed in very limited areas under licence.

4.4.2 On the Isle of Portland the practice of installing rock bolts to provide permanent protection to climbers on a number of routes has been adopted, and the location and number of these routes is also subject to local agreement between conservation interests and climbers. A local climbing Forum has also been established, and an information leaflet for climbers, which highlights the conservation value of the coast has been produced. The impact of bolted routes has been examined by the Jurassic Coast Project, which has concluded that there is no significant impact on earth science conservation, and there are overall conservation benefits due to the reduction in impacts to cliff top vegetation because these routes do not require a safety rope from the top of the cliff. Sandstone, clay and chalk cliffs are less attractive to climbers and no issues arise on areas of the coast composed of these rock types.

4.4.3 **Management policies in relation to the Site are as follows:**

P2 Dorset County Council, through Durlston Country Park and the work of the Purbeck Heritage Coast rangers, will continue to administer and monitor the voluntary climbing code at Durlston, in partnership with the British Mountaineering Council.
P3 Dorset Countryside's Weymouth and Portland Ranger will continue to administer the voluntary climbing code for the Isle of Portland.
P4 The Lulworth Estate will continue its established policy to discourage climbing on its land.
P5 The Ministry of Defence will continue to prohibit climbing within the Lulworth Ranges.

4.5 COASTAL DEFENCE

4.5.1 Coastal defence has the potential to damage earth science conservation interests through possible impacts on both geological exposures and geomorphological processes. There are examples of human intervention on the coast that have reduced its earth science interest in specific locations. Shoreline Management Plans (SMP) now provide a lead in developing a strategic approach to coastal defence which takes

into account social, economic and environmental interests. SMPs aim to implement national Government policy for coastal defence. The core aims of this policy are that coast defences should be:

- Environmentally acceptable: natural processes should not be disrupted except where life or important man-made or natural assets are at risk;
- Technically sound: a range of options should be considered, and schemes should be sustainable and work with natural processes as far as possible;
- Economically viable: the benefits of defending must be at least equal to the costs.

4.5.2 Policies within the SMPs for the Dorset and East Devon Coast are shown in Maps 4.1-4.6. No coastal defence activity is proposed throughout the vast majority of the Site, which excludes the defended frontages of the 'Gateway Towns'. In exceptional circumstances where coastal defence schemes are considered within the Site, operating authorities, planning authorities and the Department for Environment, Food and Rural Affairs (DEFRA) will be encouraged to ensure that these are only promoted and funded if they meet World Heritage objectives.

4.5.3 In circumstances where coastal defence schemes can be justified, and in the case of protection schemes on adjoining coastal frontages which lie outside the Site (including the Gateway Towns) techniques should be favoured which minimise possible impacts on the integrity of geomorphological processes, and/or on the extent and quality of geological exposures, and which do not adversely affect the setting of the Site. Consideration of the value of earth science features that could be affected by a possible scheme should form part of any cost-benefit analysis carried out or any Environmental Impact Assessment.

4.5.4 There is now a major commitment to carrying out extensive geological and geomorphological studies in relation to coastal defence proposals, and to the monitoring of coastal change in the context of the Shoreline Management Plans. Such work is making a significant contribution to our understanding of the coast, and ensures that where defence works are considered they are technically and environmentally sound and designed to the highest standard.

4.5.5 In the long term, materials used within coastal defences will find their way into the sediment circulation cells which operate along the coast. Ideally, locally-sourced materials should be favoured which match material already circulating. Where local sources are not appropriate and other material is introduced to the system, detailed public records should be maintained of the locations, types and quantities of the material used.

4.5.6 **Management policies in relation to the Site are as follows:**

P6 The local authorities and Environment Agency, through the work of the Coastline Groups, will continue to maintain and keep updated the Shoreline Management Plans, and ensure that these take full account of the World Heritage management objectives.

P7 Local authorities, the Environment Agency and the Department for Environment, Food and Rural Affairs will ensure that coastal defence works that they undertake or grant aid, are compatible with the objectives in this Site Management Plan.

P8 Local authorities will maintain and implement planning policies which ensure that coast protection carried out by both the private and public sector conforms to the objectives of this Site Management Plan.

P9 The operating authorities will consider the value of earth science features within cost benefit analyses carried out for coast defence proposals that could affect the Site. Improvements in the methodology to include the tangible and intangible values of earth science will be sought.

P10 Coastal defence authorities will ensure that the findings of research and monitoring in relation to their activities are properly disseminated to the public and the scientific community.

P11 The Coastline Groups will maintain full records of all coastal defence activities carried out within the sediment cells which shape the geomorphology of the Site, including the nature and source of materials used.

4.6 DEVELOPMENT WITHIN THE SITE

4.6.1 The land enclosed by the boundaries of the Site (beaches and cliffs) is generally unsuitable for development, highly constrained by planning policies and unlikely to be the subject of development proposals in the immediate future, although localised proposals may be a possibility where adjacent land has been development.

4.6.2 There are a few locations within the Site where built property lies within the Site boundaries. The most notable are a number of beach huts and seasonally occupied chalets in places such as Monmouth Beach at Lyme Regis,

West Weares and Church Ope Cove on Portland, and holiday parks at the Sea Shanty Holiday Chalets at Branscombe Mouth, and a caravan site at Dunscombe Manor to the east of Salcombe Regis. Also there are holiday chalets at Berry Barton Farm, Branscombe and private chalets on the beach and cliff at Weston Mouth. Further development in any of these locations is already unlikely under the current planning policy regime.

4.6.3 **Management policies in relation to the Site are as follows:**

P12 The local authorities will continue to maintain rigorous planning policies to protect the earth science conservation interests and aesthetic quality of the Site. These will include policies to prevent inappropriate development in unstable and hazardous locations and flood risk areas, and to protect the scientific importance of Sites of Special Scientific Interest, and the quality of the Site's landscape.

P13 The local authorities will actively continue to raise local awareness and understanding of landslide instability and ensure that coastal property owners are aware of the scope for their activities to impact on coastal processes.

4.7 FOSSIL COLLECTING

4.7.1 Professional and scientific collecting of fossils represents a strong part of the heritage of the Site. The Site's importance to the history of science is primarily a result of such activity since the earliest days of geology, through the pioneering work of such people as Mary Anning, Henry de la Beche, Thomas Hawkins and many others. The coastal nature of the Site and the fact that so many of the most important exposures are subject to rapid erosion mean that, in contrast to stable exposures at inland sites, without active collection much of the fossil resource of the Site would be lost to the sea. Continued responsible collecting is, therefore, vital to site conservation by seeking to find and conserve those important fossil specimens that would otherwise be lost. Management issues that have arisen in relation to fossil collecting include unauthorised excavation, occasional inappropriate use of hand-held power tools and a lack of recognition of the potential scientific value of the resource.

4.7.2 Responsible collecting is promoted at a national level by English Nature, and within the Geologists' Association's Code of Conduct for Geological Fieldwork, which is set out in Appendix 6 of this Management Plan. At a local level a voluntary Code of Practice has been established for one of the most important and popular fossil localities within the Site between Lyme Regis and Burton Bradstock. This section is very well studied and accessible and contains scientifically important and valuable fossils at known horizons in an area subject to particularly rapid erosion. The Fossil Collecting Code has the support of Charmouth Parish Council, English Nature, National Trust, museums, local authorities and the local collectors (including the professional collectors) as providing the best means of conserving the fossils and the scientific integrity of the Site. The Code:

- promotes responsible and safe collecting
- clarifies ownership of the fossils
- aims to stop digging in situ in the cliffs without permission (already with considerable success)
- promotes better communication between landowners, collectors, museums and academics, and
- promotes the acquisition of key scientifically important specimens by registered museums.

Full details of the Code are set out in Appendix 7. If management of fossil collecting is considered elsewhere in the Site, it should be carried out in accordance with the spirit of the code as agreed, or as amended by agreement of the parties to it, and in conjunction with the relevant landowners.

4.7.3 The cliffs and foreshore from Axmouth to the Cobb at Lyme Regis are designated as a National Nature Reserve and managed by English Nature in conjunction with the landowners. The management of this Reserve and the conservation of its fossil resource need to address a very wide range of visitors and users, including tourists, recreational and professional fossil collectors, academic specialists, researchers and other educational parties.

4.7.4 Fossils have been traded throughout the scientific history of the Site. Common specimens continue to be sold locally, particularly in West Dorset. This element of professional collecting does not give rise to particular management issues provided the overall methods of collection are responsible. The fossil code of conduct has highlighted the special needs in relation to the most important specimens. One of the principal aims of the code is to promote acquisition of such specimens by registered museums, preferably locally. For such an objective to be realised, there is a need to ensure that due priority is given to such specimens within museums' acquisition policies, and to seek additional resources to fund acquisition where possible.

4.7.5 Responsible amateur collecting of fossils by visitors is also compatible with site conservation. The primary emphasis of site management is on

promoting safe collecting at appropriate sites. This will generally involve informing and educating collecting by visitors towards appropriate material on beaches, and discouraging in situ collection from cliffs. Responsible use of hammers is an important part of fossil collection, and beach material provides a useful resource for practising techniques. Education about the use of geological hammers will also continue to be an important element of site management, to encourage competent, moderated use and avoid the activity causing inconvenience to other visitors.

4.7.6 There is some potential to provide access for fossil collecting by the public and educational groups within quarries by providing rock stores: piles of broken fossiliferous rocks from within the quarry which can be studied and hammered without the conservation or safety issues which could result from such activity on the coast.

4.7.7 **Management policies in relation to the Site are as follows:**

P14 The Fossil Collecting Code of Practice for Lyme Regis-Burton Bradstock will continue to be implemented by all parties. The code will be regularly reviewed in line with the timetable adopted for the review of the World Heritage Site Management Plan. Review will be co-ordinated by Dorset County Council, with amendments to be agreed by all parties to the code. Charmouth Heritage Coast Centre will continue to maintain a register of scientifically important fossil specimens collected within the area governed by the code.

P15 English Nature will continue to develop policies for management of the fossil resource within the Axmouth-Lyme Regis Undercliffs National Nature Reserve (NNR). These will in essence accord with the spirit of the fossil collecting code in operation between Lyme Regis and Burton Bradstock: the collection of any in situ fossils from the cliffs and foreshore within the NNR area will require a permit issued by English Nature as part of standard NNR policy. The collection of any loose material from the beach or mudslips, however, can be carried out without a permit provided that it is undertaken in a responsible fashion. The use of rocksaws and drills within the NNR is strictly prohibited.

P16 All parties will keep under review the possible need to agree and subsequently amend management arrangements for fossil collecting within other parts of the Site. Where there is a consensus that management of fossil collecting would be of benefit elsewhere, it will be promoted in accordance with the spirit of the Code for Lyme Regis-Burton Bradstock (as currently agreed or as amended by agreement of the parties to that code), and will take account of particular site characteristics. In situations where such management is required, Dorset or Devon County Councils (as appropriate) will take a lead in bringing together the necessary parties, including English Nature, in order to pursue agreement.

P17 Acquisition by registered museums of the most important fossil specimens found within the Site will be strongly promoted. Contacts will also be established with private collectors, with a view to promoting public access to their collections, and discussing their long-term future.

P18 Educational and public information about the Site will seek to match amateur collecting by the general public to locations where it is appropriate. Collecting will be discouraged where it would be unsafe or could lead to damage to important exposures. Public collecting from cliffs will be generally discouraged on grounds of safety, and responsible use of geological hammers will be promoted.

P19 Suitable alternative sites for recreational and educational fossil collecting will be identified where possible, particularly within managed rock stores in disused quarry areas where safe access can be provided.

4.8 PEBBLE EXTRACTION

4.8.3 Pebble (gravel) extraction from beaches is considered within Minerals Local Plans prepared by Dorset and Devon County Councils. There are no current permissions for commercial aggregate extraction from coastal beaches in Dorset and there is now only one extant planning permission for the collection of pebbles in Devon.

4.8.4 Permissions for pebble extraction from Chesil Beach were not renewed in the mid 1980s. In Devon, the planning permission for collection of pebbles at Charton Beach, Combpyne-Rousdon is classified as "dormant" under the Environment Act 1995. In the Deposit Version of the Devon County Minerals Plan, Devon County Council is proposing to serve a Prohibition Order on the site with planning permission at Rousdon Beach. Such an order, if confirmed by the Secretary of State, would remove the possibility of future pebble picking in this location.

4.8.5 A small amount of dredging is carried out by West Dorset District Council to remove shingle from the harbour entrance at West Bay, and currently the requirements of the Food and Environment Protection Act require that this is removed and cleaned, and not returned to the beach. This operation has been assessed by the Lyme Bay and South Devon Shoreline Management Plan as having no significant impact on Chesil Beach. A new coastal defence scheme is currently being designed for West Bay, which may reduce the need for this management practice in the future.

4.8.6 **Management policies in relation to the Site are as follows:**

P20 The Minerals Planning Authorities will maintain policies which continue to protect the Site from damage due to pebble extraction.

P21 West Dorset District Council will seek to reduce the maintenance dredging commitment at West Bay through consideration in the design of the new defence scheme for the town.

4.9 ROCK-SAMPLE COLLECTING

4.9.1 Collection of rock cores does not currently lead to impacts on the scientific value of rock exposures within the Site, but it can be unsightly. Coring is covered by the Geologists' Association Code of Conduct for Geological Fieldwork (Appendix 6) and its application within the Site is strongly supported. In addition to setting out coring methods that are as unobtrusive as possible, the code will ensure landowner's permission is granted prior to collecting. There is scope to increase and better disseminate the level of information about significant collections of core samples from the Site.

4.9.2 **Management policies in relation to the Site are as follows:**

P22 Scientists collecting core samples within the Site will work to the Geologists' Association Code of Conduct for Geological Fieldwork. Information regarding the code of conduct will be disseminated on a national basis by the Geologists' Association, and locally by staff responsible for the management of the Site.

P23 A project will be undertaken in collaboration with the geological community, to identify significant collections of core material, and its availability within Universities and the private sector, and disseminate a list on the Internet.

4.10 MILITARY ACTIVITY

4.10.1 The major site for military activity within the Site is the Lulworth Armour School Ranges which have been operated as a gunnery range since 1917 and include the coastline between Lulworth Cove and Kimmeridge. Management and monitoring of the wildlife of the Site is carried out through the Site Management Plan and liaison arrangements described in Appendix 3. There is no evidence of a physical impact on the earth science interests of the Site.

4.10.2 There is also a significant military site at Wyke Regis Bridging Camp on the shores of the Fleet. This is a training camp for the armed forces in bridging, and includes a small-arms range. Operations have a continued potential to create localised impacts on the beach and the shores of the Fleet, however this usage is long established and liaison arrangements, between the camp and environmental interests, to ensure there is no long term damage from operations, are good. Issues related to military use of the Fleet are also addressed through the work of the Chesil and the Fleet Nature Reserve, and the developing management scheme for the Chesil and the Fleet Special Area of Conservation (see Appendix 3).

4.10.3 **Management policies in relation to the Site are as follows:**

P24 Conservation management of the Lulworth Ranges by the Ministry of Defence will ensure that impacts on the geology and geomorphology of the Site are monitored on a regular basis, and that earth science advice provided within its Range conservation committee is taken into account in site management planning.

P25 Wyke Regis Bridging Camp will continue to liaise over the impacts of its operations on Chesil Beach with English Nature, and through participation in the Chesil and the Fleet SAC Management Scheme, ensure that changes to its present operations do not lead to significant impacts within the Site.

4.11 OIL EXPLORATION AND PRODUCTION

4.11.1 The oil industry has an established presence in Dorset. There are three established oil fields within Purbeck, all of which are operated by BP Amoco. One of these is adjacent to the Site at Kimmeridge. This is a small-scale operation, and continues to produce oil steadily, well beyond its expected life. It is the longest established of the oil fields in Dorset and the single nodding-donkey, located adjacent to the Site has become an established part of the Kimmeridge landscape.

4.11.2 Although it lies outside the Site, the nearby presence of Wytch Farm is notable due to its major role in the understanding of the earth science of the Site. It is Western Europe's largest onshore oilfield – and the sixth largest oilfield in the U.K. In recent years it has handled in excess of 110,000 barrels per day. The result is that the Dorset and East Devon Coast has a substantial international importance for oil industry training because of the juxtaposition of a major oil field, with a coastline that displays all of the rock units and the structural setting that make up the oil field, in accessible locations. This importance is enhanced by the extensive knowledge of sub-surface geology, which results from a long history of study and extensive subsurface survey information. This information also provides an important resource for raising public awareness of the Earth Science importance of the coast. Wytch Farm is also notable as an international exemplar in good environmental practice in oil exploration and production.

4.11.3 In the absence of local planning controls offshore, the Standing Conference on Oil and Gas Development in the English Channel (SCOG) was formed in 1979 in order to co-ordinate the views of local authorities. It covers the whole of the South Coast from Devon to West Sussex, and is recognised by the Government as the point of contact for local authority views on oil licensing, exploration and production. In 1993, SCOG published its 'Policy Towards Offshore Exploration And Production', setting out policies for offshore exploration activity

4.11.4 Most of the onshore area has been explored to some extent, and there are no current proposals for further production activity. There remain known geological structures, which have not yet been fully examined and might contain hydrocarbons. Interest in the area remains, as shown by the interest in acquiring onshore blocks during the most recent round of licensing.

4.11.5 The picture offshore is less certain, although there are no known commercial reserves other than those already being exploited. In the last twenty years, nineteen exploration wells have been drilled in a total of nine blocks offshore the Dorset Coast. The focus for the most recent exploration is on areas to the south of Wytch Farm, and BP Amoco have established production from blocks 98/6 and 98/7 through a land-based operation which reaches the oil fields by extended reach drilling with a horizontal offset of 11.1 km. During the course of 1999 most of the remaining exploration licences within the area were relinquished, however BP Amoco have recently been awarded an exploration licence for block 98/11, which later was unsuccessful.

4.11.6 **Management policies in relation to the Site are as follows:**

P26 Oil production and exploration onshore will continue to be regulated in the context of the Minerals and Waste Local Plans for Devon and Dorset.

P27 Offshore oil exploration, should it be considered in the future, will take full account of the policies of the Standing Conference on Oil and Gas.

P28 Opportunities to work more closely with the Oil Industry to maintain the role of the Site as a training area for oil field geology, and good environmental practice in exploration and production, will be more actively explored.

P29 More use of local oil industry data will be sought in relation to the production of public information and interpretation about the Site.

4.12 OIL AND CHEMICAL POLLUTION

4.12.1 The Site adjoins the English Channel, which is a location for major shipping activity, including the transport of oil and chemicals. A major oil spill from such shipping is a potentially significant threat to the quality of the Site. Most

earth science features are robust and would recover from such an impact over time, although this might not be the case with Chesil Beach where oil could penetrate deeply within the beach and alter its physical behaviour with unknown implications. Maintenance of the system of oil spill contingency plans is an important strand of the management response. This work is generally co-ordinated by the County Councils, although the statutory lead role within ports lies with the harbour authorities.

4.12.2 An area of Lyme bay is used for ship to ship transfer of cargoes. There is a potential pollution risk involved with this activity. . The area used, which is some 9 nautical miles off the coast, is monitored by the Maritime and Coastguard Agency of the Department for Transport. However, as the proposals are draft in nature, no enforcement is undertaken.

4.12.3 **Management policies in relation to the Site are as follows:**

P30 The local authorities and harbour authorities will continue to maintain and keep updated and exercised, emergency plans to provide the most effective response to any possible oil or chemical pollution incident in the English Channel or within the port areas. The implementation of such plans in the event of a substantial oil spill will continue to be fully backed up by the national resources of the Maritime and Coastguard Agency.

P31 The Maritime and Coastguard Agency will ensure that plans for the identification of a ship-to-ship transfer area for oil cargoes within Lyme Bay fully consider the World Heritage interests of the coast in both the assessment of options, and the implementation of management of such transfers.

4.13 PORTS ACTIVITY

4.13.1 Ports activity adjacent to the Site occurs at Portland Port and within Weymouth Harbour. The operational areas of both ports are overlooked from the Site on the north-west shore of Portland Harbour and around the Nothe, and Portland Port is also visible from the East Weares. Ports activity at Weymouth and Portland is well established, although the nature of this activity within Portland has changed from military to commercial use since the port was sold by the UK Ministry of Defence (MoD) in 1996-7.

4.13.2 In contrast with the undeveloped open coast which makes up most of the Site, the character of Portland Harbour Shore is a large sandflat, adjoined by a mixture of urban and recreational uses, with the nearby presence of the port activities of Weymouth and Portland. The rock exposures within this area are an intrinsic part of the Site because of their international importance for geology. In terms of strictly World Heritage interests within this part of the Site, management will need to focus on the long-term physical management and protection of this scientific interest. The area within the Site is not suitable for port development. Proposals for redevelopment of both port and released MoD land (lying outside but visible from parts of the Site) at Portland are likely to continue in the future and will be considered in relation to the existing planning policies. It is considered unlikely that such development will create additional planning or management issues in relation to the World Heritage features for which the Site is proposed.

4.13.3 Parts of the port estate at Portland lie on the east coast of Portland and include part of the Site. Parts of this area (including the Site) are not suitable for port operations, and a planning agreement has been reached to manage all of the port estate to the south of the East Weares Rifle Range for nature conservation purposes. This will in turn protect the setting of this area of the Site.

4.13.4 Portland Port Limited as the statutory harbour authority for Portland Harbour has established a Harbour Consultative Committee which is consulted and meets on matters substantially affecting Portland Harbour. Given the geological interest on the northern shore of the Harbour, the opportunities for representation of the interests of the Site on this Committee would be supported. Reference to geological interest within the Portland Harbour Management Plan will also be encouraged.

4.13.5 **Management policies in relation to the Site are as follows:**

P32 The port authorities will continue to conduct their activities within the statutory requirements of national legislation, taking into account geological conservation issues where these are relevant.

P33 The implementation of positive conservation management within the estate of Portland Port is particularly supported where it will enhance the setting of the Site.

P34 Representation of the geological interests within the Site will be encouraged within the Portland Harbour Consultative Committee and future review of the Portland Harbour Management Plan.

4.14 QUARRYING

4.14.1 Historically, quarrying took place within the boundaries of the Site, although there are no longer any active quarries. Old minerals planning permissions still apply to a significant number of locations on the Isle of Portland, a few of which are coastal. These are currently being considered within the statutory Review of Old Minerals Planning Permissions (ROMP). The extraction schemes included in the applications made by the minerals industry under the ROMP do not include any proposals for working within the Site, although one proposal on the south east of the Island is very close to the Site boundary.

4.14.2 Active quarrying takes place in the area surrounding the Site on Portland and parts of Purbeck. It is regulated by a statutory system of minerals planning, as described above, and World Heritage does not add to the modern restrictive planning policy regime. Existing minerals policy seeks to safeguard sites of designated importance, and protection of the interests of the World Heritage Site is provided by the fact that the areas that contain mineral resources lie within designated areas, which are of acknowledged conservation importance. The policies are summarised in Appendix 7.

4.14.3 On Portland, there are opportunities to benefit earth science conservation through partnership with the quarrying industry, and this work is being led through the Review of Old Minerals Planning Permissions, the Jurassic Coast Project and English Nature. Restoration of quarries has the potential to create new, accessible exposures and provide valuable educational and research opportunities, and the Jurassic Coast Project has examined the feasibility of this approach in creating a 'Quarry Park' on Portland. World Heritage Site status may add to the demand for such facilities. There are also conservation benefits from joint working between researchers and quarry companies during quarrying operations when interesting features can be recorded as temporary exposures. Such work already takes place and there is a considerable amount of data available from such co-operation already - and potential to make it more regularly available to educationalists and the public. Further work on the conservation importance of quarry areas is being developed through a project officer employed by Dorset Wildlife Trust.

4.14.4 Quarrying for Purbeck Stone was once undertaken in the cliffs of Purbeck but now takes place further inland in the Swanage, Acton and Worth Matravers area. Like Portland, these quarry sites contain important exposures and provide a source for geological specimens including a famous fauna of fish, reptiles, (including dinosaur footprints), insects and early mammals. Much of the available stone available for quarrying is owned by the National Trust who manage it for social, employment and historic reasons, as well a economic ones. The continued quarrying and use of Purbeck Stone is part of the geological interest of the wider coast and interpretation and educational use of the Site should be mindful of the opportunities and interest represented by the industry.

4.14.5 A number of other quarries exist along the coast but outside the Site, including Shapwick Grange Quarry near Lyme Regis and Beer Quarry Caves, both of which are in East Devon. Whilst the management of quarries outside the Site is not a direct concern of World Heritage, it would be beneficial for their management to be integrated with the conservation and visitor management objectives of this plan.

4.14.6 **Management policies in relation to the Site are as follows:**

P35 The Minerals Planning Authorities will maintain policies which continue to protect the Site from damage due to quarrying, through the protection afforded to existing sites designated for their conservation importance.

P36 Dorset County Council will complete the statutory Review of Old Minerals Permissions on Portland, and in doing so will recognise the importance of protecting the interests within the Site and its setting from the reactivation of old quarry permissions on Portland.

P37 Dorset County Council will continue to provide a lead through the Review of Old Minerals Permissions in promoting the restoration of quarries in Purbeck and Portland at the end of their working lives to provide attractive landscapes. Where feasible restoration should also aim to allow access to safe and accessible geological exposures, and enhance existing values in relation to the industrial archaeology of the stone industry. The potential role of restored quarry sites in achieving the conservation and visitor management objectives of the Site will be considered when determining future policies and agreeing restoration schemes. These issues should also be considered through the review of the Dorset Minerals and Waste Local Plan.

P38 Dorset County Council will continue to promote the potential for public use of disused quarry areas and the restoration of working quarries, examining in particular the creation of a Quarry Park on Portland, in line with the recommendations of the Jurassic Coast Project.

World Heritage Site Objective 2: to conserve and enhance where appropriate the quality of the landscape and seascape of the Site.

4.15 APPROACH TO LANDSCAPE MANAGEMENT

4.15.1 Although the reasons for the designation of the Dorset and East Devon Coast as a World Heritage Site are geological, palaeontological and geomorphological (see Chapter 2, and Appendix 0), the landscape of the Dorset and East Devon Coast is recognised as being of generally high quality. The quality of its landscape and seascape is a valuable bonus for visitors and its retention, and enhancement where appropriate should be supported.

4.15.2 It is recognised that the mechanisms to conserve the landscape qualities of the World Heritage Site, and the surrounding area are well established. These include:

- well established protective policies within the Structure and Local Plans, which regulate land use;
- the recognition of extensive parts of Dorset and East Devon as nationally important landscapes, protected as Areas of Outstanding National Beauty;
- the definition of the coasts of East Devon, West Dorset and Purbeck as Heritage Coast;
- the operation of consents for development below Low Water Mark by the Government, and within Portland and Weymouth Harbours by the harbour authorities.

4.15.3 These mechanisms provide essential support to the Site, in providing an attractive environment for visitors both within the Site boundary, and within the immediate areas that provide access to it. Although it is not a direct reason for World Heritage designation, the quality of the landscape is a key part of the experience of all visitors to the coast, whatever their motivation for visiting. Visitors attracted by World Heritage Site status are expected to share the already high value that existing visitors to Dorset and East Devon place on the attractive quality of the landscape. This is particularly the case on the South West Coast Path, where it runs along the cliff top, immediately adjacent to the Site boundary, and in relation to the quality and appearance of the access facilities within or immediately adjacent to the Site – such as car parks, footpaths and slipways. The landscape and seascape of the Site has been assessed within a number of wider assessments (see Appendix 3).

4.15.4 The established mechanisms available to conserve landscape qualities provide the appropriate arena for developing and delivering landscape policies for the coast and countryside. These initiatives already provide the positive framework for landscape management and enhancement within Dorset and East Devon. The Areas of Outstanding Natural Beauty in particular are in a new phase of policy development and are well placed to integrate the assessment, monitoring and management of the Site, within consideration of the issues and needs in the wider countryside, and addressing the need for supportive and sustainable policies in relation to agriculture, land management, development and tranquillity. The landscape on Portland which lies outside of AONB/Heritage Coast areas, also needs consideration.

4.15.5 **Management policies in relation to the Site are as follows:**

P39 Consideration of the impacts of activities within or outside the Site on its landscape and seascape will be carried out through existing initiatives, including the Structure and Local Plans, Areas of Outstanding Natural Beauty, Heritage Coasts and offshore regulatory instruments. Positive action to enhance the landscape through these existing initiatives will be particularly supported where it would also enhance the Site.

P40 The need to conserve the quality of the Site's landscape and seascape will be considered fully within the implementation of other policies within this Site Management Plan.

P41 Detailed assessment of the landscape quality of the Site will be carried out when required as part of wider landscape assessments within the Areas of Outstanding Natural Beauty and on the Isle of Portland.

4.16 ESTABLISHING LINKAGES TO POLICY FOR AREAS OF OUTSTANDING NATURAL BEAUTY

4.16.1 Most of the wider countryside surrounding the World Heritage Site lies within the Dorset Area of Outstanding Natural Beauty (AONB), and the East Devon AONB. AONB status confers statutory protection for the landscape under UK law, and brings with it the requirement for positive management under the Countryside and Rights of Way Act, 2000, and the preparation of a management plan by 2004. In both Dorset and East Devon new arrangements have been established to develop and deliver AONB management, including in both cases the establishment of the post of AONB officer, together with appropriate core teams.

4.16.2 Although the detailed plans for the AONBs are yet to be set out, it is clear that there is an important complementary relationship between the implementation of the World Heritage Site Management Plan, and AONB management. Linkages between the management structures for the AONBs and the World Heritage Site will be achieved through the AONB officers joining the World Heritage Steering Group, and through close consultation and collaboration as the AONB plans develop. This is particularly the case in relation to:

- providing a wider protected setting for the Site, and thereby meeting the requirements of the World Heritage Convention, that might have otherwise have required a buffer zone.
- the implementation of policies in this management plan that address the opportunities and impacts of World Heritage Site status on the wider area, in accordance with the principles of sustainable development,
- the provision of appropriate resources to the World Heritage Site,
- establishment of an appropriate identity for both the World Heritage Site, and the wider AONB/countryside of Dorset and East Devon.

4.16.3 **Management policies in relation to the Site are as follows:**

P42 The partnerships responsible for the implementation and development of the World Heritage Site Management Plan, and the programmes in the Dorset and East Devon AONBs will ensure a fully integrated and mutually supportive approach between these three initiatives. The AONB officers for both Dorset and East Devon will join the World Heritage Steering Group, and appropriate reciprocal representation within the AONB programmes will be established.

<u>World Heritage Site Objective 3: to welcome local people and visitors to the Site at levels which it can sustain, by encouraging those with responsibilities to:</u>

a) maintain a network of access on foot to the beaches within the Site where practical
b) maintain access to the Site via the South West Coast Path, the rights of way network and other paths
c) ensure that provision of public access and information helps to match visitor numbers to the capacity of the Site, and maintains the tranquillity of remote areas
d) consider the safety of visitors to the Site as a management issue
e) provide for visitor safety through appropriate education initiatives, and management where practicable
f) promote viewing of the Site by boat
g) provide information on the Site at local, national and international levels which encourages visiting to the Site at levels which it can sustain
h) provide high quality information and interpretation about the Site to both local people and visitors at the main access points and within the Gateway Towns
i) manage the transport impacts of visitors to the Site.

4.17 This section addresses issues related to the management of visitors to the Site. As with landscape and seascape, there is an inevitable overlap between the management needs of the Site, and the work of wider visitor and transport initiatives in Dorset and East Devon. In the case of visitor management the need for integrated policies is particularly clear: it is only possible for visitors to reach the Site via the transport and paths network within the wider countryside and from the Gateway Towns. In addition the main significant footpath access that allows visitors to enjoy the Site - the South West Coast Path - lies immediately outside the Site boundary throughout much of its length.

4.18 The approach taken in this section is, therefore to identify the visitor management issues and implications that may arise from World Heritage Site status, and to set out policies for how they are addressed through action within the Site, or within its surroundings. It is expected that, as with other aspects of the plan, these will be implemented by being integrated within the policies and work programmes of wider initiatives.

4.19 PROVISION OF PUBLIC ACCESS TO THE SITE

4.19.1 The main public access within the Site is provided by open access to beach areas. The main publicly accessible beaches within the Site are shown in Map 5; parts of Chesil Beach are subject to seasonal closures to avoid disturbance to Little Tern, which nest on the shingle. These have established patterns of visiting and facilities. The earth science interests within the Site are generally robust to tourism pressure. Effective access arrangements for beaches exist within the Site, often via permissive paths provided by choice or agreement of landowners. Maintenance of access to beaches involves the provision of existing paths and steps.

4.19.2 A major means of access to the Site on foot is the South West Coast Path National Trail. This is one of 13 designated National Trails, which have been identified by the Countryside Agency.

