

JERSEY GEOPARK

INTRODUCTION TO LANDSCAPES AND ENVIRONMENTS TO BE PROTECTED

R. A. H. NICHOLS. Ph.D. 2016.

Geology Section, La Société Jersiaise.

Geology controls...

Scenery.

Microclimates.

Valleys.

High land.

Ecosystems.

Groundwater.

Mills.

Soils.

Farming.

Stone types.

Dolmens.

Forts & Towers.

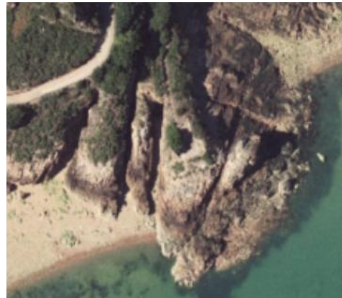
Castles.

Churches.

Road walls.

Sheltered bays.

Harbour sites.



These sites must be protected from development which will destroy their uniqueness, their history and our heritage.



CONTENTS.

1. Proposal with reference to Jersey National Parks, Ramsar sites and Habitats.
2. Significance of Geology; justification; conservation.
3. Geology SSIs.
4. Archaeology SSIs.
5. Soils.
6. Key habitats, terrestrial & littoral.
7. Water resources.
8. References.

Jersey Geopark Proposal. (***) To follow UNESCO Global Geoparks, 2016; copy attached).

The Proposal emphasises Geology and Archaeology SSIs but these should be co-ordinated with Jersey National Parks (Island Plan 2011 and National Trust Jersey) and include other coastal and inland sites for Marine Biology (Ramsar); Flora (Bot. incl. Woodland) & Fauna (Zool.); Mycology; Entomology, Ornithology and Vernacular Architecture, to present a more complete picture of Jersey's environment. Simpler language is used, c.f. Jersey's Geological Heritage, Sites of Special Interest (Nichols, R.A.H. & Blampied S. 2016. Soc. Jers.).

Significance.

The geology of Jersey is unique in the Channel Islands and different from the other islands in the Bay of St. Malo; it also differs from that of Normandy and Brittany.

The rocks, their colours and their structures are a window which reveals how the area was eroded into an island, then a small flat-topped hill and then the present day island.

Jersey consists of a striking variety of sedimentary and igneous rocks, varying from shales, greywackes and conglomerates to extrusive andesites, rhyolites and ignimbrites and several varieties of plutonic granite and diorites and gabbros. In addition, these are intruded by various minor intrusive dolerite and lamprophyre dykes. These are overlain by superficial deposits formed during the Ice Ages, such as loess, and during the Interglacials, such as raised beach gravels and peat with tree stumps.

These range in age from c. 700 Ma to the present day, with the majority of rocks being between Precambrian (> 550 Ma) and Palaeozoic (c. 400 Ma).

There is a large time-gap after the formation of these rocks, when they were eroded into hills on a coastal plain by seas which deposited chalk and limestone formations, and the recent deposits being of the Pleistocene (c. 2 Ma) and Holocene (c. 10,000 yrs bp) periods.

Much of our Ice Age history is also present when we alternated between a low-plateau landscape when loess was deposited, and an island landscape when three raised beaches were deposited and Prehistoric mankind lived in two major sea cave and rock shelter sites, giving us faunal deposits, followed by peat and woodland giving us flora deposits.

Each of the SSIs forming the Geopark, acts as a staging post on a Jersey Geology Trail along a unique geological history route and at each site, note what features derive from the geology.

Geology reacts with climate and is the foundation of our :- Scenery, location of our Valleys, Highland & Lowland, Microclimates, Groundwater, Soils, Ecosystems, Vegetation, types of Farming, supplies of Stone (Quarries & Sand extraction), Dolmens, Mills, Forts, Castles & Towers, Churches, Settlement, Roads & walls and the positions of our sheltered Bays and Harbours, walls & quays.

The twenty two SSIs are situated along a trail going clockwise from St. Helier SSI 1. South Hill, St. Helier.

Justification.

It is proposed that the selection of the twenty two SSIs justifies the significant aspects illustrated by the rock types and structures in Jersey's geological history described above.

For example, each site is described and illustrated by photos of the salient features, and its status, recognised internationally, nationally and locally, justifies it as a site worthy of full protection by the status of the Geopark.

If we preserve our Geological Heritage; we will learn about our past, we can improve the present and forecast the future.

Our Sites and our Collections are essential to fulfil these objectives and the reasons to preserve them are as follows:

Geology involves earth processes and learning the history of life.

It draws its knowledge from the rocks, be they at geological sites, be it in the laboratory through examination of specimens collected by scientists and amateurs.

All the sites and all the specimens are unique. They are witnesses to events in time and at particular places. Any copies could never take their place. They are part of our heritage. Certain geological sites are particularly interesting, be it by their content, rare and limited, or be it by their value as reference points. It is the same for specimens in collections. It is evidently impossible to preserve each geological site, each rock, mineral and fossil from natural or human destruction. None the less, the means exist today to protect the most important elements of this heritage.

Three good reasons to preserve our Geological Heritage.

1. To Encourage Scientific Knowledge.

Geologists read the rocks, the history of the Earth and of Life. The geological sites and the collections provide the same objectives in geologists' studies inspiring them to new theories and permitting them to confirm others. How can they be asked to discover new resources, to preserve others if they are not given the means to understand the fundamentals?

To preserve elements of our Geological Heritage is to facilitate the work of scientists in domains where they contribute to ensuring the vital needs of mankind, whether it's a question of utilisation of water, the use of soils and rock or the exploitation of sources of energy.

In the general interest, scientific knowledge ought to be taken into account in any modifications of important and remarkable geological sites.

2. To Permit everyone to have access to the Riches of their Natural Heritage.

The history of the Earth and that of Life are the fundamental elements of our culture. Essential questions such as "Where do we come from?" and "Where are we going?" are partly answered in those histories. To respect the Earth and its Life demands a prerequisite knowledge of geological phenomena which constitute a real heritage.

Each person, adult or child, ought to have access to this geological heritage. Geology above all is learned on the ground by observation and analysis. Making sites available is indispensable for its teaching. For each can open "windows" onto our foundations, the most important elements of our Geological Heritage ought to be preserved and given value from cultural and educational points of view.

3. To Share in our Local Economic Development.

A quarry, an excavation, a mine tip or a cliff face can become a major element in tourist development founded on the highlights of our heritage.