The South West Coast Path runs on designated rights of way alongside, and in a few places within, the Site (with the exception of the Isle of Portland). Responsibility for the management of the South West Coast Path National Trail lies primarily with the County Councils. Countryside Agency policy is to ensure that National Trails are maintained and managed to the highest standard, and a set of published standards was agreed in 1997. National funding is currently available to provide 75 per cent of the funding for trail maintenance and 100 per cent for path improvements. It is the policy of Weymouth and Portland Borough Council, Dorset County Council, and the Dorset Coast Forum to seek completion of the South West Coast Path National Trail through the inclusion of the Portland Coast. This proposal is supported by the South West Coast Path Team, and the Countryside Agency have said that there is no reason, in principle, why this should not take place, and the Weymouth and Portland Ranger is implementing improvements to bring the route up to the required standard for national trail status.

4.19.3 Further significant access to the Site is provided through the wider public rights of way network, which provides linking routes to the Coast Path, and opportunities for circular walks. The responsibility for the maintenance of rights of way rests with the County Councils. The County Councils have a duty to produce a Public Rights of Way Improvement Plan and to ensure that all rights of way are legally defined, available for use, signed and effectively promoted.

4.19.4 Military use within the 3,000 hectare estate of the Armour School Ranges at Lulworth has a significant impact on public access to the Site. The Ministry of Defence is committed to providing the maximum amount of safe public access, consistent with the operational requirements of military use. There are well-established arrangements to balance the needs of the MoD with the provision of regulated access within the ranges. A series of waymarked range walks, including a coastal route, are generally open for over 130 days each year, including 46 of 52 weekends and the main school and public holidays. The conservation value of the ranges is extremely high, partly as a result of the long-term lack of modern agricultural activity. Management and monitoring of the wildlife of the Site is carried out through the Site Management Plan and liaison arrangements described in Appendix 3. There are significant and unavoidable local noise impacts when live firing or helicopter training is taking place. These impacts are mitigated by restricting live firing to periods outside of the main public holidays, and to around 6 weekends per year. The Ministry of Defence will continue its policy of seeking to minimise the levels of noise and disturbance affecting the Site, consistent with the operational requirements of military use.

4.19.5 Access within the Site near Wyke Regis is also affected by MoD usage at the small arms firing range at Wyke Regis, in the central area of Chesil Beach, which is typically used for 150 days each year. This is one of the most remote areas of the Site, where no increase in levels of access is sought. An alternative footpath is available when firing takes place, and sentries are posted to police the footpaths and the offshore area and ensure that the public are not put at risk.

4.19.6 Management policies in relation to the Site are as follows:

P43 Continued public access to beaches within the Site will be encouraged, in cooperation with public and private landowners.

P44 The County Councils, with the assistance of the Countryside Agency, and in co-operation with relevant landowners will maintain the South West Coast Path National Trail to the relevant national standards.

P45 Dorset County Council and Weymouth and Portland Borough Council will continue to work to secure completion of the South West Coast Path National Trail through the inclusion of a route on Portland.

P46 The County Councils will seek to maintain the wider rights of way network to a high standard, in line with national recommendations by the Countryside Agency.

P47 The Ministry of Defence will continue to facilitate the maximum public access to the Armour School ranges consistent with military requirements and the protection of the environment, and continue to minimise its impacts on access to Chesil Beach.

4.20 MOTORISED RECREATION

4.20.1 Motorised marine recreation has the potential to create noise impacts within the Site which could impact on the tranquillity of the landscape. The aim should be for remote and quiet areas of the coast to remain undisturbed by a growth in noise. At present these impacts are neither widespread, nor common throughout the year: the three pressure points within the Site are occasional noisy activities around Swanage, at Bowleaze Cove and around Lyme Regis. The Dorset Coast Strategy provides a lead in working with user groups and industry to monitor and address these issues should they arise. Within statutory harbours, harbour authorities are

required to make provision for safe navigation of all craft.

4.20.2 There have been occasional instances of commercial operation of fast motor craft and personal watercraft from beaches in the remote parts of the Heritage Coasts. Such activities are incompatible with the objectives of existing site protection, and of World Heritage management and will continue to be discouraged. **The management policy on this issue in relation to the Site is as follows:**

P48 Outside of statutory harbours, site managers will continue to discourage commercial or intensive operation of fast motorised craft from beaches within the Site, and seek to provide for and control these activities in appropriate areas within the frontages of the 'Gateway Towns'.

4.20.3 The possible increase in demand for viewing of the coast from the air will require monitoring to seek to ensure that there is not an unacceptable increase in levels of disturbance from aircraft motors.

P49 Contact will be maintained with regulators of airborne traffic to monitor, and discourage inappropriate levels of airborne leisure traffic.

4.21 ESTABLISHING THE CARRYING CAPACITY OF THE SITE

4.21.1 Whilst the maintenance of existing access facilities is important, the way in which these are promoted, and the evaluation of the need for additional or improved facilities will be one of the most critical areas for ensuring sustainable use of the Site by visitors. Matching visitor levels to the capacity of the coast has been a long-standing concern on the Dorset and East Devon coasts.

4.21.2 In broad terms, the Site and the countryside surrounding it already accommodate significant visitor numbers throughout the year. (An estimate of 16 million day visitors and 4 million staying visitors come to the Dorset Coast annually with a further 1.1 million staying in East Devon.). The pattern of visiting is strongly focussed around the main summer season. The anticipated trends in visiting to South West England are upward, pointing to the continued need for an active approach to visitor management within the Site.

4.21.3 Considerable work is already spent managing visitor activity by the countryside management services of the local authorities, the National Trust and private landowners. World Heritage Site status will be regarded as underpinning and supporting this existing work. The status should be managed to avoid adding to unsustainable tourism pressures. It should not be employed to create significant changes to the established patterns of use, unless they have been carefully thought through, their impacts evaluated and shown to be beneficial to the Site.

4.21.4 The main principle of World Heritage visitor management is that visitor numbers should be matched to the carrying capacity of the Site. Such a concept can be hard to define, and will be best assessed by local managers. In terms of World Heritage Site status an assessment of carrying capacity should be made up of the following elements:

- Impacts on Earth Science: most earth science features within the Site are robust, and unlikely to be damaged by visitors, however the possibilities of such damage should always be considered. The possible impacts from the location of visitor facilities need to be considered.
- Impacts on the landscape: the facilities required to support visitor access can have visual impacts on the coast.
- Impacts on wildlife: wildlife impacts from visitors can arise from direct erosion of vegetation or disturbance to sensitive species.
- Quality of visitor experience: overall visitor numbers affect the experience of the Site. This is particularly the case within many remote parts of the Site where visitor numbers are limited due to the distance from access points. The balance between visitor numbers and the retention of remoteness needs to be carefully struck, with the emphasis in favour of remoteness.
- Impacts on traffic: visitors to the coast make up a very significant part of the road traffic in Dorset and East Devon. The means by which visitors can get to the coast, and the capacity of the transport network to get them there are increasingly important considerations.

4.21.5 **Management policies in relation to the Site are as follows:**

P50 The carrying capacity of the Site, and the road and access network serving it will be the prime considerations in managing visitor numbers within the Site. Care will be taken to ensure that public information provided about the Site through World Heritage Site status will maintain visiting levels within the carrying capacity of the Site.

P51 Site managers will be encouraged to develop consistent locally-specific indicators of carrying capacity within the Site. These will provide a basis for

monitoring visitor activity, and relating management practices within the Site as a whole.

P52 An active approach to visitor management within the Site and the surrounding countryside will continue to be supported, particularly through the work of the relevant countryside management services. The resources available for visitor management will need to be sufficient to ensure that it is effective.

4.22 ENSURING THE SAFETY OF VISITORS TO THE SITE

4.22.1 The coast is a potentially hazardous environment. In addition to the normal range of hazards within the countryside, there are additional considerations such as possible cliff falls, landslides, tidal cut-offs and mudflows. The range of risks is well understood and has recently been documented in Dorset in the context of preparations for the 1999 solar eclipse. A specific emergency plan has been put in place by West Dorset District Council, in conjunction with the County Emergency Planning Service, to set out the response to cliff falls and landslides between Lyme Regis and Burton Hive (Burton Bradstock).

4.21.2 The primary means of managing risks to visitors on the coast is through education and awareness raising. The most important safety management response is the provision of appropriate on-site signage at access points to the Site. Also important are schools educational materials, and the information and advice provided by visitor and tourist information centres and the preparation and dissemination of safety messages within interpretation and information publications. It is considered unwise to expect all visitors to beaches to follow the advice provided, nevertheless, all members of the public have a duty of care to themselves and others. Signage needs to be well designed and located sensitively so that it will both be noticed and read, and detract as little as possible from the quality of the environment.

4.22.3 There are well established arrangements for providing emergency cover on the coast. These include the Maritime and Coastguard Agency marine search and rescue centre at Portland, and Coastguard teams at Swanage, Kimmeridge, Wyke Regis, Portland, West Bay, Lyme Regis, Beer and Exmouth. Lifeboats are based at Swanage, Weymouth, Lyme Regis, Sidmouth and Exmouth, and Portland is base for one of the Search and Rescue helicopters of the Maritime and Coastguard Agency.

4.22.4 **Management policies in relation to the Site are as follows:**

P53 Interpretation and educational materials produced within the Site will promote safe activities, and provide clear indications of hazards to visitors, and the ways to reduce personal risk.

P54 Managers of the Site will be encouraged to ensure that visitors are made fully aware of the hazards which they may encounter, and the means by which they can avoid putting themselves in danger.

P55 Coastal visitor and tourist information centres will continue to ensure that safety and tide time advice is made available to visitors, together with information on local hazards.

P56 The Coastguard, RNLI and other emergency services will continue to provide effective search and rescue services throughout the Site.

4.23 PROVISION OF VISITOR INTERPRETATION

4.23.1 World Heritage Site status is expected to lead to increased expectations on the quality of signs, leaflets and publications about the Site. Such information will largely be provided or distributed outside of the Site - particularly in the Gateway Towns and beyond.

4.23.2 A co-operative approach with existing organisations will be taken to developing and delivering effective interpretation for the Site. The Site will require an interpretation plan which will ensure that materials produced are co-ordinated and consistent, and set within a coast-wide framework agreed with local providers. It will be particularly important to work closely with the following organisations, and promote joint working on interpretation and education projects between them:

- County and Local Museums in the Gateway Towns and elsewhere
- Devon's Regionally Important Geological Sites Group
- Dorset Countryside
- Dorset's Important Geological Sites Group
- Dorset and Devon Wildlife Trusts
- East Devon AONB Service
- English Nature
- Local Education Authorities
- Purbeck Field Studies and Information Group
- Public and private visitor centres, including the 'Coastlink' centres and other services such as guided walks
- Private landowners
- The National Trust

- Tourist Information Centres
- Universities and Colleges.
- Visitor accommodation centres

4.23.3 It is likely that the Site will require a 'family' of high quality interpretation for the Site and the wider coast. This should have the purpose of presenting and explaining the World Heritage interest of the Site to visitors. Whilst the lead theme will be earth science, there is potential to use geology and geomorphology as a linking theme to landscape, wildlife and cultural aspects of the Site and its surrounding countryside, where this is felt to be appropriate. A co-ordinating role to oversee interpretation related to the World Heritage Site will need to be established.

4.23.4 The Jurassic Coast Project has already spent considerable time identifying how geology can provide a leading theme for interpreting the coast. It has proposed the following initiatives, which need to be developed and tested through a thorough interpretive planning exercise for the Site as a whole:

a) Single and sets of themed leaflets to be developed by different organisations, but with co-ordinating interpretation working groups
b) Five area based booklets
c) Interpretive signs at the main car parks and access points to the coast
d) Jurassic Coast viewpoints established on the ground, and supported by a set of postcards singly or within packs
e) A biannual newsletter, the Jurassic Coast Post with topical articles, news and walks and events programmes
f) A coffee table book on the Site
g) The development of co-ordinated web sites, and location of 'webcams' at appropriate and practical locations
h) A new Quarry Park Nature Reserve and Jurassic Coast Centre on Portland.
i) A possible co-ordinated approach to improve the exhibition material in the coastal visitor centres, and a possible joint application for the necessary additional resources.

4.23.5 Local museums and visitor centres have a particularly important role in providing information and interpretation. There are a good range of established centres and museums, which are shown in Map 6. There is a need to ensure that local museums with suitable locations and earth science collections give a suitable emphasis to earth science within their displays. A leading example is provided by the work of the Philpot Museum in Lyme Regis which won two major museum prizes during 1999.

4.23.6 Coastal visitor centres and some private sector attractions are important locations for providing information on earth science and the wider coastal environment. There is a need to support action by the centres that leads to an increased emphasis on earth science information within their displays, or improvements to the quality of existing exhibitions.

4.23.7 Distribution of interpretive publications about the Site need to be effective and efficient. In addition to museums and visitor centres, distribution arrangements will be agreed with Tourist Information Centres, bookshops and newsagents. Greater dissemination of interpretation on the World Wide Web will also be undertaken, within the context of the overall interpretation programme.

4.23.8 **Management policies in relation to the Site are as follows:**

P57 A World Heritage information and interpretation plan will be established to bring together the aspirations and actions of the representatives of existing providers, and agree an interpretive programme for the Site.

P58 Close control on the quality of interpretive signage and publications about the Site will be maintained. A family of high quality literature will be produced which will provide the lead range of interpretive information about the Site.

P59 The County and local museums, visitor centres and private sector geological attractions will be encouraged to give appropriate profile to earth science within their public displays, and ensure that the information they provide is of a high quality. Joint working between centres will be encouraged wherever possible.

P60 Effective distribution arrangements for interpretive material will be agreed, making full and appropriate use of the World Wide Web.

4.24 SUSTAINABLE TRANSPORT

4.24.1 The transport implications of the predicted continued growth in visits within the south west of England are amongst the principal concerns about the sustainability of tourism activity. A growing priority of coastal and countryside management is to encourage visiting to be based on more sustainable forms of transport.

4.24.2 The lead role in delivering transport policy for the area surrounding the Site is via the Regional Transport Strategy for the South West and the Local Transport Plans for Rural Dorset and East Devon. World Heritage Site status provides an additional consideration in the development of transport plans. A checklist of transport principles related to the Site are set out

below, which should be given effect through the Local Transport Plans and the work of countryside management initiatives. The proposed principles are as follows:

a) Visitors should be encouraged to use alternatives to the car to visit the Site wherever feasible. Tourist and other information provided to visitors prior to and during their visits should emphasise the full range of transport choices that exist.
b) Facilities for car-borne visitors to the Site should not be provided if they would lead to an unacceptable increase in car usage to visit the Site and its surroundings. New tourist development should, where possible, encourage sustainable modes of transport and limit growth of car-based travel.
c) Signage of the Site from the road network using the World Heritage emblem should not be carried out unless it can be shown that possible resulting increases in traffic will be within the capacity of the road network. Signage that promotes increased car-based day visits should be particularly avoided.
d) Improved facilities for cycling and walking to the Site should be provided. Options which should be evaluated include promoting cycle and walking routes between accommodation centres and the coast using quiet roads and bridleways, provision of links to the National Cycle Network, and provision of cycle parking facilities at stations, in towns and at access points to the coast path.
e) Effective signage of cycling and walking routes to the Site out from the main towns, villages, bus and rail stations is required, including full approval and signage of the route of the South West Coast Path National Trail through all towns and villages.
f) Public transport between accommodation centres and the rural coast within the Site which meet the needs of visitors and locals should be encouraged where feasible
g) Greater access to the Site by train should be encouraged. Where stations lie outside the main gateway towns then linking bus services should be provided and integrated with the train timetable. Reconnection of coastal towns to the rail network should be supported where feasible.
h) Sea transport links along the coastline should be provided where feasible, and integrated with public transport. Sea travel should be recognised as providing the best views of the Site.
i) Visits to the Site by international visitors arriving by sea and air, and then using non-car transport to go to the Site should be encouraged.
j) Visitor information and interpretation about the Site should particularly emphasise access and activities which do not require use of the car.
k) Information and educational activities should be designed, where possible, to increase the length of stay of visitors within different local areas of the Site.
l) Interchange facilities at the Gateway Towns should be provided where possible, linked to promotion of alternatives to car transport.
m) Public transport timetables should be well-publicised and clear, and integrated with information on the other forms of access to the Site.

4.24.3 **Management policies in relation to the Site are as follows:**

P61 The County Councils will co-ordinate the production of the Local Transport Plans, taking account of the sustainable transport principles within the World Heritage Site Management Plan.

World Heritage Site Objective 4: to encourage safe and sustainable use of the Site by educational groups of all ages, and to provide a high quality range of educational information and services about the Site.

4.25.1 As noted above, the Site is already very well visited, and educational information and interpretation needs to be provided for the wide range of visitors, as set out in section 4.22. This section of the Management Plan addresses the specific needs of the many organised educational groups that visit the Site.

4.25.2 The coast is already well visited by educational groups, with the estimated number of school visits amounting to 200,000 educational bed nights annually. Durlston Country Park, Lulworth's educational ranger, Chesil and the Fleet Warden, Purbeck Marine Wildlife Reserve, Charmouth Heritage Coast Centre and the Norman Lockyer Observatory are amongst the core services which explain the geology and geomorphology of the Site to educational visitors on site. Maintaining and enhancing these services to schools and educational groups is a first priority.

4.25.3 The Jurassic Coast project has produced draft proposals on how to support and better provide for educational use of the West Dorset and Portland Coast. The three key objectives proposed are promoting better use of the coast, broadening the educational season and promoting return visits. The key elements proposed in the work programme are as follows:

a) Develop a series of new educational case studies

b) Develop an educational resource base
c) Provide and promote educational resources for schools on the Internet
d) Co-ordinate educational services between providers
e) Promoting closer partnerships between providers and schools.

These proposals have the potential for wider application within the Site. In Devon, an Educational Register of Geological Sites has been produced by the Devon Regionally Important Geological Sites Group, and includes details of educationally important coastal sites within the Site.

4.25.4 The Dorset and East Devon Coast is also an important training venue for undergraduate and postgraduate geologists and geomorphologists. There is also a particular importance for the coast as a major training ground in oil geology, although the extent of this use has not yet been quantified The opportunities to improve the facilities for this type of use, and to work more closely with Universities, colleges and the oil industry require further study.

4.25.5 **Management policies in relation to the Site are as follows:**

P62 Maintenance and development of the existing services for school visits through the coastal visitor centres will be supported.
P63 An Education Strategy, which will include a work programme to create better information to support educational use of the Site will be developed, based on the work of the Jurassic Coast Project.
P64 The extent of use and the economic value of the Dorset and East Devon Coast for undergraduate, postgraduate and industry training will be quantified in the Strategy, and the opportunities to improve facilities will be identified.
P65 Increased links will be developed where possible between co-ordinators of educational visitors and accommodation providers, with a view to encouraging greater out-of-season use of facilities.

<u>World Heritage Site Objective 5: to foster the gathering and dissemination of scientific information about the Site.</u>

4.26 SCIENCE AND RESEARCH

4.26.1 The role of the Dorset and East Devon Coast in the development of the major principles of geology and geomorphology since the earliest days of science represents one of the major elements of the Site's global importance. There are strong and continuing research interests on the coast, as evidenced by a range of national and international symposia and events that take place in the area, and by the great deal of support which was forthcoming for the nomination from professional earth scientists within the UK and internationally.

4.26.2 World Heritage Site status will provide an additional argument for promoting new research into the coast, and in supporting the public understanding of both past and ongoing studies. It will also underpin the development of improved curatorship and management of collections of important geological specimens from Dorset and East Devon locally, nationally and abroad. Priorities could include:

a) Utilising the Fossil Collecting Code of Conduct to promote co-operative and responsible approaches to collecting and research between fossil collectors, museums and researchers, and investigate ways to further assist acquisition of important specimens by registered museums.
b) Encouraging funding of new research via the Research Councils.
c) Encouraging greater emphasis on the curatorship and presentation of the geological collections within the Museums of Dorset and Devon.
d) Increasing the links with the Natural History Museum and other relevant museums.
e) Encouraging, and helping to organise and fund symposia/conferences in conjunction with local, national and international geological organisations.
f) Encouraging and publishing, or helping to publish research and the proceedings of symposia and conferences.
g) Developing, maintaining and disseminating a complete bibliography of the Site.
h) Developing, maintaining and disseminating a database on the location of important fossil specimens from the Site now in collections world-wide.
i) Supporting the continued activity of the Fleet Study Group, a group of scientists and other interests which focuses on Chesil and the Fleet, and whose work may provide a lead for activity elsewhere.
j) Establishing a website to encourage better communication on all aspects of the geology and geomorphology of the Site, in conjunction with already established initiatives.

4.26.3 Promotion of initiatives to support scientific activities in relation to the Site would benefit from specific advice from the academic community. It is proposed that this would be best achieved through the organisation of occasional meetings

with leading scientists, and the formation of a small scientific advisory group (See Section 6).

4.26.4 **Management policies in relation to the Site are as follows:**

P66 A programme of work will be developed to support and promote scientific study of the Site and its public understanding, based on the above proposals.
P67 A scientific advisory group for the Site will be established, as set out in Section 6 of the Management Plan.
P68 A strong network of contacts with leading scientists and researchers will be maintained.

World Heritage Site Objective 6: to ensure that World Heritage Site status:

a) is used responsibly in all aspects of publicity in relation to the Dorset and East Devon Coast, and
b) assists wider sustainable development objectives within Dorset and East Devon.

4.27 SUSTAINABLE TOURISM

4.27.1 The Site is within an area which is already a major tourism destination and, as noted above, is an area where continued tourism growth is anticipated, which will need to be properly managed. Principles for tourism in natural World Heritage Sites were proposed at a conference held in 1993, and are summarised in the box below. These provide a benchmark against which the tourism policies related to the Site can be assessed.

4.27.2 The quality of the natural environment is recognised in South West Tourism's Strategy as essential to the future of the tourism economy. The Strategy acknowledges the important role of the private sector as landowner and manager, but highlights the major responsibility for protecting the quality of the environment that falls on the public sector, and the leading role of local authorities. Relevant key objectives of the South West Tourism Strategy are:

a) Maintain and where possible enhance the quality of the public environment, including beaches and bathing waters to the highest standard possible
b) Increase the proportion of leisure and tourism travel making use of public transport and using walking and cycling trails
c) Implement positive measures to ensure that tourism pressures do not adversely affect the environment, local communities and the tourism experience
d) Make effective use of tourism as part of the approach to the regeneration of economically deprived areas

e) Increase the resources available for conservation and enhancement projects, including contributions from the visitor.

UNESCO PRINCIPLES FOR TOURISM IN NATURAL WORLD HERITAGE SITES

Ensure that:

- Tourism development considers and respects ecological and socio-cultural values of the Site and is consistent with the World Heritage concept;
- A management plan, considering the regional context and addressing the tourism component is established and regularly updated;
- Environmental assessments, inclusive of cumulative impacts, are carried out on recreational and commercial facilities and activities before approvals are granted;
- Monitoring programmes based on appropriate and updated indicators are in place and their outcomes are taken into account into the planning and decision taking process;
- Local populations, in and around the Site, are involved in order that they take pride in their heritage and gain benefits from tourism;
- Co-operation with the different stakeholders involved in tourism development is sought and co-ordination of the promotion of the Site is ensured;
- All site staff are aware of the World Heritage values and well trained in visitor management;
- Relevant information and education programmes are in place to ensure that visitors and local people understand and have respect for the Site and its values;
- A substantial proportion of the income generated through entrance fees is directly allocated to the Site for its improvement and management;
- The Site participates in the World Heritage concept through all appropriate means.

Agreed at Dakar, Senegal November 1993

4.27.3 Whilst there is a consensus over the policy base for tourism which is in tune with the principles established for tourism within World Heritage Sites, the need will be to ensure that such policies become a reality. There are already well-established tourism partnerships and services throughout Dorset and Devon, with co-ordination undertaken through the work of local authority tourism officers, and South West Tourism, and other bodies. A strong linkage between World Heritage objectives and the work of these departments and networks will need to be maintained.

4.27.5 **Management policies in relation to the Site are as follows:**

P69 Effective links between tourism organisations will be maintained, to ensure that the principles for tourism in World Heritage Sites will be observed, and incorporated into the development of wider tourism policies and strategies as appropriate.

4.28 PROMOTION OF THE SITE TO VISITORS

4.28.1 There is already a considerable amount of tourism and visitor information provided about the Dorset and East Devon Coast in various forms. The quality of the coastal environment is already a strong part of tourism marketing of both Dorset and Devon.

4.28.2 The 1993 conference confirmed that tourism has an essential role at a great many natural World Heritage sites. The reported experience of Sites regarding the impact of World Heritage Site status is very varied, with visitor numbers ranging from a few hundred to over several million per annum. A majority of sites considered that World Heritage had attracted publicity and contributed to the development of tourism. However, factors independent of World Heritage, such as the global growth of international tourism, and local economic development were attributed as the source of tourism growth at those sites which had experienced substantial changes.

4.28.3 Research by Locum Destination Consulting in 2002 concluded that the approach a Site takes will depend on the aims of that Site: some Sites discourage tourism or recreation, dedicating themselves to conservation or scientific research; some Sites do not promote tourism but welcome it with restrictions, regulations and sometimes charges; while other Sites actively promote tourism and recreation as a revenue generator and to promote general interest in the Site.

4.28.4 The first conclusion drawn in the context of the Dorset and East Devon Coast is that World Heritage Site status would be unlikely to lead to substantial changes in the patterns of visiting to the coast, which will remain dictated by established patterns and social and economic changes which are already in hand. The second is that the way in which World Heritage Site status is utilised, rather than the existence of the status in itself, is the critical factor in determining its impacts on tourism activity.

4.28.5 The lead in promoting the Dorset and East Devon Coast to the domestic tourism market is currently taken by local authorities. It is not considered that it would be appropriate to lead future promotion of tourism within the Site on the basis of World Heritage. Tourism promotion and marketing is however an important medium for conveying the outstanding environmental quality of the Site to prospective visitors. Closer working between site managers and tourism officers will be promoted to achieve this.

4.28.6 Considerable promotional material regarding attractions and facilities is produced by the private sector. There is a need to continue to develop close working relationships with the tourism industry, and share guidance on the appropriate use and description of World Heritage in promotional material.

4.28.7 The Jurassic Coast Project made proposals for developing specific tourism markets which aim to use geology as a linking theme to the landscape, wildlife, local character and industry in relation to the Dorset coast. Specific proposals are set out below which should be considered for development throughout the Site.

a) linking the marketing activities of existing geological and environmental attractions under the theme of the 'Jurassic Coast'
b) using interpretation to increase the quality of experience of existing visitors
c) using interpretation publications to promote staying visits using local accommodation
d) developing special interest breaks in the shoulder months, using local experts, offering activities not normally available and marketing to special interest groups such as Rockwatch and geological societies both within the UK and at an international level.
e) organising events, including a 'geology week' outside the main season.

4.28.8 Dorset and the New Forest currently co-operate over marketing of the area to international visitors, whilst East Devon falls within the Devon and Cornwall Overseas Marketing initiative (DACOM). It is considered that international visitors are one group likely to be attracted in larger numbers by World Heritage Site status. The total numbers of such visitors are likely to be small compared to the domestic market, and it is considered that their attraction will not conflict with management objectives for the Site. Specific targeting of proposals such as those listed in the previous paragraph to international visitors will be considered as a priority.

4.28.9 **Management policies in relation to the Site are as follows:**

P70 The existing public-private partnerships will remain the basis for future tourism promotion of the area, and effective links between their work and World Heritage objectives will be made
P71 Tourism publications about the Dorset and East Devon Coast will identify the importance of the coast as a World Heritage Site where appropriate, and convey the environmental value of the Site to prospective visitors
P72Tourism promotion will not be led by the status of the area as a World Heritage Site
P73 Providing a high quality of visitor experience will be retained as a leading objective of tourism policy
P74 The promotion of special interest visits by small numbers of visitors, including international tourists, will be considered
P75 Advice and information on the Site and its values will be effectively disseminated within the tourism industry.

4.29 TOURISM AND VISITOR MANAGEMENT

4.29.1 One of the keys to ensuring that tourism within the Site is sustainable is to improve the linkage between the tourism industry and site management. The needs have already been considered for the Site, resulting in the creation of a tourism working group which will steer the work of an officer who will work on visitor management and sustainable tourism projects. Relevant policies of the Dorset Coast Strategy are summarised in Appendix 9, and of the Devon Tourism Role and Action Plan in Appendix 10.

4.29.2 **Management policies in relation to the Site are as follows:**

P76 Closer links and joint working between tourism interests and site managers will be promoted through the work of the World Heritage Site Tourism Working Group.

4.30 USE OF THE WORLD HERITAGE EMBLEM

4.30.1 UNESCO has defined conditions for the use of the World Heritage emblem, which are listed in Appendix 8. Dorset and Devon County Councils fully recognise the requirements of use and will ensure their actions support responsible use of the emblem, and the identification of 'World Heritage' status at all times. The County Councils will promote local understanding of the emblem and its use, and will work in conjunction with the Government to ensure action is taken to prevent inappropriate use.

4.30.2 **Management policies in relation to the Site are as follows:**

P77 Appropriate use will be made of the World Heritage Emblem to raise awareness about the Site, in line with UNESCO guidelines.

4.31 THE ROLE OF THE GATEWAY TOWNS IN RELATION TO THE SITE

4.31.1 The identification of the Site, also requires consideration of the implications for the adjacent countryside and the communities of the Dorset and East Devon Coast. At an early stage in the development of the nomination the concept of identifying 'Gateways Towns' was agreed. Although not within the Site, the Gateway Towns have a substantial importance in the management of visitor activity, and are also likely to be the areas that could derive some economic benefit from specialist tourism related to the Site. The Gateway Towns recognised within the plan are as follows:

- Exmouth
- Budleigh Salterton
- Sidmouth
- Beer
- Seaton
- Lyme Regis
- Charmouth
- West Bay and Bridport
- Portland
- Weymouth, including Preston and Bowleaze Cove
- Swanage
- Wareham
- Poole.

Additionally, the concept of Anchor Towns for Exeter and the Poole/Bournemouth/Christchurch conurbation has been developed. These are the principal access nodes for the Site, providing airport and mainline rail connections, as well as a wider range of tourist and visitor infrastructure.

4.31.2 Although they are not included within the Site, the Gateway Towns have a very important role in achieving the visitor management objectives of World Heritage. They are also areas where additional visitors to the Site will stay, and therefore have the potential to benefit economically from their position in relation to the coast. Managing and planning development and regeneration within the Gateway Towns will be led by local authorities through the planning system, environmental improvements and other programmes. Key roles of the gateway towns which need to be maintained and strengthened are:

a) Providing a range of quality and value for money accommodation, with a need to strengthen provision of the higher grades of guest house and hotel
b) Providing the bases for a number of the principal museums and visitor centres
c) Providing information and orientation, particularly through the network of tourist information centres
d) Providing attractive and high quality environments in their own right which will attract and hold staying visitors
e) Providing links between different modes of transport, and the main access points to the Site for visitors to the Heritage Coasts
f) Providing venues for special interest breaks and events, particularly outside the main visitor season.

4.31.3 **Management policies in relation to the Site are as follows:**

P78 The role of the Gateway Towns in delivering the other policies of this Site Management Plan will be actively pursued through the planning and regeneration role co-ordinated by local authorities.

4.32 OTHER ACCESS POINTS TO THE SITE

4.32.1 In addition to the Gateway Towns there are a number of important access points to the Site. These are locations that are generally within the Heritage Coasts and are remote from the major road network. Visitor management and the provision of facilities requires particular care to ensure that their character is conserved and enhanced where possible. The number of access points to the Site is large ranging from simple footpath links from the road network to significant villages with visitor facilities. A list (not exhaustive) of some of the most significant sites outside the Gateway Towns includes the following:

- Ladram Bay
- Salcombe Regis

- Branscombe
- Stonebarrow
- Seatown
- Eype
- Burton Bradstock
- West Bexington
- Abbotsbury
- Langton Herring
- Chickerell
- Osmington
- Ringstead
- Durdle Door
- Lulworth
- Tyneham (weekend and holiday periods)
- Kimmeridge
- Worth Matravers
- Durlston Country Park
- Studland.

4.33 PROMOTING LOCAL AWARENESS OF WORLD HERITAGE SITE STATUS

4.33.1 It is important that the communities in Dorset and East Devon, including the tourism industry, are continually updated and involved in the interests within the Site and the implications of World Heritage Site status. Issues that should be addressed include both the obligations to ensure responsible management, the potential to increase public awareness and understanding of the interests of the Site, and the possibilities for the encouragement of sustainable tourism activity. Such discussions should be a key input to community planning activity in Dorset and East Devon.

4.33.2 **Management policies in relation to the Site are as follows:**

P79 A regular programme of local awareness-raising activities and events will be an early and continuing priority of World Heritage Site management, and links will be established with Community Planning initiatives to facilitate this input.

Chapter 5: Monitoring and Review

MONITORING OF THE SITE

5.1 Monitoring of the implementation of the Site Management Plan is essential to demonstrate that the objectives are being achieved. An annual report on progress in implementing the Site Management Plan will be made. This report will be publicly available.

5.2 Part of the implementation report will be a report of the state of the Site and the management of its World Heritage values in relation to an agreed set of indicators. Agreed indicators for the Site are set out below. It is important to note that the indicators are designed to prompt further investigation of management issues. It is not proposed that they are tied to detailed prescriptions for management action.