Examples are not lacking, be they a question of private initiatives or projects developed by local groups. The preservation and development of geological sites, when they respect the public's safety and quality of life, the beauty of the sites and the scientific assets, are the factors of economic development.

Thus, why not integrate the Geological Heritage into Tourism Development more often ?

Conservation.

Method Plan.

The SSI booklet contains maps of each site the angular boundaries of which have a GPS position for each corner. **(Check for printing an itinerary booklet).**

1. It is proposed that the SSI booklet be accompanied by a booklet of OS maps of each site showing the boundaries and numbered points at each corner.
2. A display board, such as the existing ones for the heritage dolmens or environment nature points, should be placed at the entrance with instructions to follow the route; not hammering or breaking of any outcrop; collect only one specimen from débris, no litter.

(Costing to be determined).

3. The entrance and starting point for visiting should be shown with a trail (dashed line) indicating the route to be followed **(Planning permission needed; list of landowners to be added form Lindsey; costs).**
4. Ideally, each of the corners should be identified on the ground by large boulders carrying a site and corner number, eg. 1.1.

Monitoring.

1. The name of the States Department/Office and a contact telephone number should be provided.
2. Photographs of each outcrop/exposure within the site should be taken for a photographic record with titles and brief descriptions of same **(Documenting sites by SJ Geol. Section, as with Arch. Sites, related to members' addresses).**
3. Periodically, Ranger checks should be made of the sites against the original photo file/proforma, with date & time, and any damage/disappearance/landslip recorded.

4. Photographic evidence and description of tree root and vegetation growth and any change should accompany the report.
5. Record and report any damage to the signs, and/or potential danger on the track, corner stones e.g. graffiti.
6. Record any reports by the public with date and time and site.
7. Record any consultation and action taken.

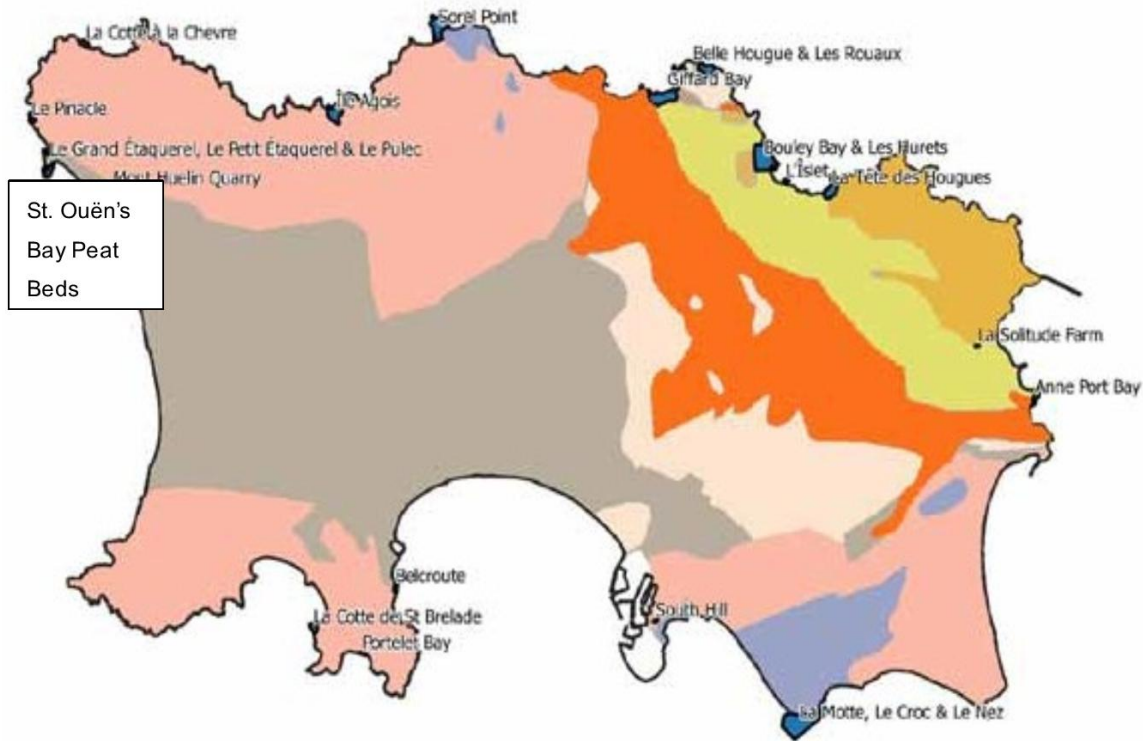
Maintenance.

1. After the periodic site check (as above), any remedial action should be undertaken, e.g. vegetation trimming (as per archaeology sites). Any root growth which could cause landslip and danger should be treated **(Rangers or land owners responsibility to be decided....was this discussed when they agreed to be an SSI).**
2. Clear the track of excess vegetation and any boulders or hazards to pedestrians.
3. Clean the displays and corner signs/numbers each Autumn and Spring.

GEOLOGY. The twenty two SSIs are situated westwards from St. Helier; Coastal Management areas are separate.

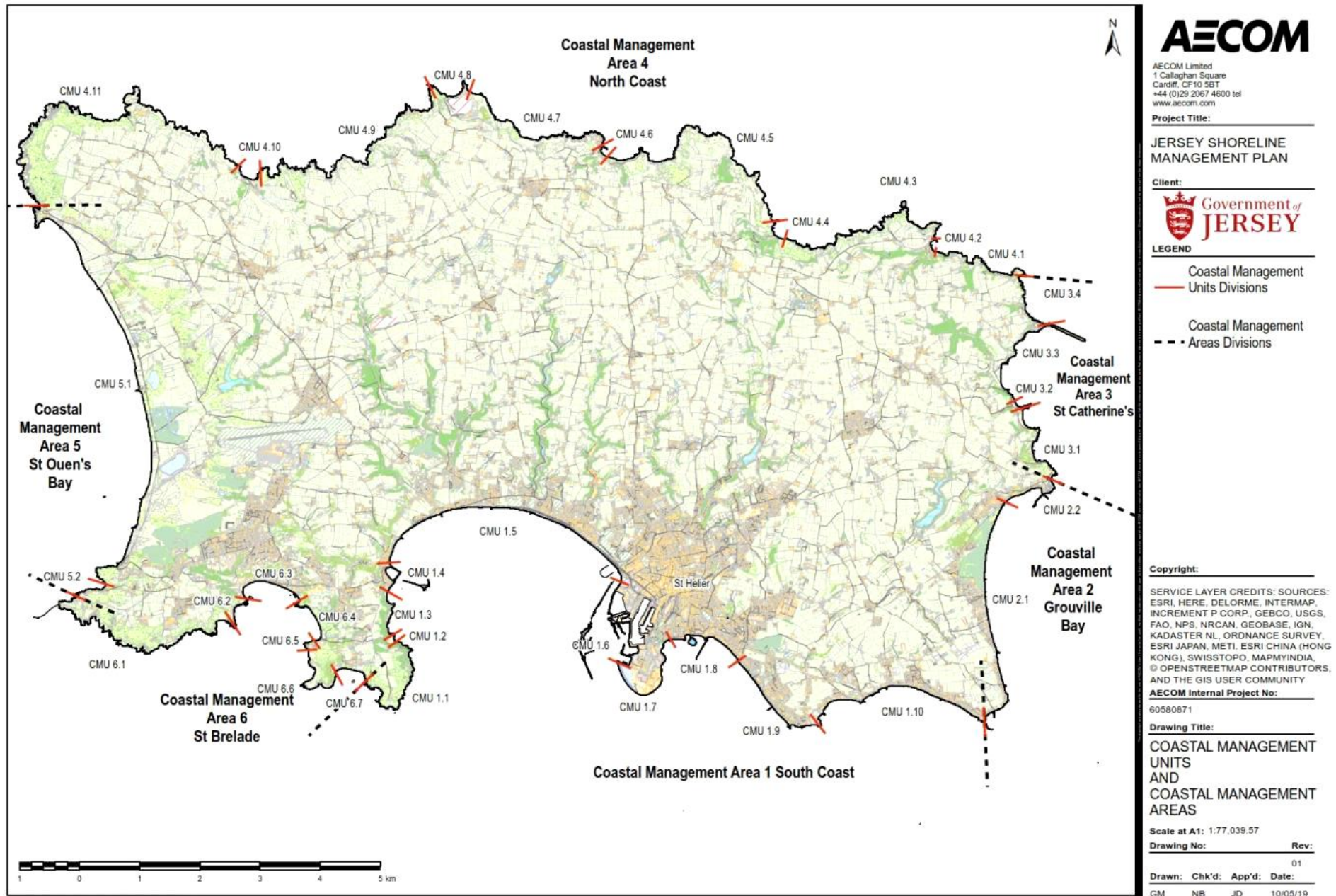
- SSI 1. South Hill, St. Helier.
- SSI 2. Belcroute Bay.
- SSI 3. Portelet Bay.
- SSI 4. La Cotte de St. Brélade.
- SSI 5. St. Ouën's Bay Peat Beds.
- SSI 6. Le Mont Hueulin Quarry.
- SSI 7. Le Petit Étaquerel.
- SSI 8. Le Grand Étaquerel.
- SSI 9. Le Pulec.
- SSI 10. Le Pinnacle.
- SSI 11. La Cotte à la Chèvre.
- SSI 12. Île Agois and Crabbé.
- SSI 13. Sorel Point.
- SSI 14. Giffard Bay.
- SSI 15. La Belle Hougue Caves.
- SSI 16. Les Rouaux.
- SSI 17. Les Hurets, Bouley Bay.
- SSI 18. L'Islet, Bouley Bay.
- SSI 19. La Tête des Hougues.
- SSI 20. La Solitude Farm.
- SSI 21. Anne Port Bay - La Crête Point.
- SSI 22. La Motte, Le Nez, Le Croc.

Continuous observation needed for mass wasting, weathering and erosion of; Cliff tops, faces, quarries, and beach deposits.
Loess, especially La Motte (Green Is.) and soil deposits.



Four policy options have been assessed: No Active Intervention, Maintain the Defence Line, Adaptive Management and Advance the Line. Each of these policy options has been assessed for each of the 36 Coastal Management Units (CMUs) presented in Figure 1-1 to select a policy option for each which provides robust and sustainable management at a local level. **AECOM 2019, Shoreline Management Plan Appendix C. Multivariate Assessment, p.1. Island Plan Review, 2012 - 2030.**

Figure 1-1: Jersey Coastline divided into Coastal Management Areas and Coastal Management Units.



JERSEY GEOPARK GEOLOGY SSI TRAILS

SSI 1. South Hill, St. Helier.



SSI boundaries (lightgreen).



The 40 metre raised beach.



Mica lamprophyre dyke contact zone.

A 40 metre raised beach which consists of a mixed pebble deposit, mostly of local granite (granophyre), embedded in sand, crops out on the north-west side of the hill.

In addition, adjacent mica lamprophyre dykes of varying strike, and a dolerite sill can be seen in the Fort Regent granophyre, part of the South-east granite, on the south side, and a classic soil creep structure occurs on the north side of this site.



Mica lamprophyre dyke, N-S strike.



A sill-like dolerite intrusion in granophyre.



Effects of soil creep on bedrock.

JERSEY GEOPARK GEOLOGY SSI TRAIL.

SSI. 2. Belcroute Bay.



SSI boundaries (light green)



Cliff exposure of raised beach & loess.



8 m raised beach

Excellent cliff exposure (sometimes covered by land slip) of Quaternary glacial deposits. Basal raised beach sand deposit overlain by periglacial head & loess. Excellent 8m raised beach strand line of large granite pebbles & cobbles. Uppermost head and loess with decalcification textures. Plus one of three island rhyolite dykes, a dolerite & lamprophyre dyke to the north and south, and a nearby def Jersey Shale Formation beach contact with the SW Granite.



Flow-banded rhyolite dyke.



Jersey Shale near SW Granite contact.



Tear-faulted lamprophyre dyke.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 3. Portelet Bay.



SSI boundaries (light green).



8m raised beach with sand and Head.



Head and loess deposits.

Excellent cliff exposures of lower glacial head, Pleistocene 8m raised beach of large granite cobbles, overlain by blown sand, glacial head and loess deposits.

Well-exposed outcrop of the coarse Corbière granite facies of the SW Granite with excellent outcrops of dolerite dykes and eroded gullies, a rare sill, and a tombolo spit linking the beach area to l'Île au Guerdain.



Corbière granite & eroded dyke gullies.



Dolerite sill, base of western cliffs.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 4. La Cotte de St. Brélade.



SSI boundaries (lightgreen).



La Cotte de St. Brélade rock shelter.



Entrance to shelter along eroded joint faces.

Fine outcrop of the Porphyritic granite type of the SW Granite and excellent differing joint patterns show how the rock shelter was formed. Rare, continuous range of Quaternary age deposits; basal loess, followed by peat then by glacial head, indicating change from glacial interglacial and back to glacial with 18m & 8m raised beach levels.