5.3 Sites of Special Scientific Interest provide a major plank of the protective measures in place for the earth science interests within the Site. English Nature have a lead role in establishing and reviewing the SSSI network, and reporting on its condition. They also have a lead role in ensuring that landowners are provided with the necessary advice to ensure that features of importance are conserved.

5.4 **Management policies in relation to the Site are as follows:**

P80 An annual status report on the Site will be prepared and published.

P81 English Nature will report regularly on the status the nationally designated Earth Science interests within the Site.

REVIEW OF SITE MANAGEMENT PLAN

5.5 The Site Management Plan will require regular review. The process for making this plan operational is discussed in the following section. Once the plan is in place there will be a need for a regular process of formal review, which it is anticipated will operate on a three-year cycle.

5.6 **Management policies in relation to the Site are as follows:**

P82 The Site Management Plan for the Site will be reviewed regularly to keep its policies up to date.

Table 1: Proposed Indicators for the Dorset and East Devon World Heritage Site

Attribute	Indicator (units of measurement)	Ideal Status	Report By	Report frequency
Quality of earth science interest	Length of defended coastline within the Site, excluding repair of existing defences (metres since January 2000)	No increase	Coast Protection and Flood Defence Authorities	Annual
	Area of land developed within the Site (hectares since January 2000)	No increase	Local Authorities	Annual
	Removal of coastal defence at Durlston Bay (no units)	Removed (long term)	Purbeck District Council	Annual
	Re-exposure of geology at Ringstead Bay (no units)	Geology re-exposed (long term)	West Dorset District Council	Annual
	Operation of West Dorset fossil collecting code of conduct (Criteria have been established by the working group)	Reported operating successfully by parties to the code.	Dorset County Council	Annual - biannual
	Permissions granted for mineral extraction and quarrying within the Site (hectares)	No new permissions granted	Devon and Dorset County Councils	Annual
	Permissions granted for development within the Site (hectares)	No permissions contrary to Local Plan Policy	District Councils	Annual
	Damage to designated Earth Science interests (linked to stated conservation objectives) within the Site	No damage	English Nature	Annual
• Quality of the setting of the Site	• Achievement of agreed work programme (no units)	• N/A	• Dorset AONB • East Devon AONB	• Annual
Tranquillity of remote coastline	Levels of use and disturbance at selected survey stations, noise measurements (methodology to be designed)	No decrease in tranquillity	Dorset Countryside, East Devon AONB Service	Biannual
Visitors to the Site	Visitor numbers to key attractions	Stability (or increasing where capacity exists)	Dorset Tourism Data Project, Devon County Council, Visitor Manager	Biannual
	Seasonal distribution of visitors	Wider, within Site capacity	Dorset Tourism Data Project, Devon County Council, Visitor Manager	Biannual
Visitor Interpretation	Implementation of World Heritage Interpretation Programme	Progress with agreed work programme	Dorset and Devon County Councils	Annual
Visitor Experience	Visit satisfaction of visitors to the Site	Stable or increasing visitor satisfaction	Dorset Tourism Data Project, Devon County Council, Visitor Manager	Biannual
Educational Use	Number of educational visitors to Coastlink visitor centres	Stable, increase where capacity exists	Coastlink Centres	Annual
	Seasonal distribution of visitors	Wider, within Site capacity	Dorset Tourism Data Project, Devon County Council, Visitor Manager	Biannual
	Success of Educational Initiatives	Targets set in relation to specific projects	Education Working Group	Annual
Transport	Visitor Numbers by mode of transport	Decrease in growth rate of car borne visits	Local Transport Plans, Dorset Tourism Data Project, Devon County Council	Biannual
Access	Usage level of coast path (number of visitors)	Stability (or increasing where capacity exists)	South West Coast Path Team	Biannual (rolling four-year programme)
	Coast Path Maintenance Budget (£)	Stable or increasing (taking account of inflation)	Dorset and Devon County Councils	Annual

Attribute	Indicator (units of measurement)	Ideal Status	Report By	Report frequency
Tourism Impact of World Heritage	Number of overseas visits	Increase, within capacity of Site	Dorset Tourism Data Project, Devon County Council	Biannual
	Number of visits prompted by World Heritage Site status	Within capacity of Site	Dorset Tourism Data Project, Devon County Council	Biannual
	Number of visitors to programmes directly related to the Site Management Plan	Achievement of targets set for such programmes	Dorset and Devon County Councils	Biannual
Visitor Safety	Number of call-outs to visitors within the Site (three year average)	Decrease	HM Coastguard	Annual
Science	Number of peer-reviewed papers published (3 year average of number of papers)	Stable or increasing	British Geological Survey	Annual
	Scientific conferences and seminars (number held, and numbers attending)	At least one national event every two years.	Dorset and Devon County Councils	Annual
	Geological budget of County Museums (proportion of total budget)	Stable or increasing	Dorset County Museum Royal Albert Museum, Exeter	Annual
	Number of visits to website	Increase	Dorset and Devon County Councils	Annual
Use of World Heritage logo	Use of logo outside of UNESCO guidelines	No instances	World Heritage Steering Group	Annual
	Inappropriate promotion of world heritage in tourism literature (number of reported incidents)	No instances	World Heritage Steering Group	Annual
Staffing	Employment of full-time Geological Co-ordinator (none)	Officer employed	Dorset and Devon County Councils	Annual
	Employment of World Heritage Tourism Officer (none)	Officer employed	Dorset and Devon County Councils	Annual

Chapter 6: Implementation

6.1 As can be seen the protection of the Site relies on the continued operation of a series of existing systems and protective mechanisms. Implementation of the plan in respect of these is unlikely to result in noticeable changes to existing site management which owners and users are already familiar with. What is new is the reporting of the operation of these systems on a regular basis, as described in Chapter 5 above.

6.2 The positive management of visitors and provision of information, interpretation and educational initiatives will be pursued through the development of the work of established public-private-voluntary partnerships. These include, though are not limited to the following:

- 'Coastlink' visitor centres
- Devon County Council
- Devon's Regionally Important Geological Sites Group
- Dorset and Devon Museums
- Dorset Area of Outstanding Natural Beauty Management Initiative
- World Heritage Site Tourism Working Group
- Dorset Countryside
- Dorset New Forest Tourism Partnership
- Dorset's Important Geological Sites Group
- East Devon AONB Service
- Geologists' Association, Dorset Branch
- Purbeck Heritage Committee
- Shoreline Management Plans.

NEW MANAGEMENT STRUCTURES

6.3 It is necessary to form new structures to ensure the delivery of a number of aspects of site management. The new bodies and their purpose are as follows:

- **World Heritage Steering Group.** This group has overall responsibility for ensuring that the management objectives of the Site are achieved, and oversees the implementation of the Site Management Plan, and the monitoring and reporting on the state of the Site. The Steering Group is formally constituted with terms of reference and specified membership. The terms of reference of the group are included as Appendix 10.
- **Science and Conservation Advisory Group (SCAG).** This group has the role of advising the World Heritage Steering Group on earth science conservation, and for achieving an effective science network to support implementation of the management plan. The group also guides the work of the Earth Science Manager. Membership is at the invitation of the County Councils, in consultation with the World Heritage Steering Group, and will focus on bringing together the local and national organisations with a lead responsibility for conservation of the Site, together with appropriate input from local scientific institutions. In view of the wide range of international interests in the World Heritage Site, a Science and Conservation Advisory Network (SCAN) will be established to provide the widest possible range of contacts to assist the management of the Site, and support science-related activities associated with it.

- **Tourism Working Group.** This is a group with a locally based membership tasked with providing ideas and advice on the integration of site management with the tourism industry, development of special interest tourism, and influencing sustainable tourism promotion to be sympathetic to World Heritage objectives. The group provides advice to the wider 'World Heritage Coast' area beyond the Site, including the area covered by the Dorset Coast Strategy. It guides the work programme of the World Heritage Visitor Manager. It will also provide a co-ordinating role for Site interpretation, supported by a more focussed approach if necessary.

It is anticipated that other working groups will be established through the World Heritage Steering Group where required to support implementation of other areas of the World Heritage Site Management Plan.

- **World Heritage Trust.** It is proposed that the a Trust should be established, in order to provide a vehicle for attracting, holding and distributing funding to aspects of World Heritage Site related activities. This proposal will be evaluated by the World Heritage Steering Group.

STAFFING

6.5 Existing posts will be specifically identified in Dorset and Devon County Councils as having responsibility for World Heritage matters across the Site. Three new posts have been created in order to deliver World Heritage Management, which are as follows:

- **Earth Science Manager:** this post has the responsibility of providing geological advice to planners and site managers, co-ordinating fossil collecting policies, and developing the scientific and educational work programmes in relation to the Site. The post will work in partnership with English Nature who retain the statutory lead role in relation to earth science and nature conservation. An **Earth Science**

Adviser focuses on Earth Science Conservation activities associated with the Site.

- **Visitor Manager:** this post has the responsibility for overseeing tourism policy for the Site. Its specific tasks include linking to existing promotional initiatives to ensure positive and responsible references to World Heritage Site status, interpretation, development of special interest tourism, promotion of sustainable transport and access policies, and the integration of visitor management and tourism development.

6.6 A diagram showing the management structure for the Site is shown in Figure 1.

PHASING OF IMPLEMENTATION

6.7 Table 2 shows the proposed phasing of implementation of the plan, and the way in which this relates to existing initiatives. This has been developed as a more detailed provisional work programme for the Site, following final establishment of the Site Management Plan.

RESOURCES

6.8 The main resource needs for the delivery of the World Heritage Site Management Plan will be met through the delivery of geological conservation through the coastal and countryside management undertaken by landowners, National Trust, local authorities, Government Agencies and others. Such work is funded through a number of different sources, including landowners resources (public, private and voluntary sectors), backed in places by local authority budgets, and grant aid from Government Agencies such as English Nature and the Countryside Agency. There will remain a key need to ensure that the levels of resources available for this work remain sufficient to the management needs of the coast, in relation to its World Heritage Site status.

6.9 The main need for specific resources for implementation of the plan will be to support the work of the staff team. The minimum staff-only costs (2003 figures) are likely to be approximately £85,000 per annum. However additional funding will be required to support project activity and the development of management programmes. Support will be provided through nominated staff within the County Councils, and other partners as appropriate to identifying and securing the necessary resources. This will involve the development of phased programmes of work, and the preparation of bids for funding. It is anticipated that funding will be sourced through a 'mixed economy' of different sources, which are likely to include the following:

- Partner funding with local authorities, government agencies, private and voluntary sector;
- Grants from Government or Government Agencies;
- National Lottery;
- European funding (e.g. LIFE);
- Industrial sponsorship;
- Public contributions, including sales and donations from visitors, perhaps focussed through membership mechanisms such as a 'Friends of…' organisation.

The preparation of robust business and development plans will be one of the major priorities in the establishment phase for the World Heritage Site Management Plan, and the assessment of the impact of the status in the wider area of Dorset and East Devon.

Figure 1: Proposed World Heritage Site management structure

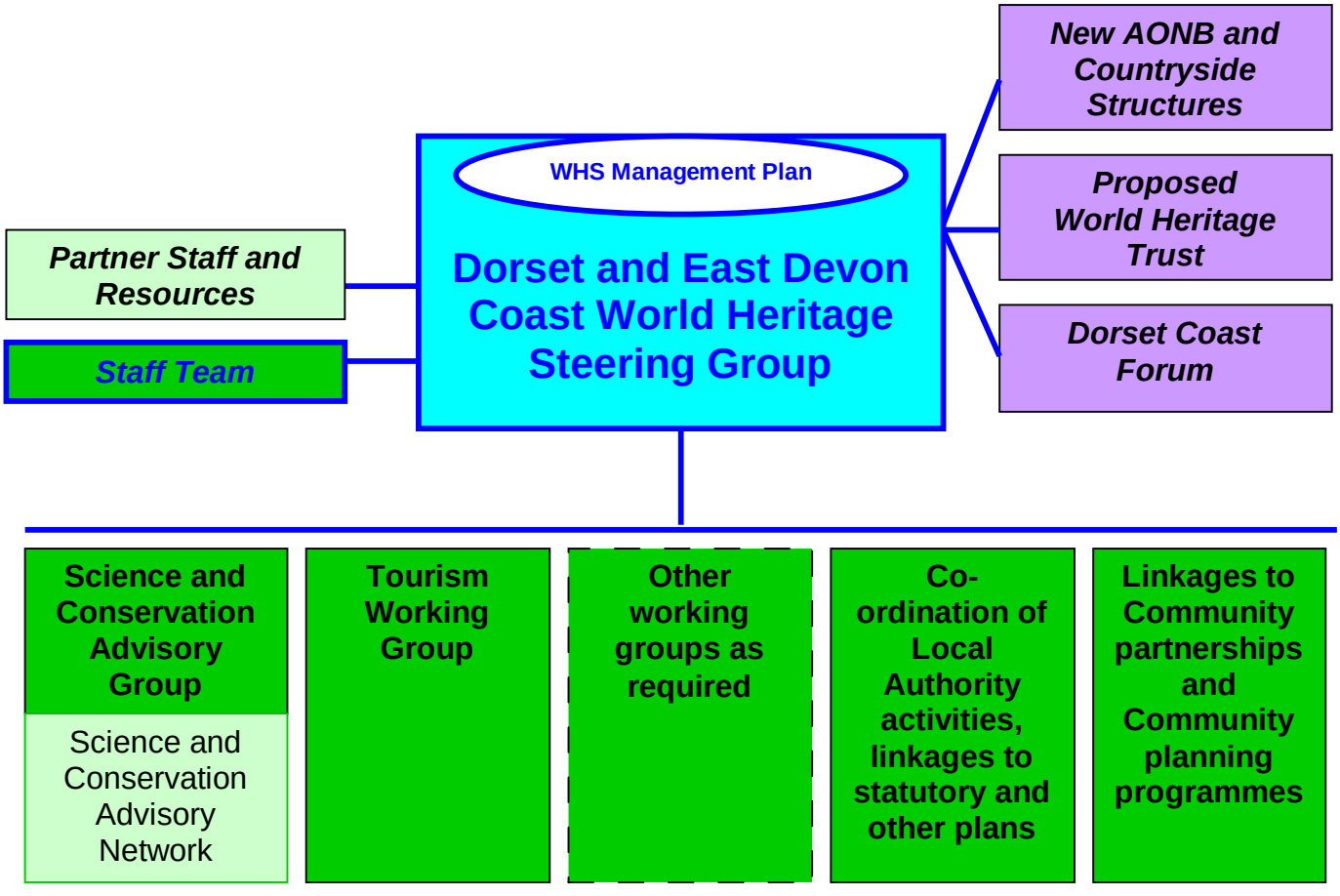

Table 2: Phasing of Implementation of the Site Management Plan, 2002-2007

Date	Site Conservation	Steering Group	Interpretation, Education and Communication	Sustainable Tourism
2002	• Appoint Earth Science Manager • Establish Science and Conservation Advisory Group and Advisory Network • Identify agreed work programme	• Establish World Heritage Steering Group, and agree terms of reference • Revise and Adopt World Heritage Site Management Plan to take account of UNESCO decision.	• Start up programme of site interpretation implemented.	• Appoint Visitor Manager. Establish World Heritage Tourism Working Group • Strategic Report on Economic Development Potential.
2003	• Implementation of Conservation Work Programme • Establish Site monitoring programme	• Establish linkages with AONB programmes • First annual report	• Production of World Heritage Site Interpretation, Education and Communications Strategies, and implementation programme	• Implementation of Tourism and Visitor Management Work Programme
2004	• Implementation of Conservation Work Programme	• Annual report	• Implementation of Interpretation, Communication and Education Work Programme	• Implementation of Tourism and Visitor Management Work Programme
2005	• Implementation of Conservation Work Programme	• First Review of Management Plan • Annual report	• Implementation of Interpretation, Communication and Education Work Programme	• Implementation of Tourism and Visitor Management Work Programme
2006	• Implementation of Conservation Work Programme	• Adopt revised plan following appropriate public consultation • Annual report	• Implementation of Interpretation, Communication and Education Work Programme	• Implementation of Tourism and Visitor Management Work Programme
2007	• Implementation of Conservation Work Programme	• Earliest date for first update of Site boundary • Annual report	• Implementation of Interpretation, Communication and Education Work Programme	• Implementation of Tourism and Visitor Management Work Programme

The existing mechanisms of protection and management operate within different cycles for review. The frequency of review of some of the main initiatives is as follows:

- Statutory Land-Use Plans - Every 5 years
- Minerals and Waste Plans - Every 5 years
- Local Transport Plans - Every 5 years
- Shoreline Management Plans - 3-5 years
- AONB Management Plans - 5 yearly reviews.

The tracking of progress and issues in relation to the detailed planning and management of the Site will be carried out by the World Heritage Steering Group in relation to the monitoring criteria set out in Chapter 5 of this plan. Detailed proposals for implementation of visitor management and interpretation, and geological conservation programmes will be set out in a regularly updated work plan from 2002 onwards. More information on existing priorities is provided in the current management statements for East Devon, West Dorset and Purbeck (Appendices 12 –14) [Note: these are substantial documents provided to UNESCO at the time of nomination, and are not appended to this version of the plan, but can be provided on request].

World Heritage Site Management Plan Appendices

This section includes the following appendices. Paragraph numbers within each section begin with the number of the appendix.

Appendix 0 **Statement of significance on the Site approved by UNESCO**

Appendix 1 **Statement on the boundaries of the Site and the World Heritage interests within them**

Appendix 2 **Dorset Coast Strategy Principles**

Appendix 3 **Existing Planning and Management Measures**

Appendix 4 **Planning policies affecting the Site**

Appendix 5 **Nature conservation areas designated under European Council Directives**

Appendix 6 **Geologists' Association Code of Conduct for Geological Fieldwork**

Appendix 7 **Fossil Collecting Code of Conduct for West Dorset**

Appendix 8 **Guidelines for use of the World Heritage emblem**

Appendix 9 **Dorset Coast Strategy Tourism Policies**

Appendix 10 **Devon County Council Tourism Role and Action Programme summary**

Appendix 11 **Terms of Reference for the World Heritage Steering Group**

Appendix 0: Statement of significance on the Site approved by UNESCO

This Appendix is an extract from the *IUCN Evaluation of Nominations of Natural and Mixed Properties to the World Heritage List. Report to the World Heritage Committee, Twenty-fifth session, 11-16 December 2001 – Helsinki, Finland. Prepared by IUCN – The World Conservation Union, 20 October 2001.*

This is the statement on the Site, which was considered and approved by the World Heritage Committee on 13 December 2001.

Appendix 1: Statement on the boundaries of the Site, and the World Heritage interests within them

A1-1 OVERVIEW

A1-1.1 The Dorset and East Devon Coast has been awarded World Heritage Site status on the basis of its global importance for the earth sciences. A detailed description of the boundaries of the Site, and the interests that lie within them is set out below.

A1-1.2 The boundaries of the Site have been defined to closely follow the earth science features that are of World Heritage interest. The landward boundaries are as follows:

- On cliff coastline, the boundary is taken at the break in slope at the top of the most landward cliff-scarp
- On coastline with no cliffs, the boundary is taken at the back of the beach
- The Site includes the Fleet lagoon and the boundary will be taken at the top of the low cliffs that lie on its northern shore.

The seaward boundary of the Site is taken as Low Water Mark.

A1-1.3 The Site excludes the frontages of some of the larger coastal towns: Sidmouth, Seaton, Lyme Regis, West Bay, Weymouth, Swanage, and also excludes the commercial port area at Portland. The resulting Site comprises eight stretches, as follows:

- Orcombe Rocks to Chit Rocks, Sidmouth
- River Sid, Sidmouth to Seaton Hole
- River Axe, Axmouth to The Cobb, Lyme Regis
- Lyme Regis to West Bay
- Chesil, the Fleet and Portland Coast
- Portland Harbour Shore
- Bowleaze Cove to Peveril Point
- New Swanage to Studland Bay

A1-1.4 Reference is made to three forms of designation that provide protection to the Site:

- Sites of Special Scientific Interest (SSSI): areas identified under the Wildlife and Countryside Act, 1981, which receive statutory protection because of their importance for wildlife and/or earth science;
- Areas of Outstanding Natural Beauty (AONB): areas identified under National Parks and Access to the Countryside Act, 1949, which receive statutory protection because of their landscape quality;
- Geological Conservation Review sites (GCR): sites identified following a national programme, carried out between 1977-1990, which identified the Earth Science sites of national and international importance in Britain. GCR sites therefore represent the series of the most significant geological and geomorphological sites within the UK, and generally receive specific protection through the Sites of Special Scientific Interest.

A1-1.5 Owing to the requirement to ensure the protection of the Site, a further general criterion for boundary setting is that only areas designated as AONB or SSSI are included within it. The description notes a few localities where this condition has been slightly modified to reflect particular circumstances.

A1-1.6 The criteria used to establish the initial boundaries of the Site will remain the basis for review of the boundaries in the future. It is implicit within these criteria that the precise location of the boundaries of the Site will change in the future as the physical form of the coast evolves, or if new evidence of the scientific importance of additional areas of the coast comes to light.

A1-1.7 There will be the need to define the precise location of the Site boundary from time to time. It is therefore considered that there should be a regular revision of the formally established boundaries of the Site, primarily to reflect changes to the coastline and the movement of the clifflines and beaches that define the extent of the Site. A small number of localities should be considered for inclusion in the future, depending on their notification for earth science reasons within the SSSI network. These localities are listed in the text below where relevant.

A1-1.8 The formal process of revision of the boundaries will be driven primarily by the survey timetables of the Ordnance Survey and the review and renotification of SSSIs by English Nature in relation to earth science interests. It is anticipated that a first review of the boundaries would be carried out not earlier than 2007, that is five years after the designation of the Site by UNESCO.

A1-2 SECTION 1: ORCOMBE ROCKS TO CHIT ROCKS, SIDMOUTH

AONB: Complete coverage, except for intertidal areas and Chit Rocks
SSSI: partial coverage
GCR sites: partial coverage, 6 sites

A1-2.1 The western boundary of this section of the Site, and of the Site as a whole is taken as grid reference 3018 0797 (SY018797), which is the western extent of GCR site 1506 (Orcombe Rocks, Permian - Triassic). This GCR site also lies within the Exe Estuary SSSI, and is cited as

an earth science feature within it. From this point east, the Site includes continuous cliff face exposures of rock and coastal geomorphological features, and the boundaries of the Site are drawn as described in paragraph A1-1.2. Particular points to note with regard to the features included, and detailed boundaries of Section 1 are as follows:

a) This section of the Site lies within designated AONB, the boundary of which has been drawn at high tide;
b) Budleigh Salterton Cliffs is an SSSI notified only for its geological interests, and is covered by two GCR sites (1507 Budleigh Salterton, Permian - Triassic and 1837 Budleigh Salterton, Coastal Geomorphology of England). The boundary of the Site at Budleigh Salterton is taken as coinciding with the boundary of the SSSI that covers the cliffs fronting the town.
c) Otterton Point is a GCR site (813 Otterton Point, Permian - Triassic Reptilia) and this interest is also cited in the SSSI citation.
d) Ladram Bay-Sidmouth SSSI (3 separate sections) is listed as having importance for coastal geomorphology at Ladram Bay (also listed as GCR site 1839 Ladram Bay, Coastal Geomorphology of England), and for geology at High Peak and Chit Rocks (also listed as GCR site 814 High Peak, Permian - Triassic Reptilia).
e) The eastern boundary of this section coincides with the extent of the notified SSSI at Chit Rocks.

A1-2.2 This section contains a unique situation within the Site where an AONB has been drawn at high water mark, and only parts of the intertidal area are covered by SSSI. These intertidal areas are included within the Site because they are protected by designation as Coastal Preservation Area (CPA). The CPA is a well established Devon-specific designation, which provides the main lead for protective planning policy for the coastal sections of the AONB and the adjoining intertidal land.

A1-3 SECTION 2: RIVER SID, SIDMOUTH TO SEATON HOLE

AONB: Complete coverage, except intertidal area
SSSI: Complete coverage
GCR sites: Partial coverage, 2 sites

A1-3.1 This section of the Site covers cliff exposures and coastal geomorphological features that lie entirely within the Sidmouth-Beer Coast SSSI, and the East Devon AONB (boundary drawn at high water mark). It is partly covered by two overlapping GCR sites at its eastern end (632 East Cliff to White Cliff, Aptian – Albian and 204 Hooken Cliff, Cenomanian - Maastrichtian), the interests of both being described in the SSSI citation. The boundary is drawn within the SSSI to exclude areas of cliff top grassland and woodland.

A1-4 SECTION 3: RIVER AXE, AXMOUTH TO MONMOUTH BEACH, LYME REGIS

AONB: Complete coverage, except for intertidal area in Devon
SSSI: Complete coverage
GCR sites: Complete coverage, 6 sites (some in part)

A1-4.1 This section of the Site covers the Axmouth to Lyme Regis Undercliffs and important cliff exposures of geology. The entire site (with the exception of the intertidal area in Devon) is AONB. It also lies entirely within SSSIs that are cited for their earth science interest. The boundary of the Site can be regarded for practical purposes as coincident with the SSSI, although should strictly exclude a small area of clifftop grassland that lies within the SSSI above Lyme Regis and is owned by the National Trust. The Site is entirely within GCR Site 800 (Axmouth to Lyme Regis, Mass Movement) and parts lie within the following sites:

- 1263 Culverhole Point, Rhaetian
- 1264 Pinhay Bay, Rhaetian
- 87 Pinhay Bay Fault Corner, Hettangian - Pliensbachian
- 916 Lyme Regis, Jurassic - Cretaceous Reptilia
- 2952 Lyme Regis, Mesozoic - Tertiary Fish/Amphibia

A1-5 SECTION 4: LYME REGIS TO WEST BAY

AONB: Complete coverage
SSSI: Complete coverage
GCR sites: Almost completely covered, 10 sites (some in part).

A1-5.1 This section of the Site includes coastal geological exposures, landslips and other geomorphological features. The entire area lies within AONB, and all but a small landslipped field at the Spittles lies within SSSIs notified for their earth science interest. Virtually all of the Site lies within GCR sites, with overlapping sites in several locations. The entire area to within 400m of its eastern boundary at West Bay lies within GCR site 87 (Pinhay Bay Fault Corner, Hettangian - Pliensbachian). Other GCR sites covering part of this section are as follows:

- 252 Seatown - Watton Cliff, Toarcian

- 546 Watton Cliff, Mesozoic Mammalia
- 794 Charmouth, Palaeoentomology
- 916 Lyme Regis, Jurassic - Cretaceous Reptilia
- 1321 Black Ven, Mass Movement
- 1330 Watton Cliff, Bathonian
- 2109 Golden Cap - Lyme Regis, Coastal Geomorphology of England
- 2901 Watton Cliff, Mesozoic - Tertiary Fish/Amphibia
- 2952 Lyme Regis, Mesozoic - Tertiary Fish/Amphibia

A1-5.2 Within this section, the boundary generally is coincident with the Site of Special Scientific Interest, with the following exceptions:

- the landward boundary is drawn at the base of the existing sea-wall to the east of Lyme Regis
- it excludes two fields within the Spittles that lie above the break of slope of the cliffs. This whole area is subject to active landslipping and the flexible approach to boundaries of the Site is particularly relevant for the future.
- It is drawn to exclude cliff-top grassland that is included in the SSSI but is unaffected by slippage.

A1-5.3 The eastern boundary of the Site at West Bay is taken as coincident with the SSSI boundary.

A1-6 SECTION 5: CHESIL, THE FLEET AND PORTLAND COAST

AONB: Partial coverage. Elsewhere, local Coastal Landscape protection policy is embodied within structure and local development plans
SSSI: Complete coverage, but on the Isle of Portland the boundary of the SSSI has been drawn at high water mark
GCR sites: Almost complete coverage, 14 sites

A1-6.1 This section of the Site covers the whole of Chesil Beach and the Fleet. It includes important cliff exposures of geology to the east of West Bay, within the low cliffs fronting the Fleet and on the Isle of Portland. It also includes landslides and other geomorphological features on the Isle of Portland. This section lies entirely within SSSIs notified for their geological and/or geomorphological interest. The central and northern part of Chesil lies within AONB, but the remainder and the whole of the island of Portland, and Portland Harbour do not. Parts of this site are adjacent to Portland and Weymouth Harbours. Chesil and the Fleet is a candidate Special Area of Conservation, under the EC Habitats Directive.

A1-6.2 The whole of Chesil Beach is a GCR Site (1800 Chesil Beach, Coastal Geomorphology of England) and the following GCR sites are also wholly or in part within this section:

- 51 Burton Cliff & Cliff Hill Road Section, Aalenian - Bajocian
- 432 Lynch Cove (East Fleet Exposure), Oxfordian
- 794 Charmouth, Palaeoentomology
- 996 Freshwater Bay, Portlandian - Berriasian
- 997 Tar Rocks, Portlandian - Berriasian
- 1000 West Cliff, Portlandian - Berriasian
- 1002 Yeolands - Grove Cliff, Portlandian - Berriasian
- 1198 West Cliff - Kingbarrow - Yeolands & Grove Cliff, Portland, Jurassic - Cretaceous Reptilia
- 1285 Blacknor, Mass Movement
- 1298 East Fleet - Small Mouth, Kimmeridgian
- 1603 Shipmoor Point - Butterstreet Cove, Bathonian
- 1643 Portland Bill, Portlandian - Berriasian
- 2380 Tidmoor Point - East Fleet Coast, Callovian

A1-6.3 On Portland the SSSIs are too extensive to provide appropriate boundaries to the Site in a consistent manner to elsewhere. The formal boundary of the Site is taken as follows:

a) The intertidal area is not included on Portland as it is not included within the SSSI
b) The boundary follows the brow of West Cliff, excluding Tout and Bowers Quarries
c) South of Blacknor to Pulpit Rock, the boundary follows the brow of the cliff and includes the raised beaches that lie within the SSSI
d) The raised beach between Pulpit Rock and Portland Bill is not included as it is excluded from the SSSI
e) On the east coast, north of Portland Bill it includes the raised beaches within the SSSI and follows the brow of the cliff to a point at grid reference 36870693
f) From this point north there are a number of disused quarries that emerge onto the cliffs and have been quarried out through the natural brow of the cliff. These are geologically important and are enclosed by a narrow coastal strip of SSSI. Since they expose rocks which can be presumed to have been those formerly exposed in the cliffs, the boundary of the Site is taken as coincident with the SSSI boundary from this point north to grid reference 36910702.
g) From this point north the boundary follows the landward break in slope of cliffs, generally following the SSSI boundary but excluding some adjoining cliff top land and quarries such as Broadcroft.

h) Finally, the boundary in the East Weares follows the SSSI boundary, as far as the route of the incline railway, excluding quarry exposures inland of that point. The Site excludes the former Kings Pier Hollow Rifle Range, which although designated as SSSI does not contain features of earth science interest..

A1-6.4 Most of this section raises no difficult issues in boundary setting. The inclusion of the cliff quarries on the south-east coast of Portland addresses a unique situation where the natural profile of the cliff has been lost, but excellent exposures exist within cliff-top quarries. The incline railway forms a convenient boundary in an area of former landslipping where a clear geomorphological limit to the Site is not easy to define.

A1-6.5 The drawing of the boundary to include the Quaternary raised beaches reflects the unique occurrence of these features within the Site, and their international earth science importance as set out in the SSSI citation.

A1-6.6 There are two boundary issues on Portland which derive from the present boundaries on the SSSI citation which were last notified in 1977. The first is that the SSSI currently excludes the natural coastal rock outcrops between Pulpit Rock and Portland Bill. The other anomaly is that the SSSI appears only to run to High Water Mark, contrary to normal practice in drawing SSSI boundaries elsewhere. These factors prevent these areas from being included in the Site currently and should be considered by English Nature as issues for resolution at the first revision of the World Heritage Site boundary.

A1-6.7 Portland Stone has an international status as a building stone, and this represents a strong associated interest with the earth science interests proposed for inclusion in the Site. The quarry landscape on Portland, including disused quarries within the Site, provides important evidence of the industrial archaeology of the stone industry.

A1-7 SECTION 6: PORTLAND HARBOUR SHORE

AONB: Not covered. Local Coastal Landscape protection policy is embodied within statutory land-use plans
SSSI: Complete coverage. The SSSI to the north of Ferrybridge is currently notified for its earth science importance, whilst the part to the south is notified on the basis of its biological interest
GCR sites: North of Ferrybridge the rock exposures are completely covered by three GCR sites. There is no GCR coverage to the south of Ferrybridge.

A1-7.1 The boundary of the Site within this section includes only the land within the SSSI to the north of Ferrybridge, it follows the SSSI boundary in its entirety from that point north. The Site includes the following GCR sites:

- 828 (Sandsfoot, Oxfordian)
- 1064 (Small Mouth Sands, Jurassic-Cretaceous Reptiles)
- 1298 (East Fleet - Small Mouth, Kimmeridgian)

A1-7.2 This is a clear example where the lateral extent of the notified earth science importance within an SSSI citation creates a grey area with regard to the definition of the boundary of the Site, because the SSSI lies outside of an AONB. Whilst there are earth science interests on Hamm Beach, and a geomorphological link to Chesil has been demonstrated, these interests are not reflected within the current SSSI citation. The criteria set for selection of the Site boundaries therefore require that the Hamm Beach is excluded from the Site at the present time. The Hamm Beach is an area which should be considered for inclusion within the Site at the time of the first revision of the boundaries of the Site, when the position in relation to its earth science importance within the SSSI network and the Geological Conservation Review has been looked at in more detail.