Striking fossils of mammoth, deer, other mammals, and human remains with tools.



Re examination of Loess & Head by UCL team.



More Palaeolithic tools & fossils found.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 5. St. Ouën's Bay Peat Beds.



SSI boundaries (lightgreen).



Peat digging areas, La Saline.



Tree stump & root systems of birch & alder.

Along the shoreline of St. Ouën's Bay, subject to weather conditions and shingle movement, there are excellent exposures of peat between 5 -7000 yrs. bp in beach sections from Le Braye to Le Port, L'Ouzière, La Saline, and Le Bas de L'Étaçq. Striking examples of tree stumps, root systems, branches and twigs of Birch (*Betula*) and Alder (*Alnus*) occur, often in their growth position in a compact peat. There are rare examples of flora such as flowers, fronds of *Phragmites* sp. later features occur such as hoof prints, cattle bones, pottery and flint artifacts.



Rootlets in sandy beds below peat, & phragmites Fossil bovine hoof prints, Le Port.



Stems & twigs in rippled peat beds.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 6. Le Mont Huelin Quarry.



SSI boundaries (light green).



Contact of Jersey Shale & NW granite.



Isolated shale xenolith in granite.

Well exposed, accessible junction between Jersey Shale Formation and NW Granite, the bedded Jersey Shale showing contact metamorphism to hornfels. And occurring as xenoliths. Isolated molybdenite in granite near junction. Curved joint planes parallel to the junction, and master joint planes in the granite.



Molybdenite & quartz vein in granite.



Curved joint plane



Master joint plane.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 7. Le Petit Étacquerel.



SSI boundaries (lightgreen).



The small stack to the left.



Turbidite flow-ripples north of stack.

Excellent examples of two former stacks eroded during higher sea level.

Excellent exposures of a variety of sedimentary structures illustrating the depositional environment of the Jersey Shale Formation north & south of slipway.



Cross-bedding & current scour.



Cut & fill structures truncating laminae.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 8. Le Grand Étacquerel.



SSI boundaries (lightgreen).



The structure of the larger stack.



Sole markings of flute casts in a bed below.

The bigger of the two stacks with sedimentary structures in a small quarry on the roadside..

Excellent exposures of many different sedimentary structures illustrating the deposition of the Jersey Shale Formation in a deltaic environment; alongside the slipway Le Slip du Sein.



Current cross-bedded units.



Boudinage of soft sediments.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 9. Le Pulec.



SSI boundaries (lightgreen).



Junction between Jersey Shale & NW granite.



Transgressive quartz-feldspar vein.

Striking exposure of contact between the NW granite and Jersey Shale Formation and excellent exposure of minor intrusive felsite dykes & veins from the granite. Mineral veins of silver & lead, zinc blende and scattered pyrite near the contact.

Two excellent examples of 8m raised beach gullies alongside slipway and sections of glacial head with gelifluxion/solifluxion feature above.



Zinc blende in ankerite lode.



Iron pyrite in quartz.



Zinc blende variation.



8m raised beach pebbles in gully.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 10. Le Pinnacle.



SSI boundaries (lightgreen).



Le Pinnacle view from Les Landes.



View of stack & col.

Striking exposure of a former stack of NW granite (photo J. de Carteret) accessible via a col; 8 & 18m wave-cut notches of former sea levels.

Dolerite sill (or low-angled dyke) in adjacent cliffs to the south east, one of several others to the north.

Associated Neolithic habitation & tool-making site and Roman fanum (temple), known internationally.



Sub-horizontal dolerite sill.



Neolithic & Roman remains area.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 11. La Cotte à la Chèvre.



SSI boundaries (lightgreen).



Sea cave at the 18m raised beach level.



Cave shape with boulders, sand, loess.

Excellent example of a sea cave & wave-cut notch eroded at the 18m raised beach level with sand & boulder deposits overlain by loess (Photos, J. de Carteret & J. Percival).

Fine NW granite textures, joint patterns and aplite veins or sills and striking steep-sided inlets eroded along joints & dykes.

Former Palaeolithic habitation site with flints during last glacial period (Devensian).



Aplite veins in coarse NW granite.



Steep-sided inlets along joints.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 12. L'Île Agois, Crabbé.



SSI boundaries (lightgreen).



L'Île Agois (foreground)from the east.



8m wave-cut notch and master joint erosion.

Various faults, joints and wave-cut notches and dykes clearly exposed. Striking cliff & inlet landforms caused by marine erosion of above.

Distinctive biotite microgranite within NW granite exposed in cliff path.

Former hermits' (Eremitic) religious site.



Cave formation along dolerite dyke.



Rare biotite microgranite along cliff path.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 13. Sorel Point.



SSI boundaries (lightgreen).



Granites intruded into diorite and gabbro.



Granite dyke and lenses in diorite.

An igneous complex in the NW granite showing a wide variation of different magma types intruded into a small space over a short period of time. Exceptionally rare exposures of how a sub-volcanic magma chamber evolved.

Shows granite, gabbro and diorite rocks formed at successive stages by intrusion and magma mingling; internationally renowned site for these features. Unique onion weathering features in the dolerite.



Light diorite column (pipe).



Feldspar/ hornblende enclave. Onion-weathered diorite.



Orthoclase twin in porphyritic granite.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI 14. Giffard Bay.



SSI boundaries (lightgreen).



Bay cliffs and beach outcrops.



Flattened and streaked ash (fiamme).

Greatest variety of volcanic rocks in Jersey, in the St. John's Rhyolite Formation. any rock types unique to the bay

Various well exposed fiamme, flow banded, rheomorphic ignimbrites. Rare lamprophyre dykes.

Best noted because it is a rare site of calc-alkaline associated plutonic and volcanic rocks in the Cadomian Orogenic belt of the Armorican Massif. Striking example of the 8m raised beach with jasper & rhyolite pebbles.



Mica lamprophyre dyke, N-S strike.



Mixed jasper & flow-banded rhyolite pebbles.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 15. La Belle Hougue Caves.



SSI boundaries (lightgreen).



Steep coastline and cliff path to caves.



Approach and entrance to cave are dangerous.

8m raised beach in the caves. Presence of rare fauna at this level; bones of red deer, hare and other small mammals due to Ca leaching from acid igneous rocks. Deposits have been dated to the Ipswichian/ Eemian interglacial. (Photos. by J. Percival).
Molluscs present in stalagmites indicate sea temperature c. 3 deg. higher than present



Entrance and interior deposits of upper cave.



Ice Age faunal remains.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 16. Les Rouaux.



SSI boundaries (lightgreen).



Wave-cut platform with shale-andesite contact



Eroded dolerite dyke, of E - W strike.

Jersey Shale Formation, sedimentary structures and major strike-slip fault features. Important and rare transition from sediments to volcanic agglomerate of the St. Saviour's Andesite Formation. NW granite intrusion clearly faulted against sedimentary and volcanic rocks in beach outcrop.

8m wave-cut platform with wave-cut notch; dolerite dyke in eroded platform; well-exposed glacial head in cliffs.



Andesite agglomerate along cliff path.



8m wave-cut platform and notch below cliffs.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 17. Les Hurets, Bouley Bay.



SSI boundaries (light green).



Les Hurets crags of Bouley Rhyolite.



Large broken banded iron & silica spherulite.

Striking rhyolites and ignimbrites of Bouley Rhyolite Formation.

Spectacular spherulitic rhyolites, colour-zoned, iron and non-iron rich, spherical to oval c. 1mm – 10cm along Les Hurets.

Excellent green and purple spherulitic rhyolite ignimbrites south of the harbour jetty.



Siliceous spherulites with thick bands.



North crag of various sized siliceous spherulites.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 18. L' Îslet, Bouley Bay.



SSI boundaries (lightgreen).



L'Îslet, loess above rhyolite ignimbrite.



Flattened pumice (fiamme) from ash flows.

Bed rock of Bouley Rhyolite Formation with excellent fiamme (flattened pumice) textures, grey and purple, flow-banded tuff and flattened and streaked tuff and ignimbrite.

Green, spherulitic rhyolite and breccia, west of l'Îslet

Pleistocene loess and glacial head preserved on the island.



Flow folds in once-mobile ignimbrite.



Isolated flow fold.



Silica & iron spherulite.



Single & compound spherulites.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 19. La Tête des Hougues.



SSI boundaries (light green)



Coarse boulder bed above sandstone.



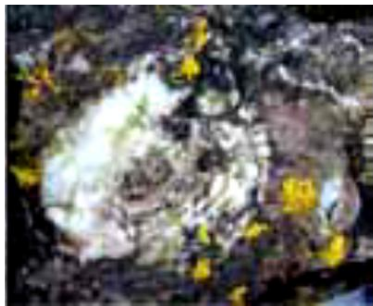
Upper large spherulitic rhyolite bed.

Best erosional unconformity between the volcanic rocks of the Bouley Rhyolite Formation and the Rozel Conglomerate Formation.

Excellent outcrop of small to large spherulites & flow folds in the rhyolite.

Excellent exposure of red mudstones with a variety of sedimentary and depositional structures of a playa - sand flat environment with reference to *Arumberia* and *Leiosphere* other possible organic remains.

Striking exposure of large and small boulder conglomerates with sandstone lenses.



Large siliceous spherulite.



Dessication cracks in fine grit bed.



Boulder conglomerate above.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 20. La Solitude Farm.



SSI boundaries (lightgreen).



Basal siltstones and sandstones & conglomerate. Conglomerate beds of unsorted boulders.



Excellent outcrops and cross-section of basal mudstone & cobble beds of the Rozel Conglomerate Formation.

Sedimentary structures indicating early environment of sand flat - playa at base.

Easy access for study of geological history of the Rozel Conglomerate Formation.



Pebble beds in cut-and-fill structures in siltstones.



Bedded sandstones overlying siltstones.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 21. Anne Port Bay - La Crête Point.



SSI boundaries (lightgreen).



Columnar-jointed flow with inclined columns. Gas bubble in volcanic breccia.



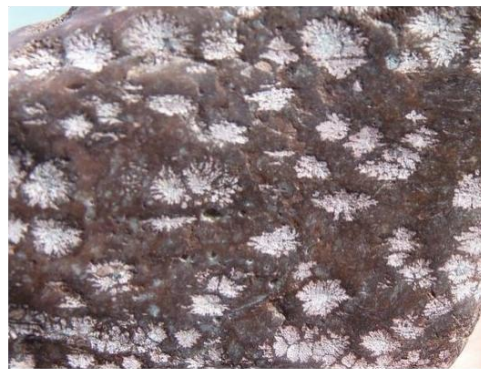
Best examples of sections of acid lava flows in Jersey, Armorica & S. England. Proximal to a volcanic vent

Striking example of the upper section of, and the only remaining site of columnar jointing in the St. John's Rhyolite Formation.

Excellent examples of ignimbrite, rhyolite breccia and flow-banded, partly spherulitic structures, plus local haematite mineralization.



Flow-fold in iron-rich rhyolite.



Crenulated spherulitic rhyolite.



Haematite and quartz vein in rhyolite.

JERSEY GEOPARK GEOLOGY SSI TRAIL

SSI. 22. La Motte, Le Nez and Le Croc.



SSI boundaries (lightgreen).



Loess and Head above diorite.



Net-veining of feldspar - diorite breccia.

Fine exposures of loess and head overlying igneous rocks of the SE granite - diorite complex.

Excellent outcrops of various light and dark coloured, banded diorites, granite and gabbro (further east).

Striking exposures of net-veining and relationships to the SE granite magma.

Many dolerite dykes of the Jersey Main Dyke Swarm together with felsite dykes and a composite acid & basic one.

Noted archaeological site.



Orthoclase Feldspar veining in diorite.



Large hornblende crystals.



Dolerite dykes in diorite.

ARCHAEOLOGY. Archaeology SSIs (Jones, Keen Birnie & Waton, 1990. Société Jersiaise, p. 12) (Cave sites omitted).