A1-8 SECTION 7: BOWLEAZE COVE TO PEVERIL POINT

AONB: Complete coverage, except to the west of Redcliff Point
SSSI: Complete coverage
GCR sites: Complete coverage for geomorphology and very extensively covered for geology, 26 sites in total.

A1-8.1 Section 7 includes exposed coastal geology and geomorphology between Furzy Cliff, near Bowleaze Cove and Peveril Point. The boundary follows a readily traceable cliff line throughout, and lies entirely within the South Dorset SSSI which is notified for its geological and

geomorphological interest. The boundary does not include the full extent of the SSSI and excludes a number of substantial areas of cliff-top vegetation. The area to the west of Redcliff Point lies outside the South Dorset AONB but lies within an earth science SSSI, and is completely covered by two GCR sites (910 Osmington, Oxfordian and 1863 Furzy Cliff - Peveril Point, Coastal Geomorphology of England), with Furzy Cliff covered by a third site (163 Furzy Cliff, Overcombe, Jurassic - Cretaceous Reptilia) The area as a whole is covered by GCR site 1863 (Furzy Cliff - Peveril Point, Coastal Geomorphology of England) and extensively covered by a series of sometimes overlapping GCR sites as follows:

- 163 Furzy Cliff, Overcombe, Jurassic - Cretaceous Reptilia
- 208 White Nothe, Cenomanian - Maastrichtian
- 547 Durlston Bay, Mesozoic Mammalia
- 634 Worbarrow Bay, Aptian - Albian
- 635 White Nothe, Aptian - Albian
- 724 Durlston Bay, Portlandian - Berriasian
- 725 Cliff House, Portlandian - Berriasian
- 726 Houns Tout, Portlandian - Berriasian
- 793 Durlston Bay, Palaeoentomology
- 910 Osmington, Oxfordian
- 914 Durlston Bay, Jurassic - Cretaceous Reptilia
- 915 Broad Bench Cuddle (Gaulter Gap - Broad Bench), Jurassic - Cretaceous Reptilia
- 998 Tyneham Cap - Houns Tout, Kimmeridgian
- 1001 Winspit - Seacombe, Portlandian - Berriasian
- 1006 Dungy Head - Mupe, Portlandian - Berriasian
- 1060 Swyre Head - Chapman's Pool, Jurassic - Cretaceous Reptilia
- 1297 Ringstead, Kimmeridgian
- 1300 Black Head, Kimmeridgian
- 1628 Gad Cliff, Portlandian - Berriasian
- 1863 Furzy Cliff - Peveril Point, Coastal Geomorphology of England
- 2289 White Nothe - Bacon House, Alpine Structures of Southern England
- 2625 Lulworth Cove, Wealden
- 2626 Mupe Bay - Worbarrow Bay, Wealden
- 2627 Durdle Door, Wealden
- 2900 Durlston Bay, Mesozoic - Tertiary Fish/Amphibia

A1-9 SECTION 8: NEW SWANAGE TO STUDLAND BAY

AONB: Complete coverage
SSSI: Complete coverage
GCR sites: Complete coverage, 4 sites

A1-9.1 Section 8 includes exposed coastal geology and geomorphology between Swanage and the Cretaceous/Tertiary unconformity west of Old Harry Rocks. The boundary follows a readily traceable cliff line throughout the Site, and lies entirely within the Purbeck Ridge SSSI and Studland Cliffs SSSI which are both notified for geological and geomorphological interests. The boundary does not include the full extent of the SSSIs and excludes a number of areas of important cliff top vegetation. This section is entirely covered by four, partly overlapping GCR sites as follows:

- 206 Hand Fast Point - Ballard Point, Cenomanian - Maastrichtian
- 632 East Cliff to White Cliff, Aptian - Albian
- 1843 Ballard Down, Coastal Geomorphology of England
- 2288 Ballard Point - Studland Bay, Alpine Structures of Southern England

A1-9.2 The eastern boundary of the Site is drawn at the Cretaceous/Tertiary unconformity at the far south of Studland Bay. This lies within the SSSI below Warren Wood, approximately 1 km west of Old Harry Rocks.

Appendix 2: Dorset Coast Strategy Principles

A2-1 The following principles were agreed by the Dorset Coast Forum in 1999 as the basis for the long-term management of the Dorset Coast. They provide a broader context for the protection and management of the Site (although not all are directly relevant to the Site as nominated).

Principle 1: The need for long-term conservation of the coast
The Dorset Coast is an outstanding natural asset. Its geological, wildlife, landscape and archaeological resources should be passed on to future generations in as good or better condition than they are in now.

Principle 2: The need for equivalent recognition for the land and sea, within realistic limits
There is a need to strive for a more equal understanding and attention to the marine environment and resources of Dorset, compared to that on land, recognising that practical limitations mean this can only be achieved over time.

Principle 3: The need to support sustainable use of coastal resources
The natural and human resources of the coast are the fundamental basis for the coastal economy together with the use and enjoyment of the coast by visitors and locals.

We support sustainable use of the coast:

- Avoiding long-term damage or pollution to renewable resources such as the natural beauty of the coast, water, fisheries
- Using coastal land wisely, and minimising irreversible losses of important habitats, and of the best and most versatile agricultural land
- Using finite non-renewable resources, such as minerals, oil and gas, responsibly, and seeking renewable alternatives to replace them in the long term.

Principle 4: The need to maximise prosperity and quality of life
Because the coast is such an important part of Dorset, we need to make sure that it plays a full part in supporting communities through business and employment development. We need to actively seek viable economic opportunities which create good jobs and are able to adapt to changes in demand.

Principle 5: The need to particularly encourage coastal development which works with the environment
Generating economic growth in a high quality environment is a major challenge. There are always limitations to the extent of development, and the environment needs to be protected not just for its own sake but because a damaged environment will damage Dorset's economy and reduce the quality of life. Economic opportunities on the coast, which can be achieved in harmony with environmental protection and enhancement, should therefore be particularly supported. Assessments of the environmental effects of proposed development are a good way of identifying possible problems, and the possible ways to mitigate them and compensate for unavoidable environmental losses. Finally we should not overlook opportunities to use development to benefit the environment through improved building design, landscaping, land management or environmental improvements.

Principle 6. The need for effective local involvement in coastal decisions
Effective local involvement in decision-taking over the planning and management of the coast should be supported wherever it is feasible and practical. Where this is not the case, and particularly in the offshore environment, it is still important that there is effective local consultation by executive and regulatory bodies which allows sufficient time for an informed response. In return, local interests in Dorset need to respond from an informed position about offshore issues, and an understanding of the strategic as well as local importance of the Dorset Coast.

Principle 7: The need to work towards a properly integrated approach to transport, and ensure coastal issues are firmly on the agenda
Transport remains a major constraint to the use of the coast, and improvements are often limited by environmental considerations and lack of resources. Many transport issues are wider than purely coastal concerns and dealt with through County and regional strategies. Nevertheless there is a strong need to ensure that these wider initiatives support the aims of the Dorset Coast Strategy. Providing more transport choices for coastal visitors is one important priority. We also need to ensure that potential benefits of transport by water are fully embraced within integrated policies, and the role of ports as hubs of multi-modal transport is fully realised wherever practical.

Principle 8: The need to work together
Statutory planning, managing and regulating organisations within Dorset which have coastal responsibilities, need to work together through the Dorset Coast Forum and elsewhere, to:

- Routinely maintain open and professional relationships
- Maximise the exchange of information, and develop compatible systems to manage it
- Ensure that information gathered at public expense is placed into the public domain, and is as freely available as possible
- Develop open and co-operative approaches to resolve conflict
- Make the best use of scarce financial resources to plan, manage, monitor and use the coast
- Ensure management and development decisions, when taken and implemented, are of the highest possible quality and based on the best possible information
- Liaise and consult openly with representatives of the owners, users and interests which they regulate, or whose actions they affect.

Appendix 3: Existing Conservation Measures and Management Plans (at the time of the nomination of the Site)

A3-1 The Dorset and East Devon Coast is already extensively protected by a variety of conservation designations, and existing land use and management plans and other initiatives provide long-term protection of the Site. The following are the principal initiatives which are relevant. The principal designations which apply to the coast are summarised in Map 2, and the main planning units are shown in Map 3.

A3-2 LAND USE PLANS

A3-2.1 Statutory Development Plans are prepared by local authorities to meet the legal requirements set out by national government acts and planning policy guidance notes. Planning advice from Government in relation to World Heritage Sites is set out in Planning Policy Guidance Note 15 (Planning and the Historic Environment) and states that:

- 'No additional statutory controls follow from the inclusion of a site in the World Heritage list. Inclusion does, however, highlight the outstanding international importance of the Site as a key material consideration to be taken into account by local planning authorities in determining planning […] consent applications and by the Secretary of State in determining cases on appeal or following call-in'.

- 'Each local authority concerned, taking account of World Heritage Site designation, should formulate specific planning policies for protecting these sites and include these policies in their development plan. Policies should reflect the fact that these sites have been designated for their outstanding universal value, and they should place great weight on the need to protect them for the benefit of future generations as well as our own. Development proposals affecting these sites or their setting may be compatible with this objective, but should always be carefully scrutinised for their likely effect on the Site or its setting in the longer term. Significant development proposals affecting World Heritage Sites will generally require formal environmental assessment, to ensure that their immediate impact and their implications for the longer term are fully evaluated.'

A3-2.2 There is no specific planning guidance on natural World Heritage Sites, and the statement within PPG15 is not intended by the Government to be directly applicable to a natural Site.

A3-2.3 Projects that require Environmental Impact Assessment (EIA) obtain consent through different statutory consent procedures. Most of the projects that require EIA are authorised under the Town and Country Planning system and are subject to the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999. Projects either fall under Schedule 1 to the Regulations, where EIA is compulsory, or Schedule 2 to the Regulations where projects have to be screened by the local planning authority to see whether they are likely to have significant effects on the environment and require EIA.

A3-2.4 The main classes of land-use plan, and the current plans which are relevant to the Site are as follows.

A3-2.5 Structure Plans, which are prepared by County Councils under powers and duties in the 1990 Town and Country Planning Act, as amended by the 1991 Planning and Compensation Act. They give strategic guidance for development, looking ahead about 10-15 years. Structure Plans go through an extensive process of consultation with the public and public agencies before being adopted.

A3-2 6 The Structure Plans which affect the area of the Site are:

- the Bournemouth, Dorset and Poole Structure Plan, adopted in 2000
- the Devon Structure Plan First Review, adopted in 1999; now subject to further review and alteration to take forward to 2016.

Both contain policies guiding development for housing, employment, tourism, shopping, community facilities and transport. They also provide a strategic framework for the care of the environment.

A3-2.4 Local Plans are currently prepared by District Councils under powers and duties in the same Act. They provide guidance for development at the detailed local level, looking ahead over a similar timescale to Structure Plans, with which they must broadly conform. They cover a similar range of topics, and undergo an equally extensive process of public consultation. In the future, Districts will be responsible for preparing Local Development Frameworks (LDFs).

A3-2.4 The Local Plans covering the area of the Site are:

- East Devon Local Plan 2001-2011, first deposit published in 2000
- West Dorset Local Plan, adopted in 1998
- Weymouth and Portland Local Plan, adopted in 1997

- Purbeck Local Plan, currently in preparation. (A revised draft plan, published in 1999, currently guides development in Purbeck.)

A3-2.5 A second deposit of the Local Plan for East Devon is due to be published in 2003. The West Dorset and Weymouth and Portland Local Plans are currently under review, in order to extend their horizons to 2011.

A3-2.6 A summary of planning policies relevant to the Site is provided in Appendix 4.

A3-3 MINERALS AND WASTE PLANS

A3-3.1 Minerals and Waste Local Plans are prepared by Mineral and Waste Planning Authorities under powers and duties set out in the Town and Country Planning Act 1990, as amended by the Planning and Compensation Act 1991. The Mineral Authorities for the Site are Dorset County Council and Devon County Council.

A3-3.2 Minerals and Waste Local Plans set out policies to control the extraction, transport and processing of mineral resources onshore, striking a balance between meeting society's needs for materials, and protecting the environment. They also contain policies governing methods and locations for disposing of wastes ranging from inert to clinical and toxic materials.

The plans relevant to the Site are:

- Devon Minerals Local Plan, Modifications Document – May 2003
- Devon Waste Local Plan – First Deposit Version – January 2003
- Dorset Minerals and Waste Local Plan, adopted in April 1999.

A3-3.3 A summary of minerals planning policies relevant to the Site is provided in Appendix 4 of this Management Plan.

A3-3.4 Minerals Planning Authorities are currently undertaking a review of old minerals permissions under the requirements of the Environment Act 1995. This is relevant to the Site on Portland where 50-year-old planning permissions affect land immediately adjacent to the coast.

A3-3.5 Both mineral operators on the Island have submitted applications under the review, which indicate a reduced area of future working that would not include land within the Site. In the south-east of the Island, however, the application still envisages a small area where land would be worked within a few metres of the cliff edge. The operator proposes to consider less intrusive methods such as mining if this area is ultimately worked; alternatively the working of this sensitive area may be given up if a suitable alternative site can be found.

A3-3.6 The applications will be subject to Environmental Impact Assessment before a decision is made by the Mineral Planning Authority, and the operators are currently preparing their environmental statements.

A3-4 SITES OF SPECIAL SCIENTIFIC INTEREST

A3-4.1 Since 1949, English Nature (formerly known as the Nature Conservancy Council for England) has identified Sites of Special Scientific Interest (SSSI) because of their plants, animals, geological or physiographic features. SSSIs first received recognition in section 23 of the National Parks and Access to the Countryside Act 1949. The Wildlife and Countryside Act 1981, as amended and strengthened by the Countryside and Rights of Way Act 2000, is now the primary legislation giving protection to SSSIs. SSSIs provide the core means of protection of the earth science interest of much of the Site. Site Management Statements for SSSIs are agreed between English Nature and landowners, indicating how the site will be managed to conserve its scientific interest.

A3-4.2 Maps and citations for the SSSIs, have been provided separately in Appendix B of the World Heritage Site nomination. Private agreements between English Nature and landowners will not be provided, but may be obtained if required, subject to agreement with the relevant landowner.

A3-4.3 Some of the areas of SSSI within the Site receive additional protection under European law, as candidate Special Areas of Conservation and Special Protection Areas. Further details are given in Appendix 3 (section A3-9), and Appendix 5.

A3-5 GEOLOGICAL CONSERVATION REVIEW SITES

A3-5.1 Geological Conservation Review Sites have been identified as being of national or international importance for earth sciences following a comprehensive national review carried out between 1977-1990. They are the most important earth science sites in Great Britain, and receive protection through their designation as Sites of Special Scientific Interest. Further information on Geological Conservation Review Sites within the Site has been provided as Appendix B to the main World Heritage Site nomination, and is summarised within Appendix 1 of this management plan.

A3-6 AREA OF OUTSTANDING NATURAL BEAUTY, HERITAGE COAST, AND OTHER COUNTRYSIDE PLANS

A3-6.1 Countryside management in relation to the Site is co-ordinated within a context of wider landscape and countryside designations.

A3-6.2 Areas of Outstanding Natural Beauty (AONB), are statutory national designations made under the National Parks and Access to the Countryside Act, 1949 whose primary aim is to conserve the natural beauty of the area. The Countryside and Rights of Way Act 2002 requires the preparation of statutory management plans for every AONB and places a duty on 'relevant' authorities to have regard to the purpose of conserving and enhancing the natural beauty of the AONB. Heritage coasts were defined by the Countryside Agency, a national body, with local authorities, to secure effective management of nationally important coastal landscapes.

A3-6.3 AONB partnerships are developing proposals for countryside management of the wider area of Dorset and East Devon, surrounding and including the World Heritage Site. Their purpose is to conserve and enhance natural beauty, to take into account social and economic needs of local communities and to provide for appropriate enjoyment of the area. The Isle of Portland lies outside AONB designation and has a dedicated ranger service. Further information on the key initiatives is as follows.

A3-6.4 The East Devon AONB Service (part of the East Devon Coast and Countryside Service) was established in September 2002. The East Devon AONB Partnership is constituted from elected members of the County and District Council, the Countryside Agency and other interests.

A3-6.5 Policies guiding the management of the AONB are set out in the second draft of the East Devon Area of Outstanding Natural Beauty Draft Management Plan entitled "Making the Landscape Work". This Plan is currently being reviewed in response to the requirements of the CROW Act and to take account of the creation of the new AONB team to deliver it. This will be published by March 2004.

A3-6.6 The Dorset AONB partnership was established in 2002. It is an alliance of 17 organisations including local authorities, government organisations and local bodies, and is supported by an AONB team who are preparing the AONB management plan. This will be completed by March 2004. The AONB structure includes heritage committees for West Dorset, Purbeck and North Dorset. The AONB management plan will include the incorporation updating of existing plans and policies for the heritage coasts in West Dorset and Purbeck.

A3-6.7 The Purbeck Heritage Strategy was published in 1995 setting out policies for joint action by a wide range of bodies with an interest in Purbeck. The policies deal with the environment, tourism and transport, and are designed to 'Keep Purbeck Special'. Implementation is overseen by the Purbeck Heritage Committee. This is a joint committee of Purbeck District Council and Dorset County Council, together with representatives of interested organisations, and has an independent chairman.

A3-6.8 The Committee is supported by an officer based within the Dorset AONB team. The Committee also receives advice from the Purbeck Forum, through which many other organisations, including parish councils, businesses and voluntary organisations, contribute ideas. The Heritage Strategy is revised every five years.

A3-6.9 A Weymouth and Portland Ranger Service is provided through Dorset Countryside through a partnership between Weymouth and Portland Borough Council, Dorset County Council, English Nature, and others. Their work is aimed at developing alternative tourism resources in the local area whilst ensuring the sustainable use and management of the area's natural heritage.

A3-6.10 Copies of the following documents were submitted to UNESCO as Appendices to this Management Plan:

- Making the Landscape Work East Devon Area of Outstanding Natural Beauty Draft Management Plan, 1998
- West Dorset Heritage Coast Issues Report, 1995
- Purbeck Heritage Strategy, 1997 (Keeping Purbeck Special: A strategy for the Purbeck Heritage Area)

- 2000 onwards: charting a new course for the Purbeck Heritage Committee.

A3-7 SHORELINE MANAGEMENT PLANS

A3-7.1 Shoreline management plans have been promoted on a national basis by the Department for Environment, Food and Rural Affairs as the means to ensure a strategic approach to coast defence. They aim to ensure that coastal protection and flood defence is implemented in a way that takes due regard for the overall natural processes operating on the coast. The Dorset and East Devon coast is covered by three plans:

- Lyme Bay and South Devon Shoreline Management Plan
- Portland Bill to Durlston Shoreline Management Plan
- Poole and Christchurch Bay Shoreline Management Plan

A3-7.2 A summary of the SMP policies for each management unit within the Site is shown in Maps 4.1-4.6 within this Management Plan.

A3-8 LANDOWNERS' MANAGEMENT PLANS

A3-8.1 A number of landholding bodies have prepared management plans for parts of the World Heritage Site which they own.

A3-8.2 The National Trust maintains plans to guide the management of its land holdings, normally dealing with issues such as wildlife, landscape and public access. In West Dorset, Purbeck and Studland these were updated in 2000-2001. The Trust anticipates completing its management plan for in 2000. Plans are also prepared on a regional or sub-regional basis dealing with certain specialist topics such as education and interpretation.

A3-8.3 The National Trust has the power to declare areas of its land inalienable. Those areas must then remain under the Trust's protection in perpetuity, unless the UK Parliament specifically authorises their compulsory purchase from the Trust by another body such as a public authority. One third of the Dorset coast and one fifth in East Devon now has this protection.

A3-8.3 The Ministry of Defence (MoD) prepares plans for the management of its land holdings, including specific plans for nature conservation. It consults with English Nature and the relevant authorities on specific projects, and each MoD establishment has a conservation committee which meets twice a year and is comprised of relevant experts.

A3-8.4 The Dorset and Devon Wildlife Trusts have coastal wildlife reserves at Weston Mouth and the Otter Estuary (Devon) and at West Bexington and Kimmeridge (Dorset). For each reserve there is a management statement or plan setting out aims and objectives, and the intended method of managing the reserve. The Trusts have agreements with the landowner of each reserve.

A3-8.5 Some private landowners prepare plans for the stewardship and use of their land, with varying degrees of consultation with public agencies and varying levels of commercial confidentiality. A number of landowners have entered into Countryside Stewardship agreements, which involve the preparation of ten-year management agreements for conservation purposes (and in places public access) which receive payments via the Department for Environment, Food and Rural Affairs.

A3-9 EUROPEAN AND INTERNATIONAL WILDLIFE DESIGNATIONS

A3-9.1 The European Community Habitats Directive requires the establishment of a series of high quality Special Areas of Conservation (SACs) across Europe aimed at conserving 169 habitat types and 623 species. The Habitats Directive is implemented in the UK through the Conservation (Natural Habitats, &c.) Regulations 1994 and the Conservation (Natural Habitats, &c.) (Northern Ireland) Regulations 1995. This legislation requires that a scheme of management is agreed for all marine SACs. Regulation 48 of the Directive requires that an 'Appropriate Assessment' is made for all plans and projects which might affect the features of interests within SACs and SPAs. The conservation objectives for some features within such sites make significant reference to the maintenance of the natural geomorphological processes that create the wildlife features for which the sites are designated.

A3-9.2 The Government is bound by the European Commission Directive on the Conservation of Wild Birds (79/409/EEC). Under this directive the Government has to designate Special Protection Areas to conserve the habitat of certain rare or vulnerable birds (listed under the directive) and regularly occurring migratory birds. It has to avoid any significant pollution or disturbance to or deterioration of these designated sites.

A3-9.3 SPAs and SACs together form the European wide network of sites known as Natura 2000.

A3-9.4 The UK Government signed the International Convention on Wetlands of

International Importance especially as Waterfowl Habitat (the Ramsar Convention) in 1976. Under the Convention the Government is committed to designate 'Wetlands of International Importance' (Ramsar sites) and to use the wetlands within its territory wisely.

A3-9.5 The following European and international sites cover parts of the Site

- Exe Estuary Special Protection Area
- Exe Estuary Ramsar Site
- Sidmouth- West Bay candidate Special Area of Conservation
- Chesil and the Fleet candidate Special Area of Conservation, Special Protection Area and Ramsar Site
- Isle of Portland to Studland Cliffs candidate Special Area of Conservation
- St Alban's Head to Durlston Head candidate Special Area of Conservation.

A3-9.6 Copies of the citation details and maps of the SPAs, SACs and Ramsar Sites have been provided within the nomination appendices (Appendix M), and the citation details are also included in Appendix 5. Chesil and the Fleet European marine site management scheme is still under discussion and is available in its latest published draft form on request.

A3-10 NATIONAL NATURE RESERVES

A3-10.1 National Nature Reserves (NNRs) are sites which have been declared by English Nature or its predecessors under Section 19 of the National Parks and Access to the Countryside Act 1949 or Section 35 of the Wildlife and Countryside Act 1981. They are either owned or controlled by English Nature or held by approved bodies such as the Wildlife Trusts.

A3-10.2 Axmouth to Lyme Regis Undercliffs is a National Nature Reserve, which lies wholly within the Site. The Reserve is owned and managed by English Nature, and a management plan for the Reserve is currently under revision.

A3-11 DORSET COAST STRATEGY

A3-11.1 The Dorset Coast Strategy was agreed by the Dorset Coast Forum in May 1999. It aims to set out a consensus view on the way in which the members of the Dorset Coast Forum will work together to improve the planning and management of the Dorset Coast. The Strategy's purposes are:

- establishing integrated policy for the Dorset Coast
- establishing guidelines for more detailed coastal management plans
- identifying strategic opportunities for resource development
- engaging and developing participation of a wide range of partners
- developing a co-ordinated approach to strategy implementation
- identifying solutions for sustainable coastal development and management
- evaluating success and the reporting of results throughout Europe.

A3-11.2 The Strategy is now being implemented by the Forum through a series of working groups, and the progressing of the World Heritage nomination is supported by the policies within it.

A3-12 THE ATLANTIC LIVING COASTLINES PROJECT

A3-12.1 In Devon (and also covering the neighbouring county of Cornwall) a framework was produced in June 2000 for integrated coastal zone management by the Atlantic Living Coastlines Project.

A3-12.2 There was extensive consultation with coastal zone managers and practitioners, with particular attention being focused on participation techniques, frameworks and networks for effective coastal zone management, sustainability indicators, information exchange and the interrelationship of coastal plans and projects.

A3-13 ESTUARY MANAGEMENT PLANS

A3-13.1 Estuary management plans are produced by local management groups, to guidelines prepared by English Nature. The only estuary with such a plan which covers part of the Site is the Exe Estuary, however the overlap is very slight.

A3-14 PORT MANAGEMENT PLANS

A3-14.1 Part of the Site overlooks the harbour authority areas of Portland Port and Weymouth Harbour. Within these areas the harbour authorities have statutory authority to provide port and harbour facilities, and to regulate and manage navigation. The World Heritage management issues in relation to port operations are limited, and are discussed in the management plan.

A3-14.2 Portland Harbour has recently been established as a commercial port, operated by Portland Port Ltd., following a long previous

history as a military harbour operated by the Royal Navy.

A3-14.3 In December 1997, the Portland Harbour Revision Order, 1997 (Statutory Instrument 1997 No 2949) was approved, empowering Portland Port Ltd as the statutory Harbour Authority for Portland Harbour and its surrounds with effect from 1 January 1998.

A3-14.4 The Order is noteworthy for a number of unusual provisions which it makes including:

- providing powers for the Harbour Authority to act 'for the conservation of the harbour's flora, fauna and geological and physiographic features of special interest;
- a commitment to the publication of a management plan;
- the formation of a consultative committee.

A3-14.5 Port and harbour authorities are also required to prepare waste management and emergency plans

A3-14.6 An initial management statement for the harbour has been published by the Portland Harbour Authority, and is available on request.

A3-15 LOCAL TRANSPORT PLANS

A3-15.1 Planning for investment in transport facilities and services is guided by Local Transport Plans prepared by the local highway authorities. For the Site and its hinterland, Dorset and Devon County Councils are the highway authorities.

A3-15.2 Local Transport Plans review the authorities' transport strategies and indicate how they will meet government objectives of widening travel choices, protecting the environment and health, and reducing pollution.

A3-15.3 The plans relevant to the Site are:
- Dorset Local Transport Plan 2000-2005, July 2000
- Devon Local Transport Plan 2001-2006, July 2000.

A3-15.4 Annual Progress Reports are produced each July and these also include a Supplementary bid for the coming financial year.

A3-16 EMERGENCY PLANS

A3-16.1 Both Devon and Dorset County Councils have prepared plans for the clearance of coastal pollution. Additional plans have been prepared by the County Councils which setout how waste material arising from coastal incidents will be dealt with. These documents sit within a hierarchy of plans from the national to the local level.

A3-16.2 At the local level, all District Councils within the Site except Purbeck District Council have prepared Oil Pollution Response Plans. The harbour authorities for Weymouth and Portland Harbours have also prepared oil spill plans, as they are required to do under International Convention. The harbour plans are awaiting approval by the UK Maritime and Coastguard Agency.

A3-16.3 The emergency plans are large documents produced in small quantities. Copies are available for inspection at the offices of Dorset and Devon County Councils, and can be made available separately if required.

A3-17 LOCAL ENVIRONMENT AGENCY PLANS

A3-17.1 The last of the Environment Agency Local Environment Agency Plans (LEAPs) were published in 2001. The LEAPs have since been superseded by an internal process of prioritising actions to deliver our vision - "Making it Happen". This is a 5 year forward look at what the Environment Agency would like to achieve for the environment, using the LEAPs actions as a guide and focussing very much on environmental outcomes. The Environment Agency is also producing more detailed action plans for particular priority areas which include:
- Salmon Action Plans
- Catchment Abstraction Management Strategies
- Catchment Flood Management Plans

A3-18 LANDSCAPE ASSESSMENTS

A3-18.1 Landscape assessments are a structured way to understand landscapes. Through the assessment geographical areas, usually referred to as landscape character areas, are identified. These have an internally consistent landscape, which can be defined through a list of key characteristics. This list can, and indeed should, include the emotional and aesthetic responses, as well as the physical features.

A3-18.2 Landscape Assessments have two main functions. First they provide a record of the landscape at a particular time, and secondly, by identifying the characteristics of a particular landscape, the assessment can identify actions needed to conserve the landscape as well as monitoring the results of any particular change in land management.

A3-18.3 The Site has been the subject of several landscape assessments, as follows:

- Dorset County Landscape Assessment 1993 an assessment by Landscape Associates for Dorset County Council and the Countryside Commission
- The Dorset Downs Heaths and Coast Landscape (1994), an assessment of the Dorset Area of Outstanding Natural Beauty
- A New View of Dorset by Richard Burden and Gordon Le Pard 1996, a revision of the Dorset County Assessment, intended for a wider audience.
- A Handbook of Landscape Management in Dorset 1997. The characteristics of each landscape character area, and the management guidance for those areas extracted from A New View of Dorset, aimed at all those who have a role in managing the Dorset landscape.
- The Devon Landscape: An Appraisal of Devon's Landscape at the beginning of the 21st Century was published in 2002. Divides the county into a number of landscape character zones which are used to inform decisions on planning and land management.

A3-19 THE SOUTH WEST COAST PATH NATIONAL TRAIL

A3-19.1 The South West Coast Path is a 613 mile National Trail which gives almost unbroken access to the coastline around England's south-west peninsula from Poole in Dorset to Minehead in Somerset. It is managed for the Countryside Agency by local authorities, the National Trust and private landowners. Co-ordination is provided by a South West Coast Path Team, funded by the Countryside Agency.

A3-19.2 A strategy *'More than just a path'* was adopted in 1997 which sets out a vision, standards and actions for the period to 2005 to guide the management, promotion and conservation of the path and the coastal corridor through which it passes.

A3-19.3 The Coast Path Team have produced a manual containing more detailed guidance notes for management of the path, and a marketing strategy. Copies of the Coast Path Strategy are available on request.

A3-20 THE JURASSIC COAST PROJECT

A3-20.1 The Jurassic Coast Project aims to demonstrate how Dorset's coastal geology can be used to promote special interest and sustainable 'geo-tourism'. The project is a partnership between local authorities, English Nature, the South West England Regional Development Agency, the Single Regeneration Budget and the EU KONVER II fund, and is supported by the Dorset Coast Forum. The project has produced a Jurassic Coast Strategy (1999) provided as Appendix P of the main World Heritage nomination. This sets out priorities for action in relation to earth science conservation, interpretation, education and tourism and marketing. It has also instigated a number of related initiatives including the Fossil Collecting Code of Conduct for the West Dorset Coast (See Appendix 7). [NOTE: The Jurassic Coast Project has now been absorbed within the work of the World Heritage Site Team].

Appendix 4: Planning Policies affecting the Site

This appendix contains details of planning policies relevant to the Site from the following land-use plans which affect the Site. Codes for each to the plans are used to identify the different policies.

- BOURNEMOUTH, DORSET AND POOLE STRUCTURE PLAN 2000 (Code: BDP 00)
- DEVON STRUCTURE PLAN 1999 (FIRST REVIEW) (Code: Dev)
- WEST DORSET DISTRICT LOCAL PLAN 1998 (Code: WD)
- WEYMOUTH & PORTLAND LOCAL PLAN 1997 (Code: W&P)
- DORSET MINERALS AND WASTE LOCAL PLAN 1998 (Code: M&W)
- PURBECK DISTRICT LOCAL PLAN REVISED DEPOSIT DRAFT 1999 (Code: P99)
- EAST DEVON DISTRICT LOCAL PLAN 1997 (Code: ED)
- DEVON MINERALS LOCAL PLAN 1994 (Code Dev M&W)

The adopted plans are currently in the course of being reviewed (see appendix 3), and the emerging successor plan policies, whilst not yet formally adopted, are material planning considerations in the determination of planning proposals.

This appendix is intended as a summary and is not a definitive statement on planning policy in relation to the World Heritage Site. Further information on planning policy should be sought from the relevant local planning authority.

A4-4.1 LANDSCAPE PROTECTION POLICIES

A4-4.1a Areas of Outstanding Natural Beauty Policies

Environment Policy G (BDP 00)
Within the Areas of Outstanding Natural Beauty priority will be given to the conservation of the natural beauty of the landscape. Proposals for major development should be allowed only if it is evident that the benefit arising from the proposal clearly outweighs the landscape value and there is no acceptable alternative.

Policy C4 (Dev)
Areas of Outstanding Natural Beauty
In designated Areas of Outstanding Natural Beauty, the conservation and enhancement of their natural beauty will be given priority over other considerations. Within these areas, development will only be provided for where it would support their conservation or enhancement or would foster their social and economic well being provided that such development is compatible with their conservation. Particular care will also be taken to ensure that any development proposed adjacent to such areas does not damage their natural beauty.