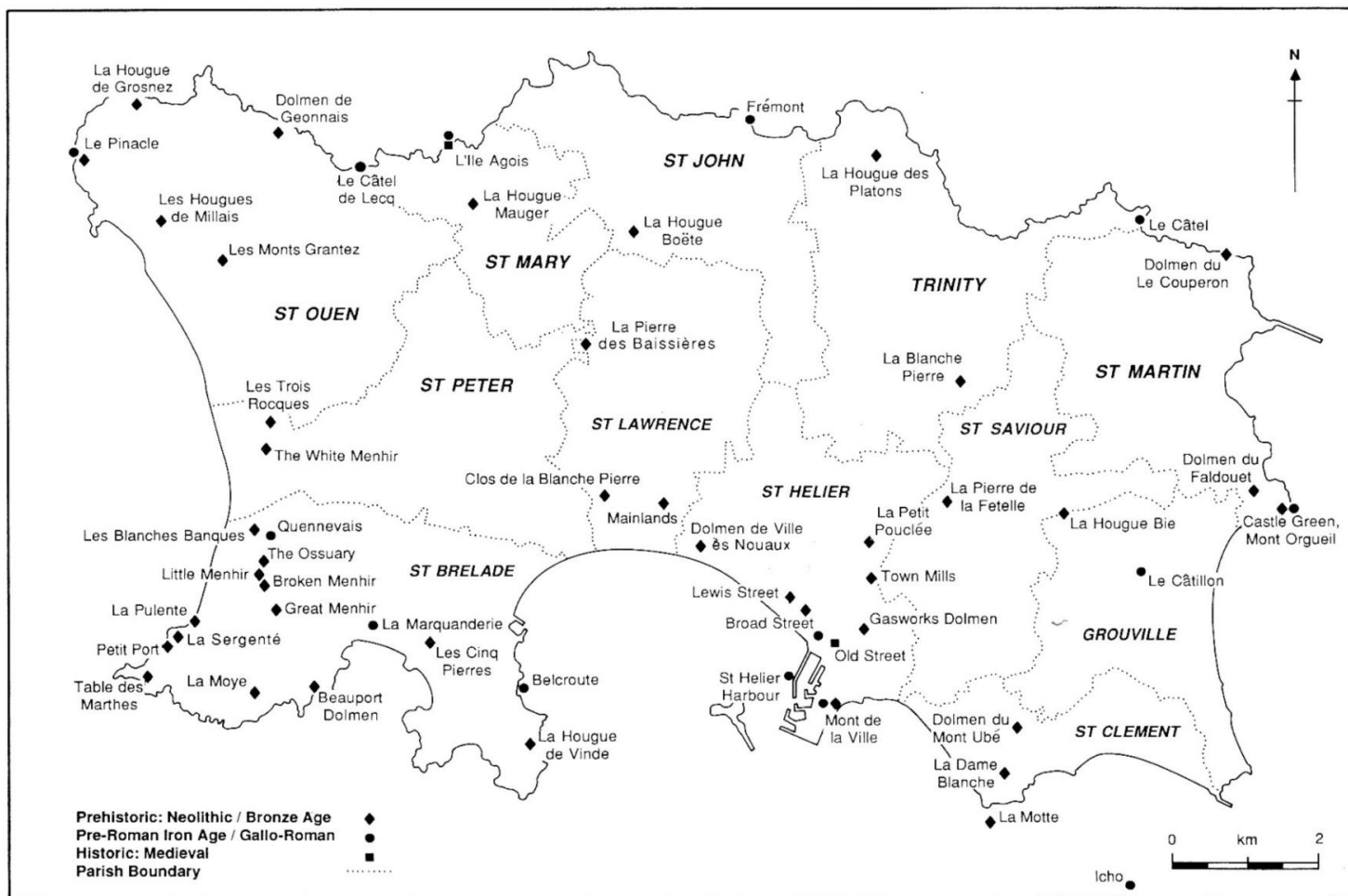


Figure 7 Holocene archaeological sites. Based on and redrawn from M. B. Finlaison and J. L. Hibbs 1985, *Jersey Island Plan: SSI Ancient Monuments: 1*. Additional information from Hawkes (1939) and Patton (1987). Reproduced by permission of the Island Development Committee, and M. B. Finlaison and J. L. Hibbs.

(Cave sites; see Geology SSIs)

La Cotte de St. Brelade

La Cotte à la Chèvre.

Dolmens.

Le Faldouet.

Le Mont Ubé.

Les Monts Grantez.

La Ville ès Nouaux.

La Sergenté.

Le Geonnais.

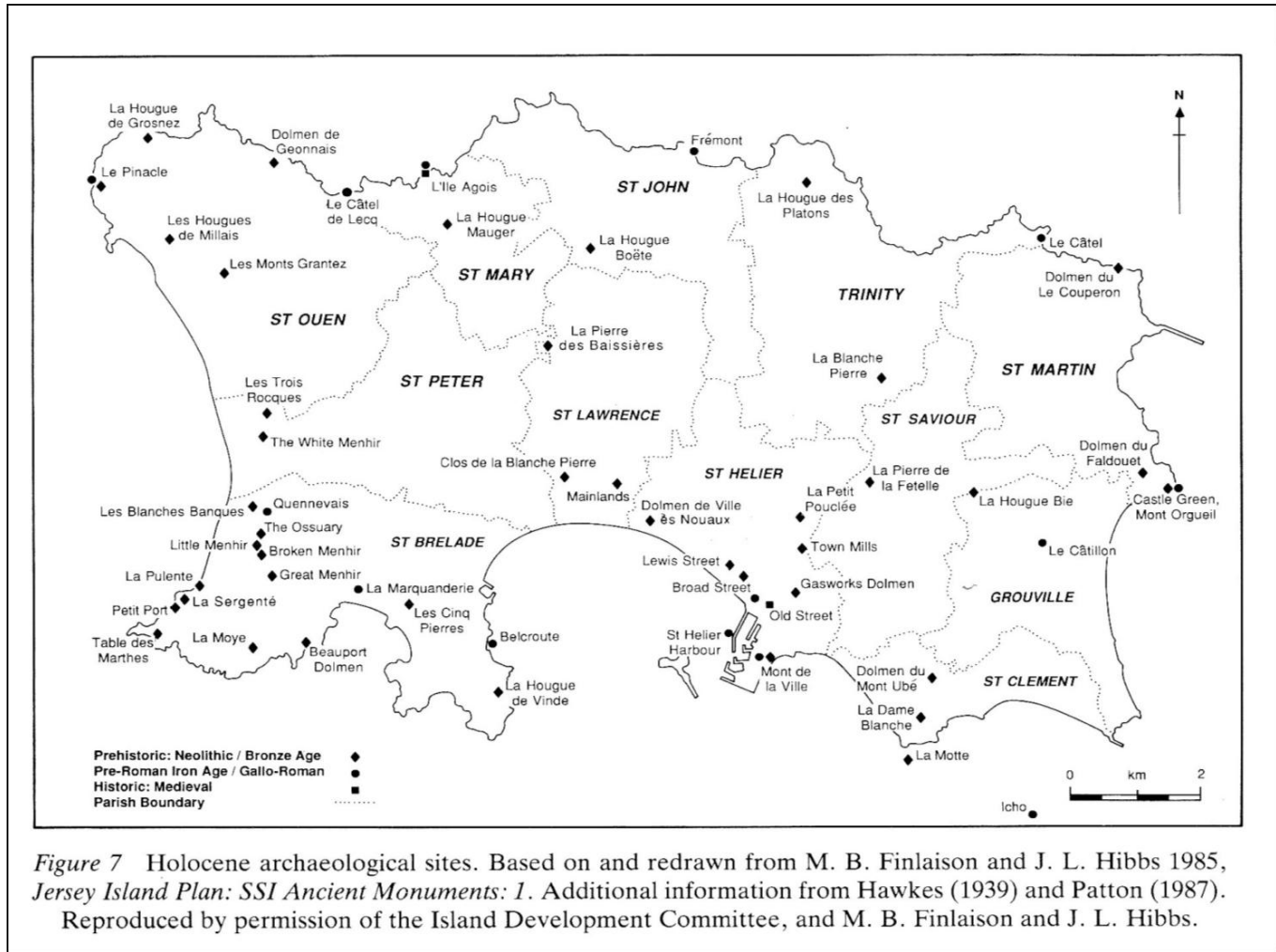


Figure 7 Holocene archaeological sites. Based on and redrawn from M. B. Finlaison and J. L. Hibbs 1985, *Jersey Island Plan: SSI Ancient Monuments: 1*. Additional information from Hawkes (1939) and Patton (1987). Reproduced by permission of the Island Development Committee, and M. B. Finlaison and J. L. Hibbs.





Superficial deposit contexts for;



Lower Palaeolithic and Neolithic flint tools, at La Hougue Bie, Jersey.

.....and for;

Grave contents; e.g. skeletal and devotional.

Metals; e.g. plate, coins, hoards, tools, weapons, utensils.

Pottery; e.g. receptacles, domestic ware.

Fossils; e.g. fauna, flora.

JERSEY GEOPARK. SOILS.

The soils of Jersey are varied but have not been mapped in detail. They overlie glacial head and loess, and most soil profiles display the standard a, b, and c intervals (horizons), from soil variably rich in humus down into subsoil and into the weathered bedrock horizon. Sometimes, this can be confused with an angular head deposit which can lie directly on bedrock.

Again, the underlying GEOLOGY is fundamental; it influences their composition as they are derived from the weathering and erosion of the bedrock during their interaction with the climate.

They govern the vegetation and land use, for example, the woodland, farmland and park land, and hence the flora and fauna of the food chain within these environments.

It is therefore essential that they are protected by the current methods of preservation which prevent their removal by the erosion on slopes, footpaths and development.

Topographically, Jersey is a plateau sloping southwards with the surface rising from c. 50m above steep cliffs in the south to c. 145m in the north from where it drops quickly down to steep cliffs c.100 m high. This plateau is deeply incised by long, mis-fit valleys with flat floors containing today's south-flowing streams. These rise just below the northern interfluvium while on the other sides (north west and east), the streams have shorter profiles and generally V-shaped sections, and dropping into the sea via waterfalls in places.

In general, the plateau surface consists of soils varying from sandy over the granites to clay loams over the shales and the generally acid volcanics, the latter not providing the fertile soils of weathered basalts elsewhere in the world.

The valleys and flat coastal marsh wetland areas are generally composed of silts and muds except where they are overlain by wind-blown (aeolian) sand.

Soil investigations were made as part of an agricultural survey for the Jersey Island Plan of 1983 and were reported by Rural Planning Services (1983a; 1983b).

Further detailed information was comprehensively added by Jones, Keen, Birnie and Waton (1990) in an excellent Société Jersiaise publication (see below).

In brief, the investigations identified seven Series related to the bedrock and drainage systems, but it should be remembered that in terms of organic content, they have been beneficiated by vrac over many years. The seven Series are summarised as follows;

1. The Trinity Series consists of silty and fine sandy loams on loess, loessic head and some fine blown sand.
2. The Colombier Series consists of silt to fine sandy loams developed on the Jersey Shale Formation and on its Pleistocene deposits derived by weathering.
3. The Noirmont Series consists of sandy loam developed over granite.
4. The Samarès Series comprises silty to fine sandy loams developed on loess or blown sand.
5. The Rozel Series consists of silty to sandy loams developed over head or igneous rock.
6. The Radier Series consists of silty clay-loams to fine sandy loams which have developed over alluvium or other drift in the valleys.
7. The St.. Ouën Series varies from loamy sands to sandy loams over blown sand with little organic

Maps showing the Soil Series distribution are only presented for seven areas along the south coast from the Airport area to St. Clement (Rural Planning Services, 1983b, Geographical Survey). These are described and summarised (loc. cit. 1990, pp. 4 - 9). These reports and the one following were kindly made available by the Environment Division (PE) of the States of Jersey.

In contrast, the comprehensive results of a geochemical reconnaissance survey (Walker, 1999) give a detailed picture of the concentration of nineteen elements in the Jersey soil profile from samples on a one per sq. km grid within depth intervals of 0 - 15cm, 15 - 30cm and 30 -

45cm. The types of soil within these intervals were not identified and the conclusions were that it was difficult to distinguish whether the presence and distribution of the elements was a result of parent rock influence or anthropogenic activities (loc. cit. p. 77). In general, soils overlying the andesite and rhyolite rocks have higher concentrations of a range of elements than those over the granites and shales, and higher concentrations of Mg, Al, Cr, Ni, K, Zn and P were found in soils overlying the volcanic rocks.

References.

Rural Planning Services, 1983a, b. Jersey Island Plan Agricultural Survey: a. Technical Report; b. Geographical Survey. Didcot: Rural Planning Services.

Jones, R., Keen, D., Birnie, J., & Waton, P. 1990. Past Landscapes of Jersey; Environmental Changes During The Last Ten Thousand Years. Société Jersiaise.

Walker, V. 1999. A Geochemical Reconnaissance Survey of Soils in Jersey (C.I.). Unpublished MSc. Thesis, Imperial College of Science Technology and Medicine, University of London.

JERSEY GEOPARK. WATER RESOURCES AND PRIORITY PROTECTION AREAS.

The river patterns are described as trellis (rectangular) and dendritic (tree - like) (Fig. 1). Both patterns show how the fracture patterns of joints and faults in the underlying geology have controlled the alignments of the tributary streams. Protection of these surface water and groundwater sources is vital to Jersey. Information on them is given below.