Policy L1 (WD)
Area of Outstanding Natural Beauty
Within the designated Area of Outstanding Natural Beauty, priority will be given to the conservation of the natural beauty of the landscape. Except for specific allocations in the Local Plan, development in the Area of Outstanding Natural Beauty will only be permitted where it will not result in harm to the natural beauty of the area. Particular attention will be paid to the design, external appearance and location of all proposed development in this area.

Policy CN1 (W&P)
Protection of Areas of Outstanding Natural Beauty
Proposals for development within the Area of Outstanding Natural Beauty will only be permitted where it can be demonstrated that they would conserve the natural beauty of the landscape. Where any development is to be permitted, it should be sited and designed so as to be in keeping with the surrounding area and with any existing development.

Policy CA6 (P99)
Areas of Outstanding Natural Beauty
Development affecting the Dorset Area of Outstanding Natural Beauty will only be permitted if it does not detract from the natural beauty of the landscape or special character of the area. Major industrial or commercial development affecting the AONB will not be permitted unless there is a proven national need for such development in the particular location proposed and a lack of alternative sites.

Policy EN5 (ED)
Development in or Adjacent to AONB
Within the East Devon or Blackdown Hills Areas of Outstanding Natural Beauty the conservation of the natural beauty of the landscape will be given priority over other considerations. Development will not be permitted unless having regard to the economic and social well being of the area:

(1) It would enhance or not harm its character;
(2) In the case of major industrial or commercial development, there is proven national interest and there is no alternative site;
(3) Its design and external appearance is in harmony with its surrounding.

A4-4.1b Heritage Coast Policies

Environment Policy J (BDP 00)

Within the areas defined as Heritage Coast, and the undeveloped coast of the Isle of Portland, priority will be given to conserving natural beauty, biodiversity and geology, whilst facilitating and enhancing, where consistent with these aims, public access, enjoyment and appreciation of the coastal zone.

Policy C7 (Dev)
The Coast
Within the Coastal Preservation Area, development, other than that of a minor nature, will not be permitted except where it is required: for the benefit of the community at large, in connection with public access for informal recreation, or for the purpose of agriculture or forestry and only when such development cannot reasonably be accommodated outside the protected areas. Such development will only be permitted when it would not detract from the unspoilt character and appearance of the coastal area.

Policy L2 (WD)
Heritage Coast Protection
Within the areas defined as Heritage Coast the following policies will apply in considering planning applications:

(i) Development which would have an adverse effect on the character or natural beauty of the Heritage Coast will not normally be permitted;
(ii) The provision of car parking and other recreational facilities will be permitted only where an increase in the number of visitors is compatible with the retention of the unspoilt character of the area and the maintenance of the ecological value of the area.
(iii) Provision will be made for public access to the coast and countryside, such provision will have regard to the effect on the landscape, the need to safeguard farmland and sites of ecological importance, the interests of landowners and farmers and the amenity of local residents.

Policy CN3 (W&P)
Conservation and Enhancement of Heritage Coast and the Portland Coastline
Proposals for development within the Heritage Coast and the coastal zone of Portland, as defined on the Proposals Map, will only be permitted where it can be demonstrated that they would conserve, protect and enhance the natural beauty of the coast, including its terrestrial, littoral and marine flora and fauna, and any features of architectural, historical or archaeological interest. Development will only be permitted where it would not be visually intrusive in views of the foreshore or the skyline or along stretches of undeveloped coast and will either:

(i) Lead to improved public access to the coast which is compatible with landscape and nature conservation interests; or
(ii) Facilitate and increase public understanding and enjoyment of the coast without damaging its special qualities; or
(iii) Involve social or economic development requiring a coastal location that will conserve and enhance the natural beauty and heritage features of the coast.

Policy CA7 (P99)
Purbeck Heritage Coast
Development within the Purbeck Heritage Coast will not be permitted unless:

(i) Its location within the defined area is essential;
(ii) It would not adversely affect the undeveloped character of the coast, the natural beauty of the coastal landscape, or the ecological or geological interest of the coast.
(iii) It would not detract from the quiet enjoyment of the coast for informal recreation.

Policy ENA (ED)
Coastal Zone
In the coastal zone defined on the proposals map development will only be permitted if:

(1) It is within the defined built up area boundary of a settlement or meets the criteria in Policy TO6 in respect of proposals at Devon Cliffs Holiday Park, Ladram Bay Caravan Park or Beer Head Caravan Park;
(2) Within the Coastal Preservation Areas it complies with the structure plan Policy CD5;
(3) It is not within an area where expensive engineering works may be required to prevent flooding, erosion by the sea or landslips.

A4-4.1c General Landscape Protection Policies

Environment Policy F (BDP 00)
The quality and diversity of the Dorset landscape should be maintained and enhanced through:

(i) The conservation and enhancement of natural and manmade features of the landscape that contribute to the character of Dorset;
(ii) Respect for the particular characteristics of the local landscape and the determination of development proposals; and
(iii) The encouragement of design in the built environment which will result in a benefit in environmental and landscape terms

Policy C2 (Dev)
Landscape Character and Local Distinctiveness

The quality of Devon's landscape and its distinctive local characteristics should be maintained and enhanced. In providing for new development, particular care should be taken to conserve those features that contribute to local distinctiveness including:

1. The setting of settlements and buildings within the landscape;
2. The patterns of woodlands, fields, hedgerows, and tree features;
3. The special qualities of rivers, estuaries and other water features;
4. Historic landscapes.

Policy C6 (Dev)
Areas of Great Landscape Value
In areas of great landscape value development should not detract from the particular landscape qualities and characteristics that have led to the designation of the area.

Policy L4 (WD)
Land of Local Landscape Importance
Within the areas identified as being of local landscape importance development will not be permitted which would harm the special features and qualities of local importance or detract from any specific benefits which the land provides and for which it is identified as being of local landscape importance.

Policy CN2 (W&P)
Areas of Local Landscape Importance
Proposals for development within the Area of Local Landscape Importance as defined on the Proposals Map will only be permitted where it can be demonstrated that no significant harm would be caused to the intrinsic landscape quality of the area. Where any development is to be permitted it should be sited so as to minimise its impact on the landscape and its design should be in keeping with the surrounding area and with any existing development.

Policy QL22 (P99)
Landscape Character
Development will be permitted provided that:

(i) It can be accommodated without detriment to the distinctive landscape qualities of the area within which it is located.
(ii) Its visual impact is in keeping with the local character of the area.
(iii) There is sufficient landscaping to enable the development to integrate successfully into the local environment.

Integration into the landscape should be achieved without the need for unnatural landscape features, such as artificial bunds, or the breaking of an important skyline.

Policy QL23 (P99)
Local Features and Landforms
Development will be permitted provided that it retains and does not detract from local features, such as the topography, waterways and ancient boundaries, which have helped define the pattern of development in the area, and make a material contribution to the character of the area.

Policy QL24 (P99)
Important Views
Development will not be permitted where it would disrupt a view from a public place which forms part of the distinctive character of the area.

Policy ENB (ED)
Areas of Great Landscape Value
In areas defined as being of great landscape value priority will be given to the conservation of the landscape. Development in such areas will only be permitted where it would not adversely affect their special landscape quality and character. Development should not have a detrimental effect on skylines or important views and should incorporate and where possible enhance important landscape features.

Policy ENC (ED)
Land of Local Landscape Importance
In areas defined as being of local landscape importance permission will not be granted for development except for recreational uses which retain the open character for the area.

A4.2 NATURE CONSERVATION AND ENVIRONMENTAL PROTECTION POLICIES

A4-4.2a Internationally Protected Sites

Environment Policy A (BDP 00)
Proposals for development which may adversely affect the integrity of a candidate or designated Special Area of Conservation, “potential” or classified Special Protection Area, or Ramsar site, will be allowed only if there is no alternative solution and if there are imperative reasons of overriding public interest.

In addition proposals for development which may adversely affect a priority natural habitat or priority species will be allowed only if they are necessary for reasons of human health or public safety, or other imperative reasons of overriding public interest.

Policy CN4 (W&P)
Protection of Designated Sites of National and International Nature Conservation Importance
Development that would either directly or indirectly destroy or have an adverse impact on the designated Site of Special Scientific Interest will not be permitted. Development that would

adversely affect the integrity of a site which is either a classified or potential Special Protection Area, a candidate or designated Special Area of Conservation, or a Ramsar site will not be permitted unless there are no alternative sites or solutions and the proposed development is required for imperative reasons of over-riding public interest, including social and economic considerations, sufficient to outweigh the ecological importance of the site's designation. Where a site hosts a priority natural habitat, type or species as defined in the habitat's directive, the only consideration of public interest which will be taken into account will be those related to human health, public safety or benefits of primary importance to the environment.

Policy CA1 (P99)
Internationally Important Nature Conservation Sites
Development which would have an impact, either directly or indirectly, on a Ramsar Site, potential or classified Special Protection Area, or candidate or designated Special Area of Conservation will be subject to the most rigorous examination. Such development will not be permitted unless:

(i) The development, either individually or in combination with other proposals, will not adversely affect the integrity of the site in terms of the conservation objectives for which it was designated; or
(ii) Where the site's integrity will be affected and the site does not host a priority habitat or species, there are imperative reasons of overriding public interest, including those of an economical or social nature, and there are no acceptable alternative solutions; or
(iii) Where the site's integrity will be affected and the site hosts a priority habitat, type or species, development is necessary for reasons of human health, public safety, or for beneficial consequences of primary importance for the environment and that there are no acceptable alternative solutions.

Where such development is allowed, conditions or planning obligations will be used to secure all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected.

Policy EN10 (ED)
Sites of Special Scientific Interest
Development applications which may impact on candidate and designated Special Areas of Conservation; potential and classified Special Protection Areas and proposed or listed Ramsar sites, will be subject to the most rigorous examination. Development applications likely to adversely affect the integrity of these sites will only be permitted if there are no alternative solutions and there are imperative reasons of overriding public interest. Where a site hosts a priority habitat or species (as listed in the EEC Habitats Directive) development within these sites and areas will not be permitted unless there are other material factors of human health and public safety or beneficial consequences or primary importance for the environment, or that the development is in the urgent national interest, and the absence of alternative sites for the development outweighs the importance of the international designation. Development which significantly affects, directly or indirectly, a designated National Nature Reserve or Site of Special Scientific Interest will be subject to special scrutiny. Where such development is likely to have an adverse effect on the site it will only be permitted if the reasons for the development outweigh the value of the site itself and the national policy to safeguard the nature conservation value of the national network of such sites.

Where development meets the above criteria and is to be permitted on a Site of Special Scientific Interest, adequate compensatory habitat enhancement or creation schemes will be required and/or measures will be taken to ensure that the impacts of the development on valued natural features of wildlife have been mitigated to their fullest practical extent.

A4-4.2b Nationally Protected Sites

Policy C14 (Dev)
The Conservation of Important Sites and Features Sites of Special Scientific Interest, National Nature Reserves and Marine Nature Reserves will be protected from development which would harm their nature conservation interest. Special Protection Areas, Special Areas of Conservation and Ramsar sites including potential Special Protection Areas and candidate Special Areas for Conservation, will be protected from development that would conflict with their conservation objectives.

Policy C17 (Dev)
The Conservation of Protected Species
Development likely to have an adverse effect on a specially protected species should only be permitted where appropriate measures are taken to secure its protection.

Policy L10A (WD)
Protection of Sites of International Importance for Nature Conservation
Development that is likely to have an adverse effect on the integrity of a designated or potential Ramsar Site, Special Protection Area or Special Area of Conservation, either by itself or in combination with other proposals for the area, will only be permitted if there is no alternative solution and there are reasons of overriding public interest why the development should proceed.

Where such sites host a priority species or habitat planning permission will be granted only if required for human health or safety considerations or there are benefits of primary importance to the environment.

Policy L10B (WD)
Protection OF Statutory Nature Reserve and Sites of Special Scientific Interest (Sssi)
Development that is likely to have a significant adverse effect upon a National Nature Reserve (NNR) or Site of Special Scientific Interest (SSSI), will not be permitted unless the development can be subject to conditions that will prevent damaging impacts on wildlife habitats or important physical features.

Where development is permitted within a NNR or SSSI, or is likely to affect such a site, the District Council will attach any necessary planning conditions or seek planning agreements to protect the scientific interest of the site.

Environment Policy B (BDP 00)
Proposals for development which may adversely affect Sites of Special Scientific Interest or National Nature Reserves will be allowed only if it is evident that the benefits arising from the development or land-use clearly outweigh the intrinsic nature conservation or scientific interest of the site itself.

Policy CN7 (W&P)
Species Protection
On sites supporting special protected species the Borough Council will not permit development unless provision is made for the retention of species in their existing habitat, or, in exceptional circumstances, their safe removal to suitable new locations.

Policy CA2 (P99)
Sites of Special Scientific Interest
Development which would have an adverse affect on the nature conservation interest of a Site of Special Scientific Interest (SSSI), either directly or indirectly, will not be permitted unless:

(i) The social, economic and/or environmental benefits to the community from the development clearly outweigh the damage to the nationally important ecological or geological value of the site: or
(ii) The effect would be minor and would not result in a significant reduction to the ecological or geological interest of the site: or
(iii) It would result in only short-term damage to the site's ecological or geological interest which would recover within a reasonable timescale: and
(iv) In all cases, there are no acceptable, less damaging, solutions.

Where habitat is destroyed, compensatory measures must be undertaken to secure at least an equivalent area of similar habitat type (or types) adjacent to or in close proximity to, the site.

Policy CA5 (P99)
Protected Species
Development that would have an adverse effect on a site supporting a legally protected species will not be permitted unless adequate measures have been taken to:

(i) Reduce disturbance to the species to a minimum;
(ii) Ensure that individual members of the species are not harmed;
(iii) Ensure that, in all relevant cases, discrete colonies of the species affected can be sustained.

Policy EN13 (ED)
Species Protection
Development which would have an adverse effect upon species protected by law will not be permitted.

A4.2c Locally Protected Sites

Environment Policy C (BDP 00)
Proposals for development which may adversely affect Sites of Nature Conservation Interest or Regionally Important Geological and Geomorphological sites will be allowed only if it is evident that the benefits arising from development clearly outweigh the intrinsic nature conservation or scientific value of the site itself.

Environment Policy D (BDP 00)
Proposals for development which may result in harm to a specially protected species or its habitat will be allowed only if there is no alternative solution and if there are imperative reasons for overriding public interest.

Policy L11 (WD)
Protection of Local Sites of Nature Conservation Interest(SNCIs)
The District Council will seek to safeguard the nature conservation interest in Local Sites of Nature Conservation Interest. Development will not be permitted if it is likely to cause serious damage to that nature conservation interest. Where development of a SNCI is permitted the District Council will attach planning conditions or seek planning agreements to retain, enhance or extend wildlife habitats.

Policy CA3 (P99)
Non-Statutory Nature Conservation Sites
Development that would have a significant adverse affect on a non-statutory site of

substantive nature conservation value will not be permitted unless:

(i) The social, economic and/or environmental benefits to the community from the development or land use clearly outweigh the damage to the locally important nature of conservation value of the site; and
(ii) In appropriate circumstances, compensatory habitat provision or management is provided.

Policy CA4 (P99)
Regionally Important Geological/Geomorphological Sites
Development that would have a significant adverse affect on a Regionally Important Geological and/or Geomorphological Site (RIGS) will not be permitted unless:

(i) The existing geological or geomorphological features for which the site is important can be preserved in situ as part of the development scheme; or
(ii) Exposures of comparable geological interest can be created elsewhere on or off the development site (where the geological interest is in the form of an exposure); or
(iii) A substantial substitute site of comparable geological or geomorphological interest can be identified, in consultation with the local RIGS group; and
(iv) There is adequate access to the geological or geomorphological features to enable teaching and/or research.

Policy EN11 (ED)
Protection of Local Nature Reserves, County Wildlife Sites and Regionally Important Geological Sites
Developments or land use changes likely to have a significant adverse effect, either directly or indirectly, on a Local Nature Reserve, county wildlife site, river or corridor or Regionally Important Geological Site identified in the local plan, or identified in its lifetime, will only be permitted if the reasons for the proposal clearly outweigh the intrinsic nature conservation/scientific value of the site. Where development is permitted on such sites adequate compensatory habitat enhancement or creation schemes will be required and/or measures required to be taken to ensure that the impacts of the development on valued natural features and wildlife have been mitigated to their fullest practical extent.

Policy EN14 (ED)
Access to Sites of Nature Conservation Interest
The Council will seek to ensure through access and management agreements, the control of development and support for habitat creation schemes that all residents have reasonable access to Sites of Nature Conservation Interest where this would not damage that interest. Wherever practical provision will be made for disabled access to sites of wildlife value.

A4-4.2d General Environment Protection and Nature Conservation Policies

Environment Policy E (BDP 00)
The biodiversity of Dorset will be maintained and enhanced, particularly through:
(i) The re-establishment of 500 hectares of lowland heath, adjacent or in close proximity to existing heathlands; and
(ii) The replacement of appropriate habitats in situations where damage or loss occurs as a result of development.

Policy (Dev)
C13 Conserving Devon's Biodiversity and Earth Science Diversity
The bio-diversity and earth science resource of Devon's natural environment should be sustained and, where possible, enhanced. Its diversity and distinctiveness should not be diminished.

Policy C15 (Dev)
In addition to sites included within the terms of Policy C14 local plans should define sites and features of nature conservation importance including landscape features which provide wildlife corridors, links or stepping stones between habitats.

Policy L12 (WD)
Nature Conservation
The District Council will have due regard to the needs of nature conservation in the consideration of all development proposals. Where development is approved on sites on which there are features of nature conservation interest including geological features the District Council will seek to safeguard these features and incorporate them in the development scheme by agreement or planning conditions.

Policy CN5 (W&P)
Protection of Sites of Nature Conservation Interest
Development which would affect a Site of Nature Conservation Interest shown on the Proposals Map will only be permitted where it would cause no significant harm to the nature conservation interest of the site, judged against the relative local or national importance and rarity of the plants, animals or habitats within the site.

Policy CN6 (W&P)
Nature Conservation And Mitigating Measures
When considering different proposals the effects upon wildlife, flora and geological features will be taken into account. Where development proposals are acceptable in principle, they should

include measures to mitigate their effects upon features of nature conservation value wherever appropriate.
Where damage is unavoidable the Borough Council will, where appropriate, seek the provision of replacement habitats or features.
The Council will attach conditions relating to the provision of mitigation and/or future land use management measures where these are necessary to remedy the impact of development, or to ensure the long-term survival of a site of nature conservation value. Where such management is desirable but the imposition of conditions would be inappropriate, the Council will seek to enter into a planning agreement covering the long-term conservation management of sites.

Policy QL31 (P99)
Nature Conservation and Amenity Features
Development will be permitted provided that any features of nature conservation value (which are not subject to a statutory or non-statutory nature conservation designation or otherwise of substantive nature conservation value) and/or features of amenity interest on the development site can be largely retained and sympathetically incorporated into the overall design of the scheme.

Policy EN12 (ED)
Other Wildlife Habitats and Features
Wherever possible, sites supporting important wildlife habitats or features not otherwise protected by policies will be protected from development proposals which would result in the loss of or significant damage to their nature conservation value.

A4.3 MINERALS/ QUARRYING

Policy 4: (M&W)
Relating to Applications Within Preferred Areas (Minerals Only)
Planning applications for minerals on land within the preferred areas will be permitted providing all the following criteria are met::

(i) Proposals affecting an AONB, the Heritage Coast, or an Area of Acknowledged Landscape Importance, make adequate provision to alleviate the impact of the development on the landscape, and ensure that restoration and after-use is appropriate to the landscape character of the area;
(ii) Proposals can be carried out without significant adverse effects on:

(a) Listed Ramsar sites, potential or classified Special Protection Areas of candidate or designated Special Areas of Conservation. Where a proposal not directly concerned or necessary to the management of the site for nature conservation would have significant effects on that site and would adversely affect its integrity in nature conservation terms the application for planning permission will be assessed in accordance with international wildlife nature conservation obligations, and will have regard to possible alternative solutions, any priority habitats or species hosted on the site, any imperative reasons of overriding public interest, and any human health or safety considerations of benefits of primary importance to the environment.
(b) Sites of Special Scientific Interest, National Nature Reserves, Marine Nature Reserves or species specially protected under the Wildlife & Countryside Act 1981 or other relevant national legislation. Where a proposal would have significant adverse effects on such a site the application for planning permission will be assessed having regard to whether such effects can be alleviated and whether the importance of the development is sufficient to override the site's nature conservation interest.

(iii) Proposals include measures to alleviate to an acceptable degree any significant adverse effects they would have on: Sites of Nature Conservation Interest, Regionally Important Geological Sites, Local Nature Reserves, or areas of marine wildlife interest;
(iv) Proposals affecting the best and most versatile agriculture land (incorporating Grades I, II and IIIa) do not result in the irreversible loss of such land, and make adequate provision for the land to be restored substantially to the sustained grade within an agreed timescale;
(v) Proposals on, or in the proximity of an ancient monument, whether scheduled or not, provided that either:-
(a) the development can be carried out without significant adverse effect on the archaeological site, or
(b) in the event of the County Council taking the view that the need for the development outweighs the need to retain the archaeological site, the proposal makes adequate provision for an appropriate level of archaeological recording and the programme of work through to publication of results;
(vi) Proposals affecting surface or sub-surface resources or land drainage systems can be carried out without a significant effect on the resource or system, including any fishery or natural eco system it supports, or that any such effect can be satisfactorily alleviated;

(vii) Proposals, either individually or cumulatively (looking at the impact the proposal would have, in addition to sites already worked or committed) do not significantly affect the amenity of:-
  (a) residential dwellings;
  (b) schools, hospitals, residential establishments or any other sensitive land uses;

(viii) Proposals in the proximity of any listed building pay special regard to the desirability of preserving that listed building or its setting or any features of special architectural or historic interest which it possesses;

(ix) Proposals in the vicinity of a Conservation Area pay special attention to the desirability of preserving or enhancing the character or appearance of that Conservation Area or its setting;

(x) Proposals make adequate provision to alleviate the impact of the development on historic parks and gardens.

(xi) Proposals do not adversely affect to a significant degree:-
  (a) the safety, engineering capacity and environment of the surrounding highway network, including, where off-site highway improvements are necessary, the amenity and environment of features of acknowledged importance in the vicinity of the improvements;
  (b) the safe and efficient operation of Bournemouth International Airport, Yeovilton Aerodrome or the Portland Helicopter Base;
  (c) the amenity, convenience and recreational benefit of any public rights of way within and surrounding the site.

(xii) Proposals satisfactorily address all the development control criteria and issues identified in the site assessments for the relevant preferred area, and in particular they make provision for any necessary advanced landscaping or planting to be effective at the appropriate stage.

Policy 5: (M&W)
Relating to Applications Outside the Preferred Areas

Any planning application for mineral or waste facilities on land outside the preferred area shall be treated as follows:

(i) Any application which is within, or which would adversely affect:

(a) An Area of Outstanding Natural Beauty;
(b) A listed Ramsar site, a potential or classified protection area or candidate or designated Special Area of Conservation, a Site of Special Scientific Interest, a National Nature Reserve, a Marine Nature Reserve or a species specially protected under the Wildlife & Countryside Act 1981 or other relevant national legislation, shall be subject to the most rigorous examination. In the case of internationally important designations, (SPAs, SACs, Ramsar sites), where a proposal not directly connected with or necessary to the management of the site for nature conservation would have a significant effect on the site and would adversely affect its integrity in nature conservation terms the application for planning permission would be assessed in accordance with international wildlife conservation obligations and will have regard to positive possible alternative solutions, any imperative reasons of overriding public interest, and any human health or safety considerations or benefits of primary importance to the environment;

(ii) Any other application will only be permitted where, having regard to the benefits that would accrue from it:
  (1) It has no significant adverse effect, either individually or cumulatively on any of the areas, designations, or criteria identified in (a)-(j) below, or:
  (2) Any significant adverse effect it would have, whether individually or cumulative, on any of the areas, designations or criteria identified in (a)-(j) below can be satisfactorily alleviated with appropriate and acceptable mitigating measures;
  (a) Sites of Nature Conservation Interest, Local Nature Reserves, Regionally Important Geological Sites, areas of marine or wildlife interest;
  (b) The best and most versatile agricultural land (incorporating Grades I, II, and IIIa). In assessing the acceptability of proposals for irreversible development affecting the best and most versatile agricultural land and special characteristics the Site may have for that development and the feasibility of directing the development to land of the lowest possible agricultural land quality will be taken into account;
  (c) Ancient monuments whether scheduled or not, and the settings of any of these;
  (d) Surface or sub-surface water resources or land drainage systems;
  (e) The Heritage Coast, Conservation Areas, Listed Buildings, Historic Landscapes, Historic Parks and Gardens, (including the setting of any of these), and other areas of acknowledged landscape importance.
  In assessing the acceptability of proposals locating in the proximity of any listed building special regard will be paid to the desirability of preserving that listed building or its setting, or any feature of special architectural or historic

interest which it possesses. In assessing proposals in the proximity of a Conservation Area special attention will be paid to the desirability of preserving or enhancing the character or appearance of that Conservation Area or its setting;
(f) The amenity of residential dwellings schools, hospitals, residential establishments, areas of acknowledged importance for quiet recreation and other sensitive land uses;
(g) The safety and engineering/environmental capacity of the surrounding highway network including, where off-site highway improvements are necessary, features of acknowledged importance in the proximity of the improvements;
(h) The amenity, convenience and recreational benefit of any public rights of way within and surrounding the site;
(i) The Bournemouth International Airport, Yeovilton Aerodrome and Portland Helicopter Consultation zones.

Policy 11: (M&W)
Negotiated Improvements:
On operating sites the County Council will seek to secure, through negotiation and agreement, improvements on all existing mineral and waste facilities, including where appropriate the following:

(i) Minimising visual impact;
(ii) Minimising the impact of noise, dust, vibration, landfill gas, leachate, smell, vermin, litter, traffic and other disturbance, insofar as those fall within planning control, and without prejudice to the requirements of any site licence/waste management licence;
(iii) Improvements to access, traffic management and routeing arrangements;
(iv) Protection, conservation and enhancement of features of geological, archaeological and ecological importance or other features which may contribute to the appropriate beneficial after-use of the site;
(v) Ensure the progressive reclamation of sites to appropriate beneficial use;
(vi) Minimise the effects of storage loss in the unsaturated zone of the aquifer.

Policy 12: (M&W)
Reduction in Impacts on the Environment
The Planning Authority will invite owners and operators of existing minerals and waste facilities to put forward proposals for securing reductions in the environmental and other impacts of these facilities. The measures involved may include:

(i) Voluntary relinquishment of permissions;
(ii) A reduction in any adverse visual impact;
(iii) Reclamation of sites to an appropriate beneficial interim use or after-use.

Policy 13: (M&W)
Negotiated Improvements: Related Land, Cumulative Impact
Where the development for (a) minerals or waste facility would in conjunction with disturbed land in the vicinity of the development lead to an unacceptable or cumulative impact the avoidance of which is necessary to enable the development proposal to proceed, the Planning Authority will invite the applicant to make arrangements to effect the improvements of the existing disturbed land to the extent that such improvements are reasonably related in scale and kind to the development proposed. The measures involved may include:

(i) Interim reclamation of long term working areas;
(ii) Low level restoration, provided it can be fully integrated within the landscape and would not result in adverse effects on long term after-use, or land drainage of the local environment;
(iii) Measures to provide suitable top soil and subsoil layers;
(iv) Measures to provide for monitoring and control of gas leachate, and a stable surface for landfill sites;
(v) Measures to protect, conserve and enhance features of geological, archaeological or ecological importance or other features which may contribute to appropriate beneficial after use of the site;
(vi) Regard to be paid to the landscape character of the area and an integrated plan for the retention and creation of appropriate landscape features;
(vii) Measures to minimise loss of storage in the unsaturated zone of the aquifer;
(viii) After care management for five years.

Policy 18: (M&W)
Borrow Pits
Planning applications for borrow pits will be permitted provided all the following requirements are met:

(i) The proposal would not adversely affect:-
  (a) Potential or designated Ramsar sites, Special Protection Areas or Special Areas of Conservation having regard to international wildlife conservation obligations;
  (b) Proposed or designated Sites of Special Scientific Interest, National Nature Reserves, Marine Nature Reserves or species specially protected under the Wildlife & Countryside Act 1981 or other relevant national legislation.

(ii) The development would not be within AONBs or the Heritage Coast wherever possible and be designed to be located to minimise the impact on the landscape character in all cases;
(iii) Proposals which satisfy all the criteria of Policy 5 2;
  (a) The site can be restored to the agreed after-use at the earliest practical date, and normally within two years within commencement of extraction, or within six months of completion of the construction scheme, whichever is the sooner;
(iv) The Authority is satisfied that the operator is able to demonstrate the ability and commitment to carry out proposals in an acceptable way, including provision that:
  (a) The site would be used solely in connection with an adjoining permitted construction scheme in close proximity; and
  (b) The provisions of Policy 3 can be fully met.

Policy 25: (M&W)
Presumption Against New Quarries (Portland)
The County Council will not grant permissions for new quarries or for extension to existing quarries on Portland unless, exceptionally, significant environmental improvements would thereby be achieved.

Policy 26: (M&W)
Voluntary Environmental Improvements On Portland
The County Council will seek agreement under Section 106 of the Town and Country Planning Act 1990, or planning obligations under Section 12 of the Planning and Compensation Act 1991, or other suitable arrangements, for the owners and operators of existing quarries on Portland to minimise the environmental impact of current operations by:

(i) Establishing substantial stand-offs between quarry operations and the curtilage of residential dwellings or other sensitive locations or developments. An appropriate stand-off will be sought having regard to the type of operations involved, topography, geology and other relevant factors;
(ii) Establishing a systematic phased order of working of sites throughout Portland;
(iii) Operating the quarries to ensure that noise, dust and blasting vibration do not significantly affect the amenity of dwellings or other sensitive land uses, and to ensure that mud and dust are not deposited by quarry traffic on highways in the vicinity;
(iv) Establishing agreed routes for lorries;
(v) Encouraging the deferment of extraction within the codes or planning permission to the latest possible date;
(vi) Encouraging the industry to explore more environmentally acceptable ways of working;
(vii) encouraging the protection of:
  (a) Special protection areas, Ramsar sites, National Nature Reserves, Sites of Special Scientific Interest;
  (b) Sites of Nature Conservation Interest, Local Nature Reserves, Regionally Important Geological Sites or the habitats of protected species;
  (c) Ancient monuments whether scheduled or not and the setting of any of these; Surface or sub-surface water resources or land drainage systems;
  (d) Listed Buildings, Conservation Areas, historic landscape and other areas of acknowledged landscape importance;
(viii) Encouraging, on restoration of sites, the creation of nature conservation habitats and sites of geological interest.

Policy 27: (M&W)
Restoration of Sites on Portland
The County Council's policy is to achieve coherent restoration of all mineral workings on Portland by:

(i) Establishing and maintaining a restoration strategy advisory group;
(ii) Establishing the following three tier classification of sites aimed at maximising the area of restoration with the minimum practical requirement for waste materials:-
  (a) Sites being capable of being restored with no importation of wastes - Type A;
  (b) Sites capable of being wholly or partially restored on a rolling programme during this planned period using only on-site overburden or waste rock - Type B;
  (c) Sites where the importation of inert waste would be beneficial in achieving restoration of all or part of the site - Type C.

Policy 28: (M&W)
Areas where Landfill will be Refused on Portland
The County Council will refuse applications for landfill on sites falling within Categories A and B of Policy 27 except for proposals to import limited quantities of soil-making material appropriate to the proposed after-use of the site, in accordance with an agreed restoration scheme.

Policy 30: (M&W)
Restoration Standards on Portland
Schemes for the restoration of site shall accord with the three tier classification of sites established in Policy 27 and shall:

(i) Make provision for landscape, conservation, amenity and/or leisure after-uses which incorporate at least one of the following: features of nature conservation; features of geological conservation; public open space or access; leisure, heritage or educational facilities, or landscape enhancement reflecting local pre-existing historic landscape features;
(ii) Be designed to ensure that land is brought back to the standard which is required to achieve the intended after-use with a minimum practical requirement for imported waste material.

Policy 34: (M&W)
Imposition of Conditions
The County Council will impose conditions on new consents to:

(i) Reduce the area of land required at any given time for excavation, overburden storage, stockpiling, and processing to the minimum practical level;
(ii) Locate, arrange and maintain processing and service areas, so as to have minimum practical adverse impact on the environment and amenities of surrounding areas and particularly on residential dwellings;
(iii) To restore land progressively, at the earliest practical opportunity having regard to the following objectives:

(a) To carry out the restoration, wherever practical, using only on-site overburden and waste rock;
(b) Where the use of imported waste is essential to achieve a satisfactory result, by the use of inert material only;
(c) To create nature conservation habitats, and seek to secure geological conservation, where appropriate, on sites restored below surrounding ground levels in accordance with schemes to be agreed with the County Council;
(d) On sites to be restored to agriculture to create traditional small scale field patterns with appropriate limestone sward, dry stone walls and hedges in accordance with detailed schemes to be agreed with the County Council.
(e) The County Council will also seek to withdraw GDO rights on new consents for Purbeck stone quarries where the uncontrolled proliferation of quarry plant and buildings would be likely to be detrimental to visual amenity in the AONB.

Policy E14 (Dev)
Safeguarding Mineral Resources
Mineral deposits which are, or may become, of economic importance will be safeguarded from unnecessary sterilisation by surface development.

Policy E15 (Dev)
Environmental Effects of Mineral Working
Any adverse effects on the environment or the amenity of local residents of mineral development should be minimised. Land which has been subject to mineral working should be reclaimed at the earliest opportunity in order to maintain or, where possible, enhance its long term usefulness, quality and appearance.

Policy E16 (Dev)
Environmental Effects of Mineral Working
Proposals for mineral development within National Parks and Areas of Outstanding Natural Beauty will be subject to the most rigorous examination, and will only be approved where the development can be demonstrated to be in the public interest where there is an overriding national need for development which cannot reasonably be met in some other way.

Policy E17 (Dev)
Mineral Working Areas
The continuation of mineral development will be acceptable in principle at mineral working areas, except where it would have an unacceptable adverse impact on the landscape character, best and most versatile agricultural land, natural beauty, nature conservation, historic environment, hydro-geology or hydrology of the area.

Policy M1 (W&P)
After uses Following Quarrying
After-uses for worked out and associated quarry areas will be permitted where they include landscape restoration to provide for informal recreational use, grazing or provide/safeguard areas of nature conservation importance. Proposals which involve a substantial amount of built development will not be permitted.

Policy M11 (Dev M&W)
AONB's, SSSI's, NNR's, Ramsar sites, SPA's and SAC's
Applications for mineral working, the tipping of mineral waste and associated activities and extensions to existing workings within or affecting Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest, National Nature Reserves, Ramsar Sites, Special Protection Areas and Special Areas of Conservation, will be subject to the most rigorous examination. Such proposals will only be approved where there is an overriding national or regional need which is greater than the need to conserve the environment, landscape, character, natural beauty and nature conservation interest of these areas.

In all cases consideration of applications in these areas will include, inter alia, an assessment of:

(i) the national and regional need for the mineral;
(ii) the impact of permitting the development, or refusing it, on the local economy;
(iii) any detrimental effects of the proposals on the environment and landscape and their long term impact; and'
(iv) in the case of extensions to existing quarries, the extent to which the proposal would achieve an enhancement of the local landscape.

Policy M12 (Dev M&W)
Nature Conservation Zones and other Sites of Nature Conservation and Scientific Interest
In considering applications for mineral development, the County Council will take into account the scientific importance and value of Nature Conservation Zones and other sites of nature conservation and scientific interest and will not normally permit proposals which would have a significant effect on their natural features, wildlife and scientific interest.

Policy M13 (Dev M&W)
Opportunities for Creation of New Habitats
In order to protect and promote the nature conservation and scientific value of existing mineral sites, the County Council will encourage the creation of new habitats and retention of important geological features, particularly where such features will be lost as a result of further mineral development.

Policy M14 (Dev M&W)
Areas of Great Landscape Value
In Areas of Great Landscape Value mineral development will normally only be permitted where it would have no significant adverse effect on the special landscape character of the area.

Policy M15 (Dev M&W)
Heritage Coast and CPA
Mineral developments within Heritage Coasts and Coastal Protection Areas will only be permitted where the need for the mineral is sufficient to override the landscape quality of the area, and/or where they would enable the enhancement of the character and appearance of the landscape.

Policy M30 (Dev M&W)
Development Control Considerations
The County Council will have regard in particular to the following considerations when assessing applications for mineral development

(i) evidence of the presence of the mineral;
(ii) an assessment of need for the mineral in the national, regional and local context;
(iii) the effects on agricultural land
(iv) the impact of the development on the environment, including nature conservation, landscape and the historic environment;
(v) the proposed working programme, including the way in which mineral waste will be dealt with;
(vi) proposals for the restoration and aftercare of the workings;
(vii) the likely traffic generation by the proposed workings;
(viii) the type and location on any ancillary plant and machinery;
(ix) the relationship of the development to existing development
(x) in the case of extensions to existing working or tipping areas, the extent to which the proposal would achieve a net benefit to the local landscape;
(xi) the extent to which any landscape works which have already been carried out would mitigate the environmental effects.

Policy M31 (Dev M&W)
Need
When considering all applications for the winning and working of minerals, the County Council will require the applicant to supply details of the need for the minerals. In determining the application the County Council will balance the national, regional, or local need for the mineral against:

(i) The environmental impact of the development and the extent to which this could be mitigated through the imposition of conditions, or by entering into an agreement; and
(ii) The extent to which the proposal could reduce the detrimental impact arising form the transport of minerals from other sites.

Policy M43 (Dev M&W)
Environmental Assessments
The County Council will require an Environmental Statement to be submitted with a planning application where proposals for minerals development are likely to have significant environmental effects. In all cases, including those where a statement has not been requested, the County Council will require sufficient information in order to be able to assess the environmental effects of the scheme.

Policy M57 (Dev M&W)
Exploration
Exploratory bore-holes and trial pits will normally be permitted, except:

(i) where drilling would prejudice the scientific importance of a National Nature Reserve, Site of Special Scientific Interest, Special Areas for Conservation, Special Protection Areas, Ramsar Sites, and Marine Nature Reserves;
(ii) where drilling would damage a Scheduled Ancient Monument or other important archaeological site; and

(iii) where drilling would cause unreasonable disturbance to local residents, which could not reasonably be alleviated by special measures.

A4-4.4 RECREATION DEVELOPMENT

Community Facilities Policies C (BDP 00)
Provision should be made for the development of countryside recreational facilities compatible with the character of the rural environment where they are easily accessible by a choice of means of transport from the main centres of residential and holiday population and/or will reduce recreational and tourism pressures on the Heritage Coast and other sensitive areas.

Community Facilities Policy D (BDP 00)
At the coastal resorts, particularly those identified in Tourism Policy A, provision should be made for the development of new and the retention of existing facilities for marine recreation, subject to consideration of the impact of such facilities on the marine environment.

Policy E10 (Dev)
Recreational Facilities
The development of major recreational facilities will only be provided for outside the National Parks, Areas of Outstanding Natural Beauty, Coastal Preservation areas and areas of great landscape value. Such developments should be close to the main areas ..., and not have an unacceptable impact on settlement, on the natural landscape, or areas valuable for wildlife, on the historic environment, or on the best and most versatile agricultural land, and should have adequate road access. Golf courses may be acceptable outside National Parks, Areas of Outstanding Natural Beauty and Coastal Preservation Areas where the above criteria can be met.

Policy E11 (Dev)
Access to Facilities
To provide for major casual recreation, including country parks or similar informal recreation areas, in locations close to the centres of population where they would be accessible by public transport and be in keeping with their surroundings.

Policy E13 (Dev)
Public Rights of Way
The long distance footpath and cycle route networks as defined on the key diagram should be maintained and extended, and proposals that would affect these routes should only be permitted where the integrity of the network can be maintained. In maintaining and developing the footpaths, cycleways and bridleways networks, advantage should be taken, wherever practicable, of redundant canals and railways.

Policy R10 (WD)
Countryside Recreation Proposals
Proposals for the provision of recreational and sporting facilities in the countryside will be permitted provided that:

(i) They are compatible in character, design and scale, with the site and its surroundings;
(ii) The amenities and interests of local residents and visitors are safeguarded;
(iii) They do not result in an increase in development in any one locality which will add significantly to peak season problems;
(iv) The necessary infrastructure, including car parking and highway requirements are available or will be provided before the development takes place;
(v) They do not conflict with landscape policies in chapter 7 of the Local Plan and do not have a materially adverse effect on agriculture.

Policy SR4 (W&P)
Facilities For Water Sports In Weymouth
The Borough Council will permit land based facilities which help to retain and expand water sports in Weymouth including sailing, angling, diving and boating, around Weymouth Harbour and at other appropriate locations, subject to Policy EC2.

Policy SR5 (W&P)
Facilities For Water Sports In Portland Harbour
The Borough Council will permit land-based facilities which help to retain existing water sporting activities around Portland Harbour, subject to Policy EC2. Facilities which would lead to an increase in water sporting activities will be permitted subject to Policy EC2 and provided that:

(i) The criteria in Policy EC2 are met having particular regard to nature and marine conservation interests.
(ii) Satisfactory land for access and car parking can be obtained.
(iii) There is no unacceptable conflict with other uses of the harbour and surrounding beaches.

Policy RE2 (ED)
Provision of Additional Recreational Facilities
Permission will be granted for additional recreational facilities provided:

(1) They are not detrimental to the character and appearance of the area and the visual and physical amenities enjoyed by adjoining residential areas;

(2) They are accessible by a choice of means of transport;
(3) Adequate car and cycle parking is provided;
(4) They are acceptable in highway access and safety terms;
(5) They are located without detriment to the best and most versatile agricultural land, nature conservation and the conservation of areas of landscape, scientific, archaeological or historic interest.

A4-4.5 TOURISM DEVELOPMENT

Tourism Policy A (BDP 00)
Development for tourism and recreation which will contribute to regeneration and/or the extension of the tourist season will be encouraged, particularly in the main coastal resorts of Christchurch, Bournemouth, Poole, Swanage, Weymouth and Lyme Regis.

Policy E5 (Dev)
Within coastal resorts Local Plans should consider the need for additional tourist accommodation and tourism facilities on a scale compatible with existing development which would not adversely impact on the environment. In these resorts , Local Plans should also identify the main tourist areas within which proposals that would detract from their tourist function and character would not be permitted.

Policy E9 (Dev)
Visitor Attractions
To provide for the development of visitor attractions/activities which make suitable use of the natural, archaeological, architectural, historic or industrial archaeological features of the area, but only where the proposals would result in the protection or restoration of such features.

Policy T4 (WD)
Countryside Tourist Attractions
Proposals for countryside tourist attractions/facilities (excluding accommodation) will be permitted provided that:

(i) They are compatible in character, design and scale, with the site and its surroundings;
(ii) The amenities and interests of local residents and visitors are safeguarded;
(iii) They do not result in an increase in of holiday development in any one locality which will add significantly to peak season problems;
(iv) They are conveniently and well located in relation to an adequate road system.
(v) The necessary infrastructure, including car parking and highway requirements are available or will be provided before the development takes place;
(vi) They do not conflict with landscape policies in chapter 7 of the Local Plan and do not have a materially adverse effect on agriculture.

All new countryside tourist attractions will be expected to provide facilities to encourage access by as wide a range of means of transport as reasonably possible. Major new attractions must be readily accessible by a range of means of transport.

Policy TM2 (W&P)
Tourist Strategy - Portland
The Borough Council will encourage and promote appropriate tourist related activities on Portland, particularly those which are related to the natural environment of the Island.

Policy TM1 (W&P)
Tourist Strategy - Weymouth
The Borough Council will continue to encourage and promote the development of tourism in Weymouth, consolidating its role as a traditional holiday resort, with a view to diversifying the range of activities and attractions, and extending the tourist season.

Policy TM8 (W&P)
Development at Bowleaze Cove
Development other than that permitted by Policy EC3 will only be permitted at Bowleaze Cove where it is for leisure/tourist related development that would not be intrusive in the coastal landscape and consists of either:

(i) A change of use of an existing building involving no significant extensions;
(ii) Redevelopment of existing buildings involving no significance increase in the scale or mass of buildings or the area covered by built development; or
(iii) New development or extensions to existing buildings that will result in a significant improvement to the environment and the appearance of the surrounding area.

Policy TM11 (W&P)
Marina Development In Portland Harbour
Proposals for marina development in Portland Harbour will be permitted provided that they:

(i) Contribute to the regeneration of surplus MOD land and buildings;
(ii) Provide adequate access;
(iii) Meet the criteria in Policy EC2 having particular regard to nature and marine conservation interests/

Policy TM13 (W&P)
Development of Portland Bill
Proposals for the development of additional built tourist related facilities will not be permitted at Portland Bill.

Policy TM14 (W&P)
Chalets and Fisherman's Huts at Portland Bill
The development of additional huts or chalets or the replacement of existing structures by more permanent accommodation will not be permitted at Portland Bill or along the coastline between Portland Bill and Southwell.

Policy TM15 (W&P)
Tourist Information Centre At Portland Bill
A tourist information centre will be provided in the Trinity House complex, along with a cafe facility and interpretation/display area.

Policy TM16 (W&P)
Environmental Interpretation Centre At Tout Quarry
The development of an environmental educational/information facility and related informal uses will be permitted at Tout Quarry provided that nature conservation interests can be safeguarded.

Policy EN15 (ED)
Visitor Facilities and Nature Trails
The Council will seek to maximise the educational value of Sites of Nature Conservation Interest through the provision, in appropriate locations, of visitor facilities, on-site interpretation and the creation of nature trails.

Policy TO5 (ED)
Provision of Visitor Attractions
Proposals for the provision of visitor attractions/activities which make suitable use of the natural, archaeological, architectural, historic, industrial archaeological features of the area will be granted permission provided that:

1. The proposals would result in the protection or restoration of such features;
2. There is no detrimental effect on agriculture, nature conservation, visual amenity, road safety and the quiet enjoyment of the area by residents;
3. The locality is capable of accepting increased numbers of visitors, without giving rise to problems of access, road safety or congestion.

A4-4.6 CARAVAN SITES & VISITOR ACCOMMODATION

Tourism Policy D (BDP 00)
Within the Heritage Coast and undeveloped coast of the Isle of Portland, development of new sites for chalets, caravans or tents should not be permitted. Within the Area of Outstanding Natural Beauty, proposals would be subject to the most rigorous examination. Elsewhere the development of new, or extension of existing, sites should be permitted where it does not conflict with other policies of this plan and where it will not result in undesirable concentration in any one area.

Policy E7
Touring parks will not be provided for in National Parks, Areas of Outstanding Natural Beauty or Coastal Preservation Areas (CPA's), although small scale tented camping sites may be acceptable where there is proven need for increased capacity or where improvements to parks are permitted by Policy E6

Housing Policy E (BDP 00)
Proposals for the development of residential caravan sites should be treated in the same manner as permanent residential development, and be subject to the same policies, except where visual appearance would make a site unacceptable.

Policy T2 (WD)
Built Holiday Accommodation
The development of built holiday accommodation will be permitted within the defined development boundaries of settlements provided criteria (a) to (e) of Local Plan Policy SP1 are met. Such development will not be permitted outside defined development boundaries.

Policy T7A (WD)
Static Caravans/Chalets – Within Heritage Coasts
Within the Heritage Coast the development of new sites or extension in areas of existing sites for static holiday caravans and/or holiday chalets will not be permitted.

Policy T7b (WD)
Static Caravans/Chalets – Outside Heritage Coasts
Outside the Heritage Coast the development of new sites or extension in areas of existing sites for static holiday caravans and/or holiday chalets will be permitted only where.

(i) A new site would involve the relocation of an existing site from a sensitive location such as the Heritage Coast, or
(ii) An extension to an existing site would involve landscape improvements and result in an enlarged site which is no more harmful to the character and appearance of its surroundings than the existing site.

Policy T8 (WD)
Touring Caravans/Tents - Within Heritage Coast
Within the Heritage Coast the development of new sites or extension in area of existing sites for touring caravans and/or tents will not be permitted.

Policy T9 (WD)

Touring Caravans/Tents - Outside Heritage Coast
Outside the Heritage Coast, the development of new sites or the extension or intensification of use of existing sites for touring caravans and/or tents will be permitted subject to the proposals satisfying the criteria set out in Local Plan Policy T10 and, where appropriate, T11.

Policy T10 (WD)
Touring Caravans and Tents, Static Caravans and Chalets, New Camping Facilities - Additional Criteria
Proposals for the development of new, or extension, intensification or internal reorganisation of use of existing touring caravan or tent sites; the internal reorganisation of use of existing static caravan or chalet sites; proposals for new camping facilities will only be permitted if, in addition to conforming with other policies of the Local Plan; they satisfy the following criteria:

(i) They are conveniently and well located in relation to an adequate road system;
(ii) They meet adequate standards of road access and car parking;
(iii) They do not have a materially adverse affect on visual amenity and other countryside interests;
(iv) They are of a size consistent with the character of the area;
(v) They do not conflict with residential amenities;
(vi) They do not result in an increase of holiday development in any one locality nor add significantly to peak season problems;
(vii) The necessary service infrastructure is available or will be provided before the development takes place.
(viii) They incorporate an appropriate comprehensive landscape scheme which will ensure that the proposals do not have an unacceptable impact on the appearance of the area. Proposals within existing sites will not have a detrimental effect on the appearance and internal layout of the site.

Policy T11 (WD)
Internal Reorganisation of Holiday Sites
Proposals for the internal reorganisation of uses within existing holiday chalet, caravan or camp sites, where necessary, will be permitted provided that;

(i) Proposals conform with other Local Plan Policies including T10.
(ii) If the site is within the Heritage Coast, no increase in the total amount of holiday accommodation is proposed.

Policy TM22 (W&P)
Retention Of Existing Caravan and Chalet Sites
The conversion of existing caravan and chalet sites to permanent built development or changes to alternative uses will not be permitted, unless the proposed use is acceptable outside the development boundary (see Policy EC3).

Policy TM23 (W&P)
Development of Static Caravans and Chalets
Proposals for new static holiday caravan or chalets sites will not be permitted unless:

(i) The resulting development would not be visually intrusive; and
(ii) There would be no adverse affect upon the special character of the Heritage Coast and the undeveloped coast of the Island of Portland, or upon the Area of Outstanding Natural Beauty or in Areas of Local Landscape Importance. Proposals for the extension of existing sites, including the change of use of caravans to chalets and visa versa, will not be permitted unless both of the above conditions are met and, in addition, a meaningful improvement in the standards, layout, landscaping or appearance of the site results and there would be no significant increase in the total amount of holiday accommodation.

Additional landscaping and environmental improvements will be sought as part of all proposals involving existing caravan sites.

Policy TM24 (W&P)
Development of Touring Caravan, Motor Caravan and Camp Sites on Portland
Proposals for the development of sites for touring caravans, camper vans, or tents will not be permitted on Portland unless criteria in Policy TM25 are satisfied and development will be inconspicuously sited and not readily visible from the coast.

Policy TM25 (W&P)
Development of Touring Caravan, Camper Van and Camp Sites
Applications for the development of touring caravan, camper van and camping sites will be permitted provided that:

(i) There will be no adverse visual or physical impact on either the best and most versatile agricultural land, the Area of Outstanding Natural Beauty, the Area of Local Landscape Importance, a Site of Special Scientific Interest, a Site of Nature Conservation Interest, the Heritage Coast or any other open coastal location.
(ii) The site has good access to an adequate road system and site access and car parking are in accordance with the Council's requirements.
(iii) The size of the Site is compatible with the character of the locality.

(iv) Any permanent built development or features are not visually intrusive.
(v) The amenities of local residents are adequately protected from any significant adverse effect as a result of the proposed development.
(vi) The proposed development does not lead to an over-intensification of holiday accommodation in any one area.
(vii) Essential public utility services are available.

Policy TO4 (ED)
Establishment of Camping and Caravanning Sites
Permission will not be granted for new caravanning and tent sites within the Areas of Outstanding Natural Beauty, the Coastal Preservation Area, or areas of great landscape value where they would detract from the character of the area. Elsewhere permission for new caravan or camping sites will not be permitted unless:

1. They are located without detriment to the best and most versatile agricultural land, nature conservation and the conservation of areas of landscape, scientific, archaeological or historic interest;
2. They are acceptable in highway access and safety terms;
3. There is no detriment to the character and appearance of the area and to the visual and physical amenities enjoyed by adjoining residential areas;
4. There is no conflict with other policies of the local plan. Proposals for the expansion or improvement of existing sites will not be permitted unless the above criteria are satisfied and where this would result in improvements to site layout and landscaping.

Policy TO6 (ED)
Retention and Upgrading of Accommodation and Facilities on Major Holiday Parks
1. Proposals for change of use or redevelopment within major holiday parks to uses other than those providing holiday accommodation or facilities for holidaymakers will not be permitted.
2. Upgrading of accommodation or facilities on holiday parks will be permitted provided:

    (i) There is no extension of the site beyond its existing boundaries;
    (ii) There is no incursion into those undeveloped areas of the site which are significant in reducing the impact of the development in the landscape;
    (iii) The facility to be provided is incidental to the holiday park use and for the benefit of staying guests.

A4-4.7 PORTS AND FISHING

Policy EM12 (W&P)
Proposals for the Fishing Industry
The Local Planning Authority allocates land at Castletown Pier for the improvement of on-shore and berthing facilities. Any proposals which will help expand and diversify the existing fishing industry based in Portland and Weymouth Harbours will be permitted, subject to Policy EC2.

A4-4.8 COASTAL DEFENCE

Environment Policy K (BDP 00)
Development should not be allowed in areas where coastal erosion, flooding, sea level rise and increased storminess are likely to affect it during the lifetime of the development.
Environment Policy L (BDP 00)
Development which is essential for coastal protection and sea defence should take account of:

(i) The environmental significance of the location in which it is proposed; and
(ii) Its effect on natural processes.

Appendix 5: Nature conservation areas designated under European Council Directives

The following pages contain citation details for areas designated as Special Protection Areas, of Special Areas of Conservation under European Council directives. For details of the protection afforded to these areas please see Appendix 3 (Section A3-3.9).

Appendix 6: Geologists' Association Code of Conduct for Geological Fieldwork

The Geologists' Association Code of Conduct for Geological Fieldwork is the benchmark national code of practice within the UK for professional and amateur field geologists. It sets out recommendations for best practice in relation to all aspects of field work.

Appendix 7: Fossil Collecting Code of Conduct for the West Dorset Coast

Developing a Code of Conduct

A Working Group of landowners, conservation organisations, museum curators and local fossil collectors has developed this Fossil Collecting Code. The Group was established in order to address growing conflicts of interest with regard to fossil collecting along the West Dorset coast. The Group recognises the essential need for fossil collecting to continue. However, it also recognises that collecting must be carried out in such a way as to satisfy all those with an interest in our fossil heritage.

This Code, though specifically aimed at professional and dedicated amateur collectors, also applies to all those who come here to collect fossils, whether for study or recreation. The safest and best advice, particularly for inexperienced collectors and educational groups, is that they should restrict their activities to the beaches alone. Advice to this effect is provided by interpretation signs, leaflets and the services of the Charmouth Heritage Coast Centre.

The Code has been developed by:

- The Jurassic Coast Project
- The National Trust
- Charmouth Parish Council
- English Nature
- Charmouth Heritage Coast Centre
- West Dorset Heritage Coast (Dorset County Council)
- Dorset and Somerset Museum Services
- Local fossil collectors

The Geology and Fossils of the West Dorset coast

The West Dorset coast contains one of the finest exposures of rocks from the Lower and Mid Jurassic Period to be found anywhere in the world. High erosion rates, particularly in the winter, ensure a plentiful supply of fossils onto the beaches. This coast is one of the best sources of marine Jurassic aged fossils in the world and numerous important finds have been and continue to be made here. Not surprisingly it has been designated by English Nature as a Site of Special Scientific Interest (SSSI) for its geology, fossils and landslides. It also forms part of a Site based on the wealth of earth science interest exhibited along virtually the entire Dorset and East Devon coast and the role that this coast has played in the historical development of geological and geomorphological science.

Fossil Collecting

On the rapidly eroding West Dorset coast, fossil collecting is essential if specimens, some of which may be of great scientific value, are to be saved from damage or destruction by the sea.

Collecting also offers an opportunity for people to learn about the ancient past and to contribute to our understanding through the discovery of new finds or the development of scientific study. However, it is important that fossils are collected both responsibly and safely.

Fossil Collectors want to be able to collect fossils freely. For many it is both a great learning experience and recreational activity. Most collectors, both amateur and professional, have a deep-seated interest in palaeontology and a wish to contribute to the development of the science. Professional collectors have most time and a great deal of local knowledge, but they need to sell their finds in order to earn a living. As a general rule, Landowners own the fossils on or under their land. The National Trust is the principal landowner along the West Dorset coast. The Trust is a registered charity charged with preserving places of Historic Interest or Natural Beauty for the Nation to enjoy. All along the West Dorset coast it seeks to preserve the landscape and nature conservation interests and to provide public access over its property so far as that is consistent with its preservation.

English Nature is the Government's statutory advisor on conservation including the Earth sciences. It designates National Nature Reserves and Sites of Special Scientific Interest and promotes sustainable management of these sites.

Museum curators and Researchers are keen to secure key scientifically important specimens for recognised collections as part of the nation's heritage and to provide a collection upon which scientific research can be based. Curators and researchers seek to ensure that the maximum associated scientific data is gathered when specimens are collected. Some researchers require access to strata and specimens in situ in order to undertake their work.

Objectives of the Code

The interests of all those involved with fossil collecting on the Dorset Coast need not be mutually exclusive, indeed many interest groups can assist each other so long as each party is aware of, and accepts the interest of the other. The fossil collecting Code of Conduct is an attempt to balance those interests.

The primary objectives of the code are to:

- promote responsible and safe fossil collecting
- restrict the excessive digging or 'prospecting' for fossils along fossil rich strata
- clarify ownership of the fossils
- promote better communication between all those with an interest in fossils from the West Dorset coast
- promote the acquisition of key scientifically important fossils by recognised museum collections.

Area covered by the Code

The area covered by the Code is land in National Trust and Charmouth Parish Council ownership between Lyme Regis and Hive Beach at Burton Bradstock.

Review and changes to the code

The Working Group will be responsible for review and revisions of the code in the future. Criteria to measure the success of the code have been drawn up.

The Key Scientifically Important Fossils Recording Scheme

There are two categories of fossils recognised within the Recording Scheme; Category I, Key Scientifically Important Fossils, and Category II for fossils of some (but not key) importance.

Category I fossils include new species or those specimens which may represent new species, fossils which are extremely rare such as the Charmouth dinosaur Scelidosaurus and fossils that exhibit exceptional preservation.
Category II fossils include vertebrates such as reptiles and fish, partial or complete, especially where the horizon of origin can be identified. Nautiloids and certain ammonites together with unusual assemblages of fossils are also included.

A full list of both categories can be found at the end of this document.

To comply with the Code, all Category I fossils are to be recorded and certain restrictions apply to their disposal (see 4. and 5. below). To comply with the Code it is not obligatory to record Category II fossils although it is strongly recommended. No restrictions apply to the disposal of Category II fossils.

Fossil ownership

At present the Code applies to National Trust and Charmouth Parish Council land only. Both landowners wish to make clear their ownership of these fossils but they are willing to see ownership transferred to those collectors who follow the Fossil Collecting Code of Conduct and record their key scientifically important fossils.

Maps of land ownership are available at the Charmouth Heritage Coast Centre and the Code will be promoted to other landowners along the West Dorset coast.

Contact information

- Charmouth Heritage Coast Centre, Lower Sea Lane, Charmouth, Dorset DT6 6LL Tel 01297 560772.
- The web site can be found at http://members.aol.com/charhercen.

Permission to undertake excavations should be sought from the National Trust

- Patrick Woodford, The National Trust, Hillbutts, Wimborne, Dorset BH214DS Tel. 01202 882493

or:

- Charmouth Parish Council, The Elms, The Street, Charmouth, Dorset DT6 6LN Tel. 01297 560826

Please note:

Those collectors who do not follow this voluntary code, particularly by digging or prospecting in situ in the cliffs, or failing to record Category I fossils, may be regarded as stealing the fossils, and appropriate legal action may be taken against them.

Key Scientifically Important Fossils

The Jurassic rocks exposed on the West Dorset coast contain abundant and extremely diverse fossils. Consequently, the following examples cannot be fully comprehensive and provide general guidance only. In many cases, the decisions regarding relative importance will rely on the knowledge of the collectors. However, wherever there is doubt about the scientific importance of any fossil finds, collectors are recommended to contact the relevant fossil group specialist(s) for assistance.

Category I fossils

a) Fossils which certainly represent new species. These can belong to any taxonomic group - vertebrate, invertebrate or plant.

b) Fossils that are thought to represent new species. Again these can belong to any group - vertebrate, invertebrate or plant. (Subsequent work may indicate that some of these are not in fact new species and provided that they do not fall within 1c) or 1d) below, they may be 'downgraded' to Category II fossils).

c) Fossils that are extremely rare. Although not necessarily new species they are nevertheless clearly of great scientific importance. Examples include: dinosaurs, pterosaurs, sharks and rays, (near) complete insects and arthropods (crustaceans, crabs), recognisable leaf fronds and plant cones etc. This subcategory includes forms which are very rare in certain stratigraphic levels if found in situ or where the stratigraphic horizon can be identified satisfactorily; for example, fossil echinoids or gastropods are rarely found within the clay dominated Lower Lias strata.

d) Fossils which exhibit exceptional preservation. For example, ichthyosaurs (or other vertebrates) showing skin texture, uncrushed skulls, which could provide data on brain size or other physiological aspects etc. Among invertebrates, fossil cephalopods (cuttlefish, squids, ammonites or belemnites) showing traces of gill structures, arms and hooks etc are of key scientific importance.

Note: Some fossils from the Lias, such as ichthyosaurs, are not uncommonly found with traces of soft tissues preserved. These would not be regarded as Category I unless there are soft part features preserved which are particularly rare or exceptional. The same may be true for certain invertebrate groups, such as belemnite 'ink sacs', which are not that uncommon in the Black Ven and Belemnite Marls.

Category II fossils

Reptiles: ichthyosaurs and plesiosaurs etc.

Fish: including sharks, rays, coelacanths, bony fish
Fossil remains, especially fragmentary, isolated, bones or scales etc, may be relatively common in some beds. The stratigraphical range of many forms is poorly known and any data may be important to relevant specialists. It is recommended therefore that collectors do record significant, recognisable finds if found in situ or where the stratigraphic horizon can be identified satisfactorily.

Arthropods: insects
Relatively scarce fossils, mainly recorded from the woodstone/flatstone horizons. Many insect remains are indistinctly preserved, but given their scarcity, any recognisable forms are worthy of recording.

Molluscs: belemnites
Extremely common fossils especially in isolated guards. It is not anticipated that these would be recorded, unless a particular bedding plane concentration ('belemnite battlefield') or similar fauna was collected.

Molluscs: ammonites
One of the most common and characteristic fossils from the Dorset coast occurring throughout the section. Many of the usual taxa are abundant and comprise the 'bread and butter' specimens for commercial, amateur and tourist collectors. It is not anticipated that these forms would be recorded, although any unusual species or particularly large/mature shells showing apertural details etc are worthy of inclusion in the database.

Molluscs: nautiloids
A neglected group of fossils, occurring throughout much of the succession and rarely collected commercially. It is not expected that these would be recorded, though exceptional specimens (e.g. bedding plane assemblages or others yielding palaeoecological data) are worth considering for inclusion on the database.

Molluscs: bivalves
An abundant group of fossils, occurring throughout much of the succession and rarely collected commercially. It is not expected that these would be recorded, although exceptional specimens (e.g. bedding plane assemblages or other preservations yielding palaeoecological data) are worth considering within the database.

Brachiopods
As bivalves above

Echinoderms: crinoids and starfish
A group of considerable interest to collectors, especially specimens from the 'Pentacrinites' and 'Eype Starfish' beds. There are many specimens of these in public collections and it is not anticipated that specimens would normally be recorded. However, exceptional accumulations of crinoids attached to drift wood etc, or of brittle stars, are worthy of recording on the database.

Appendix 8: UNESCO Guidelines On The Use Of The World Heritage Emblem

PREAMBLE

The World Heritage Emblem (hereafter 'Emblem') created by the artist Mr. Olyff under contract with UNESCO, was adopted by the second session of the World Heritage Committee as the official

Emblem of the World Heritage Convention, symbolising the interdependence of cultural and natural properties. Although there is no mention of the Emblem in the Convention, its use has been promoted by the Committee to identify properties protected by the Convention and inscribed on the World Heritage List since its adoption in 1978.

The World Heritage Committee is responsible for determining the use of the World Heritage Emblem and for making policy prescriptions regarding how it may be used.
The Emblem symbolises the Convention, signifies the adherence of States Parties to the Convention, and serves to identify sites inscribed in the World Heritage List. It is associated with public knowledge about the Convention and is the imprimatur of the Convention's credibility and prestige. Above all, it is a representation of the universal values for which the Convention stands.

The Emblem also has fund-raising potential that can be used to enhance the marketing value of products with which it is associated. A balance is needed between the Emblem's use to further the aims of the Convention and optimise knowledge of the Convention world-wide and the need to prevent its abuse for inaccurate, inappropriate, and unauthorised commercial or other purposes.

The Guidelines and Principles for the Use of the Emblem and modalities for quality control should not become an obstacle to co-operation for promotional activities. Authorities responsible for reviewing and deciding on uses of the Emblem (see below) need parameters on which to base their decisions.

APPLICABILITY OF THESE GUIDELINES AND PRINCIPLES

The Guidelines and Principles proposed herein cover all proposed uses of the Emblem by:

- The World Heritage Centre;
- The UNESCO Publishing Office and other UNESCO offices;
- Agencies or National Commissions, responsible for implementing the Convention in each State Party;
- World Heritage Sites;
- Other contracting parties, especially those operating for predominantly commercial purposes.

RESPONSIBILITIES OF STATES PARTIES

States Parties to the Convention should take all possible measures to prevent the use of the Emblem in their respective countries by any group or for any purpose not explicitly recognised by the Committee. States Parties are encouraged to make full use of national legislation including Trade Mark Laws.

INCREASING PROPER USES OF THE EMBLEM

Properties included in the World Heritage List should be marked with the emblem jointly with the UNESCO logo, which should, however, be placed in such a way that they do not visually impair the property in question.

Production of plaques to commemorate the inclusion of properties in the World Heritage List

Once a property is included on the World Heritage List, the State Party should place a plaque, whenever possible, to commemorate this inscription. These plaques are designed to inform the public of the country concerned and foreign visitors that the Site visited has a particular value which has been recognised by the international community. In other words, the Site is exceptional, of interest not only to one nation, but also to the whole world. However, these plaques have an additional function which is to inform the general public about the World Heritage Convention or at least about the World Heritage concept and the World Heritage List.

The Committee has adopted the following Guidelines for the production of these plaques:

- the plaque should be so placed that it can easily be seen by visitors, without disfiguring the Site;
- the World Heritage Emblem should appear on the plaque;
- the text should mention the Site's exceptional universal value; in this regard it might be useful to give a short description of the Site's outstanding characteristics. States Parties may, if they wish, use the descriptions appearing in the various World Heritage publications or in the World Heritage exhibit, and which may be obtained from the Secretariat;
- the text should make reference to the World Heritage Convention and particularly to the World Heritage List and to the international recognition conferred by inscription on this List (however, it is not necessary to mention at which session of the Committee the Site was inscribed); it may be appropriate to produce the text in several languages for sites which receive many foreign visitors.

The Committee proposes the following text as an example:

"(Name of site) has been inscribed upon the World Heritage List of the Convention concerning the Protection of the World Cultural and Natural Heritage. Inscription on this List confirms the exceptional universal value of a cultural or natural site which deserves protection for the benefit of all humanity."

This text could be then followed by a brief description of the Site concerned.
Furthermore, the national authorities should encourage World Heritage Sites to make a broad use of the Emblem such as on their letterheads, brochures and staff uniforms.
Third parties which have received the right to produce communication products related to the World Heritage Convention and Sites must give the Emblem proper visibility. They should avoid creating a different Emblem or logo for that particular product.

PRINCIPLES

The responsible authorities are henceforth requested to use the following principles in making decisions on the use of the Emblem:

1. The Emblem should be utilised for all projects substantially associated with the work of the Convention, including, to the maximum extent technically and legally possible, those already approved and adopted, in order to promote the Convention.
2. A decision to approve use of the Emblem should be linked strongly to the quality and content of the product with which it is to be associated, not on the volume of products to be marketed or the financial return expected. The main criterion for approval should be the educational, scientific, cultural, or artistic value of the proposed product related to World Heritage principles and values. Approval should not routinely be granted to place the Emblem on products that have no, or extremely little, educational value, such as cups, T-shirts, pins, and other tourist souvenirs. Exceptions to this policy will be considered for special events, such as meetings of the Committee and ceremonies at which plaques are unveiled.
3. Any decision with respect to authorising the use of the Emblem must be completely unambiguous and in keeping with the explicit and implicit goals and values of the World Heritage Convention.
4. Except when authorised in accordance with these principles it is not legitimate for commercial entities to use the Emblem directly on their own material to show their support for World Heritage. The Committee recognises, however, that any individual, organisation, or company is free to publish or produce whatever they consider to be appropriate regarding World Heritage Sites, but official authorisation to do so under the World Heritage Emblem remains the exclusive prerogative of the Committee, to be exercised as prescribed in these Guidelines and Principles.
5. Use of the Emblem by other contracting parties should normally only be authorised when the proposed use deals directly with World Heritage Sites. Such uses may be granted after approval by the national authorities of the countries concerned.
6. In cases where no specific World Heritage Sites are involved or are not the principal focus of the proposed use, such as general seminars and/or workshops on scientific issues or conservation techniques, use may be granted only upon express approval in accordance with these Guidelines and Principles. Requests for such uses should specifically document the manner in which the proposed use is expected to enhance the work of the Convention.
7. Permission to use the Emblem should not be granted to travel agencies, airlines, or to any other type of business operating for predominantly commercial purposes, except under exceptional circumstances and when manifest benefit to the World Heritage generally or particular World Heritage Sites can be demonstrated. Requests for such use shall require approval in accordance with these Guidelines and Principles and the concurrence of the national authorities of countries specifically concerned.
8. The Centre is not to accept any advertising, travel, or other promotional considerations from travel agencies or other, similar companies in exchange or in lieu of financial remuneration for use of the Emblem.
9. When commercial benefits are anticipated, the Centre should ensure that the World Heritage Fund receives a fair share of the revenues and conclude a contract or other agreement that documents the nature of the understandings that govern the project and the arrangements for provision of income to the Fund. In all cases of commercial use, any staff time and related costs for personnel assigned by the Centre or other reviewers, as appropriate, to any initiative, beyond the nominal, must be fully covered by the party requesting authorisation to use the Emblem.
10. National authorities are also called upon to ensure that their sites or the World Heritage Fund receive a fair share of the revenues and to document the nature of the understandings that govern the project and the distribution of any proceeds.
11. If sponsors are sought for manufacturing products whose distribution the Centre considers necessary, the choice of partner or

partners should be consistent, at a minimum, with the criteria set forth in Annex V of the "Internal Guidelines for Private Sector Fund-Raising in Favour of UNESCO," and with such further fund-raising guidance as the Committee may prescribe. The necessity for such products should be clarified and justified in written presentations that will require approval in such manner as the Committee may prescribe.

AUTHORISATION PROCEDURE FOR THE USE OF THE WORLD HERITAGE EMBLEM

A. Simple Agreement of the National Authorities
National authorities may grant the use of the Emblem to a national entity, provided that the project, whether national or international, involves only World Heritage Sites located on the same national territory. National authorities decision should be guided by the Guidelines and Principles.

B. Agreement Requiring Quality Control of Content
Any other request for authorisation to use the Emblem should adopt the following procedure:

a) A request indicating the objective of the use of the Emblem, its duration and territorial validity, should be addressed to the Director of the World Heritage Centre.
b) The Director of the World Heritage Centre has the authority to grant the use of the Emblem in accordance with the Guidelines and Principles. For cases not covered, or not sufficiently covered, by the Guidelines and Principles, the Director refers the matter to the Chairperson who, in the most difficult cases, might wish to refer the matter to the Bureau for final decision. A yearly report on the authorised uses of the Emblem will be submitted to the World Heritage Committee.
c) Authorisation to use the Emblem in major products to be widely distributed over an undetermined period of time is conditional upon obtaining the manufacturer's commitment to consult with countries concerned and secure their endorsement of texts and images illustrating sites situated in their territory, at no cost to the Centre, together with the proof that this has been done. The text to be approved should be provided in either one of the official languages of the Committee or in the language of the country concerned. A draft model form to be used by third parties to obtain States Parties' authorisation for the use of the Emblem appears as an appendix to this document.
d) After having examined the request and considered it as acceptable, the Centre may establish an agreement with the partner.
e) If the Director judges that a proposed use of the Emblem is not acceptable, the Centre informs the requesting party of the decision in writing.

RIGHT OF STATES PARTIES TO EXERT QUALITY CONTROL

Authorisation to use the Emblem is inextricably linked to the requirement that the national authorities may exert quality control over the products with which it is associated.

1. The States Parties to the Convention are the only parties authorised to approve the content (images and text) of any distributed product appearing under the World Heritage Emblem with regard to the Sites located in their territories.
2. States Parties that protect the Emblem legally must review these uses.
3. Other States Parties may elect to review proposed uses or refer such proposals to the World Heritage Centre. States Parties are responsible for identifying an appropriate national authority and for informing the Centre whether they wish to review proposed uses or to identify uses that are inappropriate. The Centre will maintain a list of responsible national authorities.

APPENDIX 9: Dorset Coast Strategy 1999 Tourism Policies

POLICY 5.1: OVERALL STRATEGY FOR COASTAL TOURISM

An integrated and long-term approach to tourism between the resorts and rural coast will be sought. Priority issues for the coast include:

- Improving the overall quality and value for money of Dorset's tourism product
- Prioritising development of the staying visitor market through higher quality serviced and self-catering accommodation, and attracting more higher-spending visitors
- Spreading the visitor load by focussing on out-of-season special interest markets
- Developing the established role of resorts as accommodation centres in their own right and as gateways to the rural coastline
- Improving the integration of activity and promotion between the different attractions
- Improving links between the public and private sectors
- Providing real alternatives to the car as the main mode of visitor transport
- Using the potential of World Heritage Site status to help protect the undeveloped coast and facilitate sustainable tourism.

5.1a The Dorset Coast Forum will establish a Tourism Working Group to establish better links between policy makers, the tourism industry and coastal managers. The group will take on the tourism role of the former Tourism and Recreation Working Group.

5.1b The Dorset Coast Forum will support the work of the Dorset Tourism Marketing Strategy, develop better integration with the Tourism Working Group and encourage a project-based approach to issues.

5.1c The Dorset Coast Forum will seek to identify criteria for monitoring the impact of tourism in a high quality environment.

5.1d The Dorset Coast Forum will support the efforts of the principal resorts to create their own distinctive characters.

5.1e The Dorset Coast Forum will work with smaller coastal towns and villages to develop their role as gateways to the undeveloped coast and marine environment and develop locally distinctive and complementary roles.

POLICY 5.2: INCREASED LINKAGE BETWEEN THE TOURISM INDUSTRY AND VISITOR MANAGEMENT

The management of visitors on Dorset's sensitive rural coast should be more explicitly recognised as an integral part of the tourism economy. There is a need to consider ways in which appropriate visitor management can be supported by the tourist economy, and a need for tourism interests to have a greater role in influencing the standards of visitor management, which are delivered.

5.2a The Dorset Coast Forum will support more co-ordinated and active visitor management on the rural coast through Local Authority Ranger services and other existing site-based management services.

5.2b The Dorset Coast Forum will encourage regular meetings, focussed at the District Council level which bring together coastal managers, tourism policy makers and tourism industry representatives in order to develop policy and assist in the prioritisation of work programmes.

5.2c The Dorset Coast Forum will encourage a more cohesive approach to the provision and promotion of coastal access

5.2d The Dorset Coast Forum will encourage higher standards of interpretation and information at coastal access points and improved dissemination through Tourist Information Centres and tourism accommodation.

5.2e The Dorset Coast Forum will promote active debate about the transport implications of the trends in the tourism economy, and ensure that evidence and information is fed into the Local Transport Plans, and other transport and planning initiatives.

5.2f The Dorset Coast Forum will work with the tourism industry and other relevant organisations to research and agree ways in which the industry could help fund improved visitor management.

POLICY 5.3: PROMOTING NEW SUSTAINABLE TOURISM MARKETS

A healthy tourism industry requires a longer visitor season and priority should be given to promoting out of season tourism based on a series of niche markets which are available in Dorset. Possible markets include:

- Residential study tours and courses for those interested in geology, history, wildlife and other themes
- Professional seminars and conferences/training based on studies of the Dorset coast

- Return visits by school and college students and their families
- Events based around marine recreation and watersports
- Events, activities and conferences based around Dorset's marine life and the innovative techniques used to research and interpret it
- Use of the coast as settings for film and television scenes.

5.3a The Dorset Coast Forum will encourage the wider promotion and further development of well-managed sailing, power boating and other marine recreation events in appropriate locations.

5.3b The Dorset Coast Forum will encourage the promotion of special interest, uniquely 'Dorset' holidays to international markets.

5.3c The Dorset Coast Forum will encourage the expansion of Dorset Coastlink by the development of additional marine and coastal interpretation centres along the Dorset Coast, initially focussing on existing information centres. These could include existing centres at Studland, Bournemouth and Weymouth and possibly new centres at Hengistbury Head, Portland, West Bay or Lyme Regis. A wider coverage of centres along the coast would help to increase the profile of 'Marine Week' and marine interpretation in general.

5.3d The Dorset Coast Forum will encourage market research into the economic potential of educational activity and environmental tourism and organise a conference for the tourism industry to explore the potential of niche markets.

POLICY 5.4: WORLD HERITAGE AND THE TOURISM INDUSTRY

Now that the UK Government has announced that the Dorset and East Devon coast in on their final 'Tentative list' of World Heritage Sites, there is the potential to promote growth in the coastal tourism economy. It is essential however that the designation is used properly and responsibly and that any economic development is sustainable and not detrimental to the 'natural' value of the World Heritage Site. Active discussion must take place between all relevant parties to ensure that there is agreement on the role of the designation in promoting tourism and that guidelines are established that will ensure the long term future coast as a well-managed World Heritage Site.

5.4a The Dorset Coast Forum will establish a World Heritage Steering Group to begin the process of developing a World Heritage Site Management Plan, and giving consideration to policies for visitor promotion, management and transport issues

POLICY 5.5: THE JURASSIC COAST AND THE TOURISM INDUSTRY

Growth in coastal tourism income will be encouraged through the Jurassic Coast Project.

5.5a The Dorset Coast Forum will support appropriate measures for geological conservation and the development of geological education, interpretation and geotourism strategies through the work of the Jurassic Coast Project.

5.5b The Forum will encourage the Jurassic Coast project in developing the Portland economy through the celebration of its internationally important coastal geology and quarrying heritage. The Forum will support the development of plans for an internationally important 'Jurassic Coast Centre', which will focus on these and other related themes.

POLICY 5.6: PRIORITISING THE DEVELOPMENT OF STAYING VISITOR MARKETS

Staying visitors bring more revenue into the local economy per capita and are more likely to make use of public transport. The Forum believes that developing an infrastructure that supports the staying visitor will assist the future prosperity of coastal tourism. A key element of this is the arrangements made for transportation, and means of slowing traffic growth and prioritising the use of sustainable transport.

5.6a The Dorset Coast Forum will initiate further research into the comparable tourism value of day-trippers and staying visitors.

5.6b The Dorset Coast Forum supports the continued development of work on a sustainable transport strategy by the Purbeck Heritage Committee.

5.6c The Dorset Coast Forum will assess existing public transport links between the rural coast and accommodation centres, and make recommendations for improvements if necessary.

5.6d The Forum will promote and encourage increased use of cycling as a mode of transport by staying visitors.

5.6e The Forum supports the development and marketing of an integrated visitor transport network centred on Weymouth, with links east to Swanage and west to Lyme Regis

5.6f The Dorset Coast Forum will promote the use of sea transport for visitor movement in the County.

POLICY 5.7: COASTAL NEEDS FOR INFORMATION AND MONITORING

Existing tourism research needs to be better disseminated throughout the county and further research is required to properly evaluate the use of the coast by visitors, their attitudes and demands for facilities, and the development potential and value of new markets.

5.7a The Dorset Coast Forum will seek to improve the data available for the better management of tourism in the county.

5.7b The Dorset Coast Forum will encourage improved monitoring of the use of countryside sites by visitors.

POLICY 5.8: STRENGTHENING THE ROLE OF THE RESORTS

The regeneration of flourishing and distinctive coastal resorts and towns will be supported, through:

- Maintaining and improving the appearance and quality of sea fronts to a high standard
- Maintaining and increasing the range of high quality attractions and accommodation
- The provision of increased facilities for water-based recreation, and maintenance of high standards of beach management & water quality
- The development of the resorts roles as gateways to the rural coast, through improved access, public transport and publicity
- Promoting a diversity of small businesses geared to providing quality and value for money services to visitors and locals.

5.8a The Dorset Coast Forum will support the efforts of the resorts to develop their own individual and distinctive character.

5.8b The Dorset Coast Forum will, where practicable, use tourist accommodation and conference facilities for its events and activities.

5.8c The Forum will encourage the promotion of resorts, alongside those in rural Dorset, as out of season accommodation bases for special interest and activity holidays.

5.8d The Dorset Coast Forum will encourage the safe development and diversification of marine recreation activities at the resorts but provide safeguards that will minimise impacts on the rural coast.

5.8e The Dorset Coast Forum will encourage the resorts to work with rural coast managers to establish better arrangements for managing tourism within the coast as a whole.

APPENDIX 10: "Tourism – Everybody's Business": Devon County Council's Role and Action Programme 2003

Strategic Overview

Provision of Strategic Influence

Influencing South West Tourism, Regional Development Agency, Regional Assembly, Government Office for the South West, Countryside Agency, Environment Agency etc to ensure that the interests of Devon's economy and environment are recognised at the regional level and the county's competitive position is secure.

Goal: A Prosperous Devon

1. Develop a Better Understanding of Tourism

- Develop the current occupancy survey to monitor volume and value trends and facilitate best value comparisons.
- Commission appropriate research to learn more about visitors and non-visitors including their views on public transport improvements.
- Interpret and disseminate market intelligence to local organisations and tourism SMEs.
- Evaluate marketing campaigns to monitor targets and economic impact.
- Investigate the potential market for a flagship tourist attraction together with opportunities for existing attractions.
- Investigate a methodology of assessing environmental and social costs of tourism, together with the economic value of the environment.

2. Increase Off Peak Activity

- Product development and marketing initiatives to maximise the proportion of trips taken outside the main season.
- Develop / co-ordinate one major out of season, county-wide festival annually linking directly to the website themes based on Devon's local distinctiveness.
- Co-ordinate and encourage the opening of attractions and other visitor facilities into the early and late season.
- Examine how sport and recreational tourism, including watersports and countryside pursuits,, can play a role in contributing to out of season tourism through the promotion of events and activities.
- Seek to extend the period of operation of tourist and recreational bus services.

3. Develop the Devon Brand

- Establish a stronger Devon branding based on its high quality environment which is proactively promoted through the media.
- Develop and market Devon-wide themed tourism products not local authority 'destinations'.
- Develop marketing activity to encourage an increase in overseas tourism to Devon.
- Develop better use of the Internet and other on-line media and new technologies for marketing purposes**.**
- Research the economic value of marine activities including sailing, sea-angling and cruise ship activity.

4. Improve the Quality and Diversity of Attractions

- Support South West Tourism's scheme for attraction standards.
- Work with South West Tourism and the attractions sector eg. DATA (Devon Association of Tourist Attractions) to examine the impact of attraction proposals and encourage better regional co-ordination.
- Develop the diversity and quality of cultural and creative attractions.

5. Ensure Accommodation Meets Market Demand

- Provision of accurate, up to date information on market demands / trends re. accommodation
- Review of structure planning policies which influence the location of new accommodation.
- Encourage participation in the harmonised quality standards scheme for accommodation.
- Continue to promote national and local 'inspected only' accommodation.

6. Encourage High Quality Throughout the Tourism Sector

- Promote a positive, quality image of Devon.
- Encourage higher standards of customer care and welcome.
- Encourage support for the network of Tourist Information Centres.
- Implement revised National Guidelines for tourism brown-signing, once agreed.
- Encourage destination benchmarking and health checks by district and unitary authorities.
- Encourage appropriate new tourism development through planning policies.

7. Increase the Use of Information and communication Technology

- Capitalise on new ways to deliver information to visitors including electronic information points for public transport.
- Develop and promote a Devon brand portal web site which would access a common single information database.
- Provide ready access to training and support for small businesses, so they can take

advantage of marketing and communication through this medium.
- Support business development of the network of Tourist Information Centres through ICT including identifying funding sources.

8. Improve the Performance of Tourism Businesses
- Increase high-value tourism activity.
- Improve the performance of existing businesses and stimulate new ones where appropriate.
- Train and equip local people to take jobs in the industry.
- Encourage the industry to become better employers.
- Support for a first-stop shop facility for SMEs involved in tourism.
- Ensure the principles of environmental sustainability are included within all tourism training.

9. Encourage Rural Regeneration Through Tourism
- Develop easier access to the countryside especially by sustainable transport.
- Encourage use of local suppliers and services.
- Develop linkages between food, drink and other local produce and the tourism industry.
- Promote and support tourism initiatives as part of the integrated development of Devon's market towns and villages.
- Encourage tourism operators to highlight the linkages between their product and the environment through appropriate interpretation.
- Encourage new markets for activity and special interest breaks.
- Co-ordinate action between local stakeholders, especially rural tourism enterprises.

10. Work in Partnership towards Resort Regeneration
- Ensure planning policies meet the need for a positive and innovative approach to tourism development in resorts and tourist centres.
- Support SWERDA's Market and Coastal Towns Initiative, including conservation work through the Heritage Economic Regeneration Scheme.
- Work with district and unitary authorities to implement enhancement programmes.
- Take account of the peripheral nature of resorts and their inbound visitor traffic and public transport requirements in the Local Transport Plan.
- To ensure museums in the resorts and market towns benefit from any potential funding opportunity.
- Encourage the development of all-weather attractions and facilities.

11. Tackle Social Inclusion by Increasing Access to Tourism For All
- Ensure that all facilities and infrastructure will meet the requirements of the Disability Discrimination Act by 2004.
- Seek public transport access to tourist areas so that facilities are inclusive to non-car owners.
- Consider the needs and opportunities of visitors with disabilities and ensure these are taken into account in development of recreational routes.
- Help tourism businesses to be more aware of the physical barriers that impede access.
- Ensure that the promotion of tourism is totally inclusive of all sections of society including the requirements of DCC's Race Equality Scheme.

Goal: Improving Transport

12. Improve the Transport Infrastructure Taking Account of the Needs of the Tourism Industry
- Increase tourism by addressing Devon's perceived peripherality and developing improved transport links to Devon by air, sea, rail and coach, together with improved interchanges.
- Promote the branding of major trunk roads through Devon such as the Devon Expressway (A38) and the A361(North Devon Link)/A39.
- Optimise the role of the Local Transport Plan puts in place alternatives for tourists to the use of the car where feasible and that further measures are developed to aid tourism–related traffic including coaches, caravans and sight-seeing car-drivers.
- Implement agreed National Guidelines for tourism brown signing.

13. Develop Public Transport Opportunities for Tourists
- Increase tourism without traffic by developing opportunities for tourists to travel by train and bus for journeys within Devon.
- Encourage Local Plans to include provision for infrastructure in support of public transport, including tourist coaches.
- Improve public transport in rural areas, linking in to local visitor attractions, the walking and cycling networks, and countryside destinations such as reservoirs.
- Ensure that public transport opportunities are marketed and promoted for leisure use eg. Dartmoor Rover, and that joint promotions between operators, with attractions and

museums, and links to recreational routes, are encouraged.
- To further develop joint Travelwise / museum and heritage attractions initiatives.

14. Continue to Improve the Walking, Cycling and Horse-Riding Networks
- Maintain and improve the Public Rights of Way network and implement the Countryside and Rights of Way legislation.
- Continue to enhance the strategic networks for walking and cycling, including the National Cycle Network routes, in Devon.
- Maintain, and where necessary, improve the physical standard of the strategic walking network to compete with high quality products elsewhere.
- Examine the feasibility of providing horse-riding networks.
- Ensure that the recreational networks are properly marketed and promoted and that detailed information and interpretative material is available for all routes.
- Develop the economic potential arising from the creation of the access networks and work with town and parish councils to achieve this.

Goal: Looking After Devon's Environment, Culture and Heritage

15. Conserve the Resource
- Maintain and develop effective Structure Plan policies to protect the landscape and special character of Devon.
- Ensure appropriate tourism is developed within the County's National Parks and Areas of Outstanding Natural Beauty taking account of the special characteristics of their landscapes.
- Work with environmental agencies and conservation groups to plan for visitor activity.
- Use strategic route networks as catalysts for environmental enhancement including landscape, nature conservation and traditional buildings.
- Progress the Devon Building Centre as a visitor attraction promoting Devon's traditional building skills and materials
- Establish visitor management plans for areas under pressure.
- Develop counter-attractions to relieve the pressure on over-visited sites.
- Work with holiday parks to minimise their impact on the landscape, through appropriate landscaping schemes.

16. Encourage Good Environmental Practice
- Ensure a wider take-up of environmental schemes across the whole industry in the County and that appropriate training is available.
- Encourage waste minimisation and examine the opportunities to provide appropriate re-cycling facilities for small tourism businesses.
- Develop and promote additional visitor payback schemes and codes of responsible behaviour.
- Encouragement with Encams (former Tidy Britain Group) to improve beach facilities and bathing water quality.
- Develop marketing initiatives promoting Devon as a destination for eco-tourism based on the natural and built heritage of the County.
- Encourage farmers and landowners to benefit from land management schemes such as Stewardship and Environmentally Sensitive Areas.

17. Develop Opportunities for Cultural Tourism
- Develop the tourism and economic potential arising from the UNESCO designated Dorset and East Devon Coast World Heritage Site, the Braunton Burrows Biosphere Reserve and the bid for World Heritage status for Cornwall and West Devon Mining Landscape.
- Ensure the Local Cultural Strategy pays due regard to the role of tourism within the cultural resource.
- Encourage and support the local distinctiveness of Devon including the built environment.
- Ensure that the cultural characteristics of the strategic route network are enhanced and interpreted.
- With adjoining counties, develop the tourist potential of canals in the sub-region through appropriate marketing initiatives.
- Develop events and festivals.
- Develop and support museums and other heritage attractions.
- Investigate the opportunities to provide for leisure learning linked to the heritage sector.
- Create linkages for tourism with local cultural strategies.

18. Involve Local Communities in Tourism
- Ensure that tourism issues are recognised in the preparation of Community Strategies.
- Consult with local communities on significant tourism issues.
- Encourage the links between tourism and community enhancement.
- Raise awareness of importance of tourism for the well-being of communities.

Appendix 11: Terms of Reference for World Heritage Steering Group

1. These terms of reference specify the aims and membership of the Dorset and East Devon Coast World Heritage Steering Group (WHSG).

2. The 1972 World Heritage Convention is one of the family of UNESCO conventions for the protection of the cultural and natural heritage. Under the Convention, cultural and natural sites are designated as being of outstanding universal value and placed on the World Heritage Sites list. Of particular relevance are the following two articles of the Convention:

   Article 4
   Each State Party [i.e. the UK Government] to this Convention recognizes that the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage referred to in Articles I and 2 and situated on its territory, belongs primarily to that State. It will do all it can to this end, to the utmost of its own resources and, where appropriate, with any international assistance and co-operation, in particular, financial, artistic, scientific and technical, which it may be able to obtain.

   Article 5
   To ensure that effective and active measures are taken for the protection, conservation and presentation of the cultural and natural heritage situated on its territory, each State Party to this Convention shall endeavor, in so far as possible, and as appropriate for each country:

   a. to adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes;
   b. to set up within its territories, where such services do not exist, one or more services for the protection, conservation and presentation of the cultural and natural heritage with an appropriate staff and possessing the means to discharge their functions;
   c. to develop scientific and technical studies and research and to work out such operating methods as will make the State capable of counteracting the dangers that threaten its cultural or natural heritage;
   d. to take the appropriate legal, scientific, technical, administrative and financial measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage; and
   e. to foster the establishment or development of national or regional centres for training in the protection, conservation and presentation of the cultural and natural heritage and to encourage scientific research in this field.

3. The achievement of these commitments in relation to the Dorset and East Devon Coast is set out the World Heritage Site Management Plan, published by Dorset and Devon County Councils, who are also the local sponsors of the World Heritage nomination, with the support of the Dorset Coast Forum.

Purpose of the World Heritage Steering Group

4. The purpose of the WHSG is specified in the World Heritage Site Management Plan as follows:

   - **World Heritage Steering Group.** This group will have overall responsibility for ensuring that the management objectives of the World Heritage Site are achieved, and will oversee the implementation of the World Heritage Site Management Plan, and the monitoring and reporting on the state of the World Heritage Site. The Committee will be formally constituted with terms of reference and specified membership. The membership of the group will be based on the Steering Committee formed to oversee the preparation of this Site Management Plan.

   Recognising that in detail there are widely shared responsibilities for managing the Site, the Group and its members will use their best endeavours to perform the above role.

5. The World Heritage Site Management Plan is non-statutory, and the World Heritage Steering Group will also operate on a non-statutory, non-executive basis. Dorset and Devon County Councils in particular, and members of the Steering Group in general, undertake to bring significant issues and opportunities in relation to the World Heritage Site to the attention of the World Heritage Steering Group. Its specific tasks will include:

   - Providing a link between UK Government and Dorset and Devon interests to ensure the commitments made under the World Heritage Convention are met;
   - Promoting good working relationships and co-ordination between the members of the Steering Group over the implementation

of the Plan, and joint working with other partners;
- Advising the work of Dorset and Devon County Councils (and any jointly funded project officers employed by them) on the implementation and development of the World Heritage Site Management Plan;
- Ensuring that conservation, tourism, commercial and landowning interests have a direct input to the work undertaken in relation to the World Heritage Site;
- Providing a forum where issues related to World Heritage status can be raised and discussed;
- Generating ideas on the development of new projects and activities in relation to the World Heritage Site;
- Advising and assisting, without prejudice, funding applications for work related to the World Heritage Site;
- Consultation on the annual monitoring report on the Site, prior to its completion and submission to UNESCO;
- Promoting greater public awareness of the World Heritage Convention, and appropriate local publicity;
- Promoting participation from Dorset and East Devon in national and international activities related to the promotion of the World Heritage Convention.

Advisory Groups

6. The Steering Group will be advised by a Science and Conservation Advisory Group (SCAG) on matters related to the conservation of the scientific interests of the Site, and by a Tourism Working Group (TWG) on aspects of WHS related to tourism, including interpretation, sustainable tourism, promotion, branding and publicity.

7. The WHSG will be kept fully informed of the meetings and activities of the SCAG and TWG, and will receive the agendas and minutes of each. The WHSG may ask the SCAG and TWG to consider and report back on specific issues, or the SCAG and TWG may independently raise and refer issues to the WHSG.

8. Significant issues and initiatives will ultimately be the responsibility of the WHSG to advise on. For the efficient management of the work programme, responsibility for advising on specific projects and issues may be delegated to one of the Advisory Groups.

9. Other advisory groups may be established following discussion with the World Heritage Steering Group if required.

Membership of the Steering Group

10. Initial membership of the Steering Group is based on the membership of the World Heritage Steering Group that has advised the development of the nomination, and is as follows:
    - Dorset County Council
    - Devon County Council
    - Department for Culture, Media and Sport, or their nominee from the UK delegation to UNESCO
    - Government Office South West (representing Department for the Environment, Food and Rural Affairs)
    - Chairman of the Dorset Coast Forum
    - Chairman of the World Heritage Tourism Working Group
    - Chairman of the World Heritage Scientific Advisory Group
    - English Nature (National Adviser on Earth Science)
    - Countryside Agency
    - British Geological Survey
    - South West Tourism
    - South West of England Regional Development Agency
    - East Devon District Council
    - Purbeck District Council
    - West Dorset District Council
    - Weymouth and Portland Borough Council
    - Lyme Bay and South Devon Coastal Group
    - Geologists' Association
    - Ministry of Defence Estates
    - A representative of the National Trust
    - A private coastal landowner representative from Dorset, appointed following consultation with the CLBA
    - A private coastal landowner representative from Devon, appointed following consultation with the CLBA
    - A representative of local Fossil Collectors
    - A representative of the tourism industry in Dorset, appointed following consultation with the World Heritage Tourism Working Group (unless this role is covered by the Chairman of the TWG)
    - A representative of the tourism industry in Devon, appointed following consultation with the World Heritage Tourism Working

Group (unless this role is covered by the Chairman of the TWG)

- Dorset AONB Partnership
- East Devon AONB Partnership.

11. The membership will be reviewed from time to time to confirm that the right range of interests continues to be represented. Invitations to additional members, or any requests to join the Steering Group will be fully discussed at a meeting of the Group prior to any approach or response.

Chairmanship of the Steering Group

12. The group will be chaired by an existing member of the Group.

Secretariat

13. Secretarial support will be provided to the group by Dorset and Devon County Councils.

Frequency of Meetings

14. The group will meet a minimum of once annually, and at other times as necessary for the achievement of the tasks set out above.

Minutes of Meetings

15. Meetings will be minuted by Dorset and Devon County Councils, and the minutes will be publicly available.

Linkages to other initiatives

16. The Steering Group will ensure that linkages are maintained between the World Heritage Site Management Plan for the Site, and the other planning and management initiatives locally that need to take account of World Heritage objectives. These linkages are set out in the World Heritage Site Management Plan, and will be kept under continual review. The linkages are summarised in the attached diagram from the World Heritage Site Management Plan.

Review of terms of reference

17. These terms of reference may be reviewed by the WHSG at any time, and may be amended following full discussion of a revised draft at a meeting of the WHSG.

David Andrew
Chairman of World Heritage Steering Group
22 July 2002

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

DORSET AND EAST DEVON COAST (UNITED KINGDOM)

1. DOCUMENTATION

i) **WCMC Data sheet:** (19 references)

ii) **Additional literature consulted:** Goudie, A. and Brunsden, D. 1997. **Classic Landforms of the East Dorset Coast**. The Geographical Association, Sheffield; and Ellis, N.V et al. (Eds.). 1996. **An Introduction to the Geological Conservation Review**. Joint Nature Conservation Committee, Peterborough.

iii) **Consultations:** 2 external reviewers contacted; relevant officials from government, protected area agencies, and public institutions; private estate owners; geological associations; tourist operators; and other interest groups.

iv) **Field visit:** February-March, 2001. Paul Dingwall,

2. SUMMARY OF NATURAL VALUES

Located on the south coast of Britain, the nominated property comprises eight sections along 155km of largely undeveloped coast and countryside between Orcombe Rocks, near Exmouth in east Devon in the west, and Studland Bay, Dorset, in the east. The total area of the site is 2,550ha, 80% of which is cliffed coastline. The property has a combination of internationally renowned geological features considered by both palaeontologists and geomorphologists to be one of the most significant research sites for their respective fields of study in the world. The nominated site includes a near-continuous sequence of Triassic, Jurassic and Cretaceous rock exposures, representing almost the entire Mesozoic Era (between 251 and 66 million years ago), or approximately 185 million years of Earth history. The Triassic succession of mudstones and sandstones is over 1,100m thick, representing 50 million years of deposition. The sequence of Jurassic strata exposed between Lyme Regis and Swanage is among the best sections of marine Jurassic-age rocks to be found anywhere in the world. All stages of the Cretaceous are represented with the exception of the very youngest.

The nominated site contains a range of internationally important Mesozoic fossil localities, including Lyme Regis, Kimmeridge Bay, the Isles of Portland and Purbeck, Durlston Bay, High Peak, Otter Point, Furzy Cliff (Weymouth), Charmouth and Axmouth. Great numbers of vertebrate, invertebrate and plant fossils have been discovered, along with fossil dinosaur footprints in quarries near Swanage. Examples of significant palaeontological discoveries not known from elsewhere include *Dimorphodon macronyx*, one of the earliest flying reptiles, and *Scelidosaurus harrisoni*, the "Charmouth dinosaur". Important among the marine reptiles are *Temnodontosaurus*, ichthyosaurs, *and Metriacanthosaurus parkeri*. The area has yielded a rich source of ammonites such as *Asteroceras obtusum, Parkinsonia parkinsoni* and *Titanites anguiformis*, which have been used to zone the Jurassic. Well preserved remains of a late Jurassic fossil forest, estimated to be more than 140 million years old, are exposed on the Isle of Portland and the Purbeck coast: many trees are preserved *in situ* with their associated soils and pollen, a boon for palaeoecologists.

In terms of the site's geomorphological significance, a great variety of landslides have formed, some of which, such as those at Bindon, Black Ven, Hooken, East Weares and Kings Pier, are scientifically important throughout Europe. The long history of scientific study of these mass-movement systems is such that these formations have become, literally and figuratively, 'textbook' examples. The site is also renowned for the study of beach formation and evolution on a retreating coastline. Chesil Beach, stretching from West Bay to Portland, is one of the best-studied beaches in the world. The beach is famous for the volume, type and grading of pebbles. The 480ha Fleet Lagoon, enclosed by Chesil Beach, is one of the most important saline lagoons in Europe, its sediments providing evidence of late Holocene beach evolution, and changes in sea level, climate and vegetation. Chesil Beach and the Fleet is an outstanding example of a barrier beach and lagoon system, protected by several national and European designations. The Isle of Purbeck is notable for its well developed

coastal landforms, including cave-bay sequences and textbook examples of bays, stacks, and rock arches at Lulworth Cove, Durdle Door and Old Harry Rocks.

In addition to the site's palaeontological and geomorphological significance, important coastal vegetation habitats occur in the nominated area, such as the landslipped cliffs and cliff-top grasslands of W. Dorset, that support several rare plant species of national and European importance and parts of the nominated coast are protected under international designation. The Exe Estuary Special Protection Area (SPA), a Ramsar wetland, supports over 20,000 migratory wildfowl, including internationally important populations of avocet, dark-bellied brent goose and slavonian grebe. The Sidmouth to Beer Coast SSSI (Site of Special Scientific Interest) protects the westernmost example of species-rich grassland in England, with a very diverse invertebrate fauna. The Lyme Bay reefs provide one of the most easterly locations for several Mediterranean-Atlantic plants species, such as the pink seafan *Eunicella verrucos,* and has rich epifauna, especially sponges.

3. COMPARISON WITH OTHER GEOLOGICAL SITES

The site is significant in terms of geological history, palaeontology, geomorphology and the history of geological and related sciences.

In terms of geology, the Dorset and East Devon Coast is one of Britain's most significant areas, and one of two mainland sites nominated for its geology on the U.K. World Heritage tentative list. The area includes 67 nationally and internationally recognised localities in the statutory Geological Conservation Review. While sites representing the same geological time period are found throughout the world, there is no better example anywhere of a complete succession through the Mesozoic Era, a period of 185 million years. Among prominent geological World Heritage sites, Istchigualasto-Talampaya in Argentina and Canada's Dinosaur Provincial Park represent the Triassic and late Cretaceous respectively, but no site currently on the World Heritage list contains the complete Mesozoic succession. The nominated site also represents an exceptionally well-documented sedimentary basin, now one of the best-known and oft-studied of its type in the world. Only Australia's Sydney and Gippsland Basins, and the western flank of the Basin and Range Province in North America, are similar, but none is extensively protected.

In terms of palaeontology, the nomination document includes a comprehensive comparative analysis in which 12 selected fossil sites or interests are rated against the IUCN criteria for establishing the outstanding universal value of fossil sites (pp. 36-37). The results clearly demonstrate the global significance of the Dorset and East Devon sites in all rated categories, particularly in terms of the long geological time period represented; the diversity of fossil assemblages; the international significance of sites (all 12 are assessed as internationally important); and the quality of preservation of specimens, with some complete and well-articulated skeletons, three-dimensional and soft-part preservation and the presence of finely detailed plants and wood structures. The Lyme Regis (Lower Jurassic) and Purbeck Group formations (Lower Cretaceous) are the most significant fossil sites; specimens from them are found throughout the world's museums.

In terms of geomorphology, the landslides here are internationally recognized, comparable with those of the Black Sea Coast and New Zealand, which are also internationally renowned. The Bindon landslide complex, protected in the Lyme Regis to Axmouth Undercliffs National Nature Reserve, was the first to be fully described in a scientific memoir. Black Ven is the largest mudslide complex in Europe. No beach in the world is known to have been as intensively studied as Chesil Beach, and there are few that exhibit the exceptional degree of grading of the size of its sediments along the shore. The juxtaposition of concordant and discordant coastlines (i.e. those aligned with and against the grain of the geological structure) within the same geological strata, as found on this coast, is rare on a global scale.

The nominated area also has an internationally unique status in the history of geological science. Regarded for more than 200 years as among the best available research sites anywhere for geological inquiry, the resulting prodigious output of research, published in thousands of scientific papers, has fundamentally shaped the development of geological thinking. Its role in this respect continues today.

4. INTEGRITY

4.1. Site integrity

The nominated site contains all the key, interdependent elements of geological succession exposed on the coastline. It has an almost complete representation of Triassic, Jurassic and Cretaceous rocks, all within a single sedimentary basin. Regional tilting of the structures to the east means that a walk from west to east along the coast is an almost unbroken "journey" through 185 million years of geological time. The stratigraphy represents a wide range of both marine and terrestrial depositional environments and a full range of sedimentary rock types. The array of fossil faunas and floras show interrelated elements of the prehistoric record of life and environments. The site includes a series of coastal landforms whose processes and evolutionary conditions are little impacted by human activity. The boundary of the site is defined by natural phenomena: on the seaward side the site extends to the mean low water mark and on the landward side to the cliff top or back of the beach. This is also in general consistent with the boundaries of the nationally designated areas that protect the site.

The high rate of erosion and mass movement in the area creates a very dynamic coastline; the boundaries of the site, therefore, may need periodic monitoring to ensure that significant changes to the shoreline are reflected in revised boundaries.

4.2. Management integrity

The nominated site lies almost entirely within two areas designated under national conservation legislation as Areas of Outstanding Natural Beauty (IUCN Category V Protected Landscape/Seascape). Also protected under national law are thirteen SSSIs, and a large National Nature Reserve (IUCN Category IV). The site also contains areas designated as being of international importance for wildlife, either as a Special Conservation Area or SPA under European Community Directories. Chesil Beach/the Fleet and Exe Estuary are designated as a Ramsar Wetland of International Importance.

An estimated 95km of the 155km of coastline in the nominated site are owned by public bodies, conservation agencies or large private estates. While most of the site is in private ownership, mainly within four large estates, the National Trust, a major U.K. conservation charity, owns about 35km of coastline. Smaller areas are owned by County and District Councils and by the Ministry of Defence, which uses 5km of coast as the Lulworth Gunnery Ranges: the Ministry's management of this area is subject to conservation policies set out in a management plan. Privately owned SSSIs have management oversight from the English Nature agency. The bed of the Fleet lagoon and part of Chesil Beach are owned by the Ilchester Estates and managed as a local nature reserve. There are two commercially owned landholdings on the Isle of Portland.

The nominated property is currently extensively protected by a variety of designations and a range of land use and protected area management plans. A single management plan has been prepared for the nominated site, coordinated by the Dorset and Devon County Councils. The plan, which has undergone public consultation, has six prime objectives relating to the protection of the geology and landforms, conservation and enhancement of landscapes and seascapes, and visitor management and education. Significantly, emphasis is given to integrating World Heritage management with wider sustainable development objectives in the counties. Management plans for existing areas inside the nominated property: they include county development plans, local district plans, mineral and waste management plans, shoreline management plans and Environment Agency river catchment plans. The National Trust maintains plans for management of wildlife, landscape, and visitor use of its properties; all its sites are inalienably conserved for the benefit of the public. Wildlife Trust reserves, National Nature Reserve, and military lands all have management plans.

Many people are employed by landowners and agencies to undertake management operations in sites within the nominated area. More than 40 wardens and rangers are employed by the two county councils, the E. Devon and Purbeck District Councils, English Nature, the National Trust, Ilchester and Lulworth Estates and the Dorset Wildlife Trust. Two new positions - geological coordinator and tourism officer - are envisaged if World Heritage status is achieved. Management of the area is well funded on a partnership basis with more that £500,000 provided annually for staff budgets of current employees, excluding professional staff such as local government planners and tourism officers. There are many well developed and professionally managed information centres, museums, accommodation and transport facilities, and other services available to visitors. Public access to the beaches and cliff tops is available via public rights of way and permissive paths. The South-West Coastal path, one of 13 nationally designated trails, extends through part of the site. Excellent marine search and rescue facilities are located at several sites in the area. The research capacity underpinning protected area management, provided from regional and national scientific institutions, is substantial.

Only about ten people live permanently in the nominated site, though there are some seasonally occupied beach huts and holiday chalets. The population in gateway towns is estimated at less than 200,000. The area has been

a popular tourist destination since the 18th Century, and about 14 million people, mostly day-trippers, visit the nominated site and adjacent coastal areas annually. There are currently few significant threats to the site. A vigilant regime of active management will address important issues such as path erosion, and vegetation and wildlife disturbance. A voluntary code of conduct has been developed to help manage the collection of fossils by amateur and professional collectors. Two sites lie within areas where there are permissions for mineral extraction, but the local authorities believe neither will be reactivated. Coastal defence works are required in places but they are not overly intrusive on site values.

In summary, IUCN believes this nominated site has strong legal protection and is managed effectively for long-term preservation of its natural geological values. It thus meets the conditions of management integrity.

5. ADDITIONAL COMMENTS

None.

6. APPLICATION OF CRITERIA/STATEMENT OF SIGNIFICANCE

Dorset and East Devon Coast is nominated in accordance with World Heritage natural criteria (i) and (iii).

Criterion (i): Earth's history and geological features

In relation to this criterion, the site's claim to outstanding universal value is based on the following significant values:

- The coastal exposures within the site provide an almost continuous sequence of Triassic, Jurassic and Cretaceous rock formations spanning the Mesozoic Era and document approximately 185 million years of Earth history;

- The site includes a range of internationally important fossil localities – both vertebrate and invertebrate, marine and terrestrial - which have produced well preserved and diverse evidence of life during Mesozoic times;

- The site contains a range of textbook exemplars of coastal geomorphological features, landforms and processes;

- The site is renowned for its contribution to earth science investigations for over 300 years, and has helped foster major contributions to many aspects of geology, palaeontology and geomorphology; and

- The site has continuing significance for many aspects of earth science research and is a high quality teaching and training resource for the earth sciences.

Critical examination of these elements, complemented by field inspection, discussions with protected area managers and scientists, and consideration of the views of independent reviewers and prominent scientists who have written in support of the nomination, lead to the conclusion that these claims can be fully substantiated. The site is also unlike any other geological site currently accorded World Heritage status, and it has both a scientific and conservation significance ranking it among these existing sites. IUCN considers that the nominated site meets this criterion**.**

Criterion (iii): Superlative natural phenomena or natural beauty and aesthetic importance

The nominated property is a substantially natural coastline in a setting of attractive rural landscapes and associated seascapes. Most of the site is designated as nationally significant in terms of its scenic qualities (e.g., as Areas of Outstanding Natural Beauty and Heritage Coasts). The attractiveness of the site derives in particular from the classically developed landforms, whose scenic qualities are enhanced by the close association of a great diversity of landforms in a relatively confined area. Component materials of the landforms also have aesthetic appeal: stone quarried from Purbeck, Portland and Beer has been used in the construction of many great buildings in Britain, some of which (e.g., the Tower of London) are themselves World Heritage cultural sites.

Moreover, the landscapes have inspired a number of authors, poets and artists of international renown, adding to the rich legacy of cultural associations with the site.

However, when compared to existing World Heritage sites fulfilling the criterion, IUCN considers that Dorset and East Devon Coast is of national importance rather than of outstanding universal value. IUCN considers that the nominated site does not meet this criterion.

7. RECOMMENDATION

The Bureau recommended to the Committee that the Dorset and East Devon Coast site be **inscribed** on the World Heritage List under natural criterion (i).

CANDIDATURE AU PATRIMOINE MONDIAL - ÉVALUATION TECHNIQUE UICN

LITTORAL DU DORSET ET EST DU DEVON (ROYAUME-UNI)

1. DOCUMENTATION

i) **Fiches techniques UICN/WCMC** (19 références)

ii) **Littérature consultée: Additional literature consulted:** Goudie, A. and Brunsden, D. 1997. **Classic Landforms of the East Dorset Coast**. The Geographical Association, Sheffield; and Ellis, N.V et al. (Eds.). 1996. **An Introduction to the Geological Conservation Review**. Joint Nature Conservation Committee, Peterborough.

iii) **Consultations:** Deux évaluateurs indépendants; fonctionnaires compétents, agences responsables des aires protégées et institutions publiques; propriétaires privés; associations de géologie; agents de tourisme et autres groupes intéressés.

iv) **Visite du site:** Février-mars 2001. Paul Dingwall.

2. RÉSUMÉ DES CARACTÉRISTIQUES NATURELLES

Situé sur le littoral méridional de la Grande-Bretagne, le site proposé comprend huit sections s'égrenant sur 155 km, dans un paysage essentiellement sauvage, entre Orcombe Rocks, près d'Exmouth (est du Devon), à l'ouest et Studland Bay (Dorset) à l'est. La superficie totale du site est de 2550 hectares dont 80 pour cent de littoral bordé de falaises. Le bien présente un ensemble de caractéristiques géologiques de réputation internationale, considérées par les paléontologistes et les géomorphologistes comme l'un des sites de recherche les plus importants du monde pour leurs domaines de recherche respectifs. Le site proposé comprend une séquence quasi continue de roches à nu datant du Trias, du Jurassique et du Crétacé et représentant pratiquement toute l'ère mésozoïque (entre 251 et 66 millions d'années) ou environ 185 millions d'années de l'histoire de la terre. La succession de «mudstones» et de grès du Trias est épaisse de plus de 1100 mètres et représente 50 millions d'années de dépôts. La séquence de la strate jurassique à nu entre Lyme Regis et Swanage est parmi les meilleurs exemples au monde de roches marines du Jurassique. Toutes les étapes du Crétacé sont représentées à l'exception des très très récentes.

Le site proposé contient une gamme de localités fossilifères du Mésozoïque d'importance internationale, y compris Lyme Regis, Kimmeridge Bay, les îles de Portland et Purbeck, Durlston Bay, High Peak, Otter Point, Furzy Cliff (Weymouth), Charmouth et Axmouth. On y a découvert, en abondance, des fossiles de vertébrés, d'invertébrés et de plantes ainsi que des empreintes fossiles de dinosaures dans des carrières près de Swanage. Parmi les exemples de découvertes paléontologiques importantes inconnues ailleurs, il y a *Dimorphodon macronyx*, un des premiers reptiles volants et *Scelidosaurus harrisoni*, le «dinosaure de Charmouth». Parmi les reptiles marins importants, on peut citer *Temnodontosaurus*, les ichthyosaures et *Metriacanthosaurus parkeri*. La région a donné une source riche d'ammonites telles que *Asteroceras obtusum, Parkinsonia parkinsoni* et *Titanites anguiformis*, qui ont toutes servi à établir les zones du Jurassique. Sur l'île de Portland et sur le littoral de Purbeck, sont exposés les vestiges bien préservés d'une forêt fossilisée du Jurassique supérieur qui aurait plus de 140 millions d'années: de nombreux arbres sont préservés *in situ* avec leur sol et leur pollen - un trésor pour les paléo-écologistes.

Du point de vue de l'importance géomorphologique du site, il y a une grande diversité de coulées de terre et certaines (Bindon, Black Ven, Hooken, East Weares et Kings Pier, par exemple) sont d'importance scientifique à l'échelle de l'Europe. L'étude scientifique déjà ancienne de ces systèmes de mouvements de masse est telle que les formations sont devenues, au propre comme au figuré, des cas d'école. Le site est également renommé pour l'étude de la formation et de l'évolution des plages sur un littoral en recul. Chesil Beach, qui s'étend de West Bay à Portland, est une des plages les mieux étudiées du monde, célèbre pour le volume, le type et l'étalement granulométrique de ses galets. Fleet Lagoon, qui couvre 480 hectares et qui est englobée dans Chesil Beach, est une des lagunes salées les plus importantes d'Europe: l'étude de ses sédiments permet d'observer l'évolution des

plages à la fin de l'Holocène et les changements du niveau de la mer, du climat et de la végétation. Chesil Beach et Fleet Lagoon constituent un exemple exceptionnel de système de cordon littoral et lagune, protégé par plusieurs dénominations nationales et européennes. L'île de Purbeck est remarquable pour sa topographie côtière à maturité, y compris des séquences de grottes et baies et des exemples de baies, de pinacles et d'arches à Lulworth Cove, Durdle Door et Old Harry Rocks, qui sont de véritables cas d'école.

Outre son importance du point de vue paléontologique et géomorphologique, le site proposé contient des habitats côtiers importants pour la végétation tels que les falaises effondrées et les prairies de sommet de falaise dans l'ouest du Dorset où l'on trouve plusieurs espèces de plantes rares d'importance nationale et européenne. Certains secteurs du littoral proposé sont protégés par des dénominations internationales. La Zone de protection spéciale (ZPS) de l'estuaire de l'Exe, un site Ramsar, accueille plus de 20 000 oiseaux d'eau migrateurs, y compris des populations d'importance internationale d'avocettes, de bernaches cravants et de grèbes esclavons. Le Site d'intérêt scientifique spécial (SISS) de Sidmouth à la côte de Beer protège l'exemple le plus à l'ouest de l'Angleterre d'une prairie riche en espèces ayant une faune d'invertébrés très diverse. Les récifs de Lyme Bay sont parmi les sites les plus à l'est pour plusieurs espèces de plantes atlantico-méditerranéennes telles que *Eunicella verrucos,* et contiennent aussi une épifaune riche, en particulier des éponges.

3. COMPARAISON AVEC D'AUTRES SITES GÉOLOGIQUES

Le site est important du point de vue de l'histoire géologique, de la paléontologie, de la géomorphologie et de l'histoire des sciences géologiques et connexes.

Du point de vue de la géologie, le Littoral du Dorset et est du Devon constitue l'une des régions les plus importantes de Grande-Bretagne et l'un des deux sites continentaux inscrits, pour la géologie, sur la Liste de référence du patrimoine mondial du Royaume-Uni. La région comprend 67 localités reconnues au plan national et international dans l'Étude de conservation géologique. Il existe, partout dans le monde, des sites qui représentent la même période géologique mais il n'existe pas de meilleur exemple d'une succession complète du Mézosoïque, une période de 185 millions d'années. Parmi les plus importants biens géologiques du patrimoine mondial, Ischigualasto-Talampaya, en Argentine, et le Parc provincial Dinosaur, au Canada, représentent respectivement le Trias et la fin du Crétacé mais aucun site actuellement inscrit sur la Liste du patrimoine mondial ne contient une succession mésozoïque complète. Le site proposé représente également un bassin sédimentaire exceptionnellement bien étudié, un des mieux connus et des plus souvent étudiés de ce type au monde. Seuls les bassins de Sydney et du Gippsland, en Australie, ainsi que le flanc ouest de la province des cuvettes et prairies, en Amérique du Nord sont comparables mais aucun d'eux n'est aussi bien protégé.

Du point de vue de la paléontologie, le document justificatif comprend une analyse comparative complète où 12 sites fossiles choisis sont évalués d'après les critères UICN permettant d'établir la valeur universelle exceptionnelle des sites fossilifères (p. 36-37). Les résultats démontrent clairement l'importance mondiale du Littoral du Dorset et est du Devon dans toutes les catégories évaluées, en particulier du point de vue de la longue période géologique représentée; de la diversité des ensembles de fossiles; de l'importance internationale des sites (les 12 sites évalués sont importants au niveau international); et de la qualité de l'état de préservation des spécimens avec quelques squelettes complets et bien articulés, des parties molles et en trois dimensions bien préservées et la présence de plantes et de structures de bois au détail très fin. Les formations du groupe Lyme Regis (Jurassique inférieur) et Purbeck (Crétacé inférieur) sont parmi les sites fossilifères les plus importants; les musées du monde entier possèdent des spécimens provenant de ces sites.

Du point de vue géomorphologique, les coulées de terre sont réputées au plan international et comparables à celles du littoral de la mer Noire et de Nouvelle-Zélande qui sont également réputées au niveau international. Le complexe de coulées de terre de Bindon, protégé dans la Réserve naturelle nationale de Lyme Regis à Axmouth Undercliffs, fut le premier à être entièrement décrit dans un mémoire scientifique. Black Ven est le plus grand complexe de coulée de boue d'Europe. Aucune plage au monde n'est aussi étudiée que Chesil Beach et bien peu présentent l'étalement granulométrique exceptionnel des sédiments de rivage. La juxtaposition d'un littoral concordant et discordant (c'est-à-dire aligné avec ou contre le grain de la structure géologique) dans la même strate géologique, comme dans le site, est rare à l'échelle mondiale.

Le site proposé jouit également d'un statut international unique dans l'histoire de la science géologique. Considéré depuis plus de 200 ans comme l'un des sites les plus intéressants pour la recherche géologique, il a livré une quantité prodigieuse de données de recherche, publiées dans des milliers d'articles scientifiques, qui ont

fondamentalement façonné le développement de la pensée géologique. Son rôle à cet égard se poursuit encore aujourd'hui.

4. INTÉGRITÉ

4.1. Intégrité du site

Le site proposé contient tous les éléments clés et interdépendants de la succession géologique à nu sur le littoral. Il contient une représentation presque complète des roches du Trias, du Jurassique et du Crétacé dans un même bassin sédimentaire. En raison de la pente régionale des structures vers l'est, une promenade d'ouest en est, le long de la côte, se transforme en «voyage» ininterrompu à travers 185 millions d'années de temps géologiques. La stratigraphie représente une vaste gamme de milieux sédimentaires marins et terrestres et une gamme complète de types de roches sédimentaires. Dans l'assemblage de faune et de flore fossiles, on peut observer des éléments intimement liés de l'expression préhistorique de la vie et des milieux naturels. Le site comprend une série d'éléments topographiques côtiers dont les processus et les conditions d'évolution ont subi peu d'effets des activités humaines. Les limites du site sont définies par un phénomène naturel: du côté de la mer, le site s'étend jusqu'à la laisse moyenne de basse mer et du côté de la terre jusqu'au sommet de la falaise ou l'arrière de la plage. Ces limites correspondent également à celles des zones classées au niveau national pour la protection du site.

Le taux d'érosion élevé et le mouvement de masse créent un littoral très dynamique; les limites du site, en conséquence, pourraient nécessiter une surveillance périodique pour faire en sorte que les changements importants dans le littoral soient reflétés dans des limites révisées.

4.2. Intégrité de la gestion

Le site proposé se trouve presque entièrement à l'intérieur de deux zones classées en vertu de la législation nationale sur la conservation de la nature, dans la catégorie Zone à la beauté naturelle exceptionnelle (Catégorie V de l'UICN, paysage marin et terrestre protégé).

Il y a également treize zones d'intérêt scientifique spécial protégées par la loi nationale ainsi qu'une grande réserve naturelle nationale (Catégorie IV) de l'UICN. Le site comprend aussi des zones d'importance internationale pour la faune et la flore sauvages - une zone de conservation spéciale et une zone de protection spéciale, sous l'égide de la Communauté européenne. Chesil Beach/Fleet Lagoon et l'estuaire de l'Exe forment un site Ramsar.

Sur les 155 km de littoral se trouvant dans le site proposé, 95 km appartiendraient à des organismes publics, des agences de conservation ou feraient partie de grandes propriétés privées. La majeure partie du site fait essentiellement partie de quatre grandes propriétés privées, mais le National Trust, un grand organisme britannique de conservation à but non lucratif possède environ 35 km du littoral. Des zones plus petites appartiennent aux Conseils de Comté et de District et au ministère de la Défense qui utilise 5 km du littoral à Lulworth Gunnery Ranges: la gestion de la région par le ministère fait l'objet de politiques de conservation énoncées dans un plan de gestion. La gestion des zones d'intérêt scientifique spécial privées est supervisée par l'organisme English Nature. Le lit de Fleet Lagoon et une partie de Chesil Beach appartiennent au Ilchester Estates et sont gérés en tant que réserve naturelle locale. Il y a deux terrains appartenant à des intérêts commerciaux sur l'île de Portland.

Le site proposé bénéficie actuellement d'une protection importante sous une diversité de dénominations. Il est doté de toute une gamme de plans pour l'utilisation des sols et pour la zone protégée. Un seul plan de gestion a été préparé pour le site proposé : il est coordonné par les Conseils de Comté du Dorset et du Devon. Le plan qui a fait l'objet d'une consultation publique a six objectifs principaux relatifs à la protection de la géologie et de la topographie, à la conservation et à l'amélioration des paysages terrestres et marins et à la gestion du tourisme et de l'éducation. Il convient de noter que l'accent est mis sur l'intégration de la gestion du bien dans les objectifs de développement durable généraux des comtés. Il existe des plans de gestion pour certaines zones à l'intérieur du site proposé: ils comprennent des plans de développement des comtés, des plans de district locaux, des plans de gestion des minerais et des déchets, des plans de gestion du littoral et les plans de l'Environment Agency pour le bassin hydrographique. Le National Trust a établi des plans de gestion pour la faune et la flore sauvages, le paysage et l'utilisation touristique de ses propriétés; tous les sites sont conservés de manière inaliénable dans

l'intérêt public. Les Réserves du Wildlife Trust, la réserve naturelle nationale et les zones militaires disposent toutes de plans de gestion.

Les propriétaires et agences emploient de nombreuses personnes pour assurer la gestion dans le site proposé. Les deux Conseils de Comté, les Conseils de District de l'est du Devon et de Purbeck, English Nature, the National Trust, Illchester et Lulworth Estates ainsi que Dorset Wildlife Trust emploient plus de 40 gardiens et gardes. Deux nouveaux postes – coordonnateur géologique et responsable du tourisme – sont envisagés au cas où le statut de bien du patrimoine mondial serait accordé. La gestion de la région est bien financée sur une base de partenariat et plus de 500 000 livres sterling sont consacrées chaque année au budget pour couvrir le salaire des employés actuels à l'exception des membres du personnel professionnel, tels que les planificateurs et responsables du tourisme du gouvernement local. Il y a de nombreux centres d'information gérés de manière professionnelle, des musées, des logements et des moyens de transport pour le public. L'accès du public aux plages et au sommet de la falaise est assuré par des droits de passage et des sentiers publics. Le sentier du littoral sud-ouest, un des 13 sentiers nationaux, traverse une partie du site. Il y a d'excellents équipements de sauvetage en mer dans plusieurs endroits de la région. La capacité de recherche à la base de la gestion de l'aire protégée, fournie par des institutions scientifiques régionales et nationales, est très importante. Dix personnes seulement vivent en permanence dans le site proposé mais, en saison, quelques cabanes de plage et chalets de vacance sont occupés. La population, dans les villes d'accès, est estimée à moins de 200 000 personnes. La région est une destination touristique populaire depuis le 18e siècle et environ 14 millions de personnes, essentiellement en excursions d'un jour, visitent le site proposé et les zones côtières adjacentes chaque année. Il n'y a actuellement que peu de menaces importantes pour le site. Un régime vigilant de gestion active traitera les questions importantes telles que l'érosion des sentiers et la perturbation de la végétation et de la faune sauvage. Un code de conduite volontaire a été mis au point pour aider à gérer la collection de fossiles des collectionneurs amateurs et professionnels. Il y a deux concessions minières à l'intérieur du site proposé mais les autorités locales estiment que dans aucun des deux cas, les activités ne reprendront pas. Des travaux de protection du littoral sont nécessaires par endroits mais ne gâchent pas trop les valeurs du site.

En résumé, l'UICN estime que le site proposé dispose d'une protection juridique importante et qu'il est géré de manière efficace en vue de la protection à long terme de ses valeurs géologiques naturelles. En conséquence, il satisfait aux conditions d'intégrité de la gestion.

5. AUTRES COMMENTAIRES

Aucun.

6. APPLICATION DES CRITÈRES/DÉCLARATION D'IMPORTANCE

Le littoral du Dorset et est du Devon est proposé conformément aux critères naturels du patrimoine mondial (i) et (iii).

Critère (i): histoire de la terre et processus géologiques

Concernant ce critère, le document invoque une valeur universelle exceptionnelle en raison des valeurs importantes suivantes :

- Les parois côtières exposées à l'intérieur du site fournissent une séquence pratiquement continue de formation rocheuse du Trias, du Jurassique et du Crétacé s'étendant sur tout le Mésozoïque et «écrivent» environ 185 millions d'années d'histoire de la terre.

- Le site comprend une gamme de localités fossilifères d'importance internationale – à la fois pour les vertébrés et les invertébrés, marins et terrestres – qui offrent une preuve bien préservée et diverse de la vie durant l'époque mésozoïque.

- Le site contient toute une gamme de caractéristiques, formes topographiques et processus géomorphologiques côtiers qui sont des cas d'école.

- Le site est célèbre pour sa contribution aux études des sciences de la terre depuis plus de 300 ans et il a apporté des contributions majeures à de nombreux aspects de la géologie, de la paléontologie et de la géomorphologie.

- Le site est important pour de nombreux aspects de la recherche en sciences de la terre et constitue une ressource d'enseignements et de formation de haute qualité pour les sciences de la terre.

Un examen critique de ces éléments, complété par une inspection sur le terrain, des discussions avec les gestionnaires de l'aire protégée et des scientifiques et l'étude de l'opinion d'évaluateurs indépendants et de scientifiques éminents qui ont soutenu par écrit cette proposition forcent à conclure que toutes ces prétentions peuvent être pleinement vérifiées. Le site ne ressemble à aucun autre site géologique se trouvant actuellement sur la Liste du patrimoine mondial; son importance du point de vue scientifique et pour la conservation le classe parmi les sites déjà inscrits. L'UICN considère que le site proposé remplit ce critère.

Critère (iii): phénomènes naturels éminemment remarquables ou de beauté exceptionnelle

Le site proposé présente un littoral relativement naturel, dans un cadre de paysages ruraux plaisants et paysages marins associés. La plus grande partie du site est proposée pour son importance national du point de vue de ses qualités paysagères (par ex., en tant que zone à la beauté naturelle exceptionnelle et littoral du patrimoine). L'intérêt du site provient en particulier de formes topographiques classiques dont les qualités paysagères sont renforcées par une association étroite à une grande diversité de formes topographiques dans une zone relativement confinée. Les matériaux composants les formes de relief ont aussi un aspect esthétique: les pierres exploitées sur Purbeck, Portland et Beer ont été utilisées dans la construction de nombreux ouvrages célèbres de Grande-Bretagne dont certains (par exemple la Tour de Londres) sont eux-mêmes des biens culturels du patrimoine mondial. En outre, le paysage a inspiré de nombreux auteurs, poètes et artistes de renommée internationale, ce qui ajoute un intérêt au patrimoine culturel riche du site.

Toutefois, lorsqu'on le compare à des sites existants du patrimoine mondial qui remplissent ce critère, l'UICN considère que le Littoral du Dorset et est du Devon est d'importance nationale plutôt que de valeur universelle exceptionnelle. L'UICN considère que le site proposé ne remplit pas ce critère.

7. RECOMMANDATION

Le Bureau a recommandé que le Comité **inscrive** le Littoral du Dorset et est du Devon sur la Liste du patrimoine mondial sur la base du critère naturel (i).