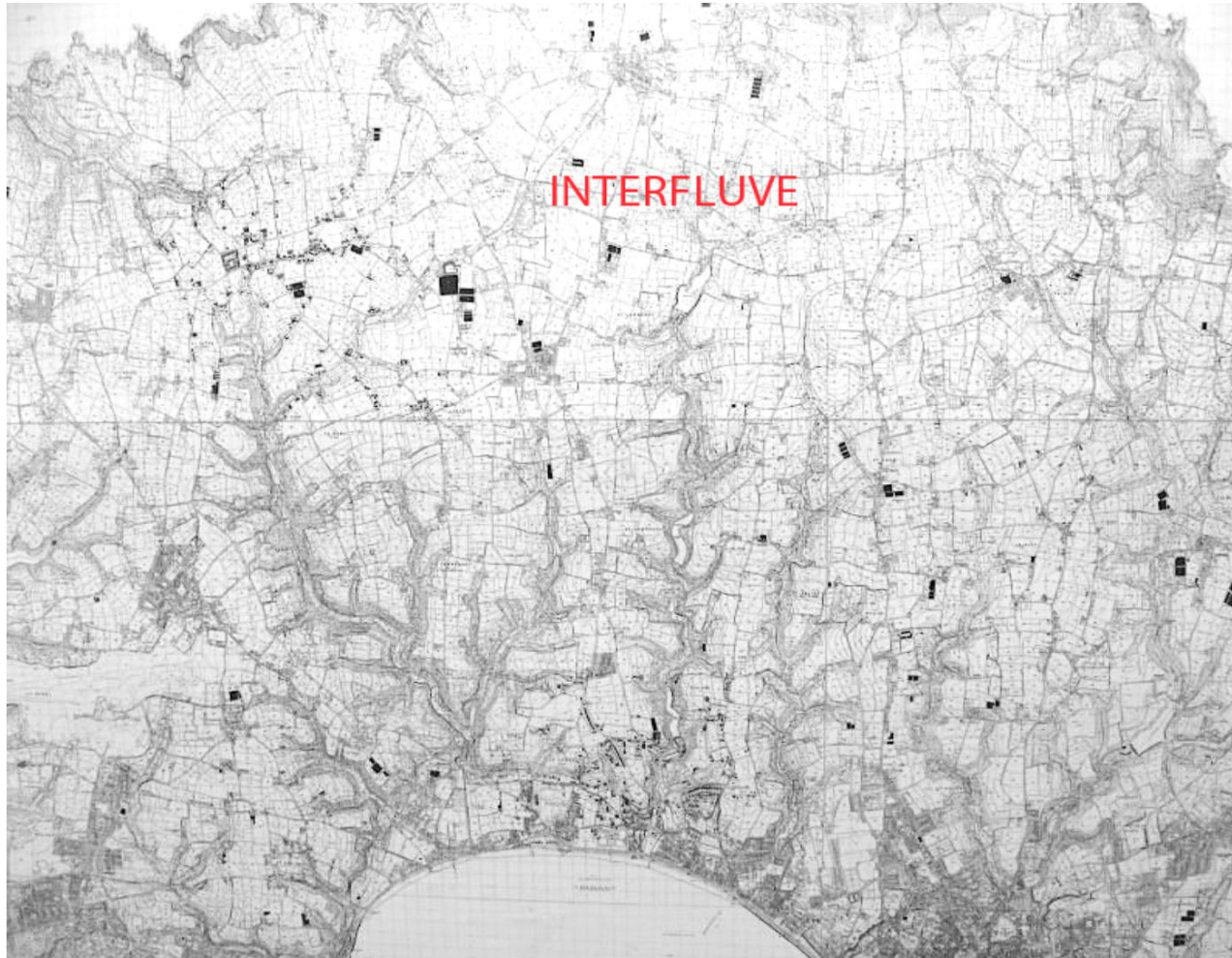


Fig. 1.

Protected Areas Register.

The WFD (Water Framework Directive) requires a Register of protected Areas to be established; for England and Wales this consists of a MS Access (Microsoft Access) database and, where appropriate, the water body data sets have a 'protected areas' attribute. However, due to the size of Jersey (there will be fewer Protection Areas) and for simplicity of data management in the future, a pragmatic approach has been undertaken that simply marks up the protected areas on the Island with GIS (Geographic Information System) dataset attributes. GIS layers will distinguish different types of protected areas (for example, with drinking water priority protected areas which will contain the main water supply reservoirs as well as the upstream catchment areas).

Protected areas will be defined in the following categories:

- Areas for the protection of habitats and species.
- Water bodies used for the abstraction of drinking water.
- Recreation waters.
- Nutrient sensitive areas.
- Areas designed to protect economically significant aquatic species.

Under the Water Framework Directive, protected areas have additional quality standards applied to them. Protected areas are usually designated as requiring a higher degree of protection either for their surface water or groundwater, or to conserve habitats and species that directly depend on those waters. Across Europe, many of these Protected Areas include sites that are already designated under existing European Legislation. This isn't straightforward in Jersey where European legislation is not necessarily adopted and these areas are not already in existence. Realistically, resource implications are also paramount and there is a need to avoid additional layers of bureaucracy.

The watercourses can be delineated into 5 watercourse types (heights Above Ordnance Datum (AOD)).

1. Steep shoreline watercourses less than 1km long - one reach type.
2. Shallow shoreline watercourses less than 1km long - one reach type.

3. Moderate sloped watercourses with no change in gradient - one reach type.
4. Variable sloped watercourses with shallowing gradient transition between 15 - 45m AOD - two reach types.
5. Variable sloped watercourses with steepening gradient transition at 45m AOD - two reach types.

In addition, where present, reservoirs would split the watercourse up further.

Most of the streams on the island fall within 2 of these types, as can be seen below which shows the **streams coloured by type** (Fig. 2).

Fig. 3 shows that there is a general trend in channel gradients, with watercourses less than 1 km long having steep gradients typically greater than 0.10m/m. An inflection point occurs at this point with watercourses longer than 1km having shallower gradients. Whilst watercourses longer than 1km long typically have shallower gradients, the gradients often vary along these longer watercourses, from which multiple reaches can be delineated.

Although it could be considered more pragmatic to reduce the numbers of types down further, the five types have been retained; the reason being that it is important to understand the relative types of different water bodies if proxy data is to be used through the IWMP (Integrated Water Management Programme) (e.g. if a watercourse is lacking ecological monitoring data, it may be possible to use another water body of the same type as a data 'donor').

Figure 4: Jersey's water bodies and Water Management Areas (WMAs)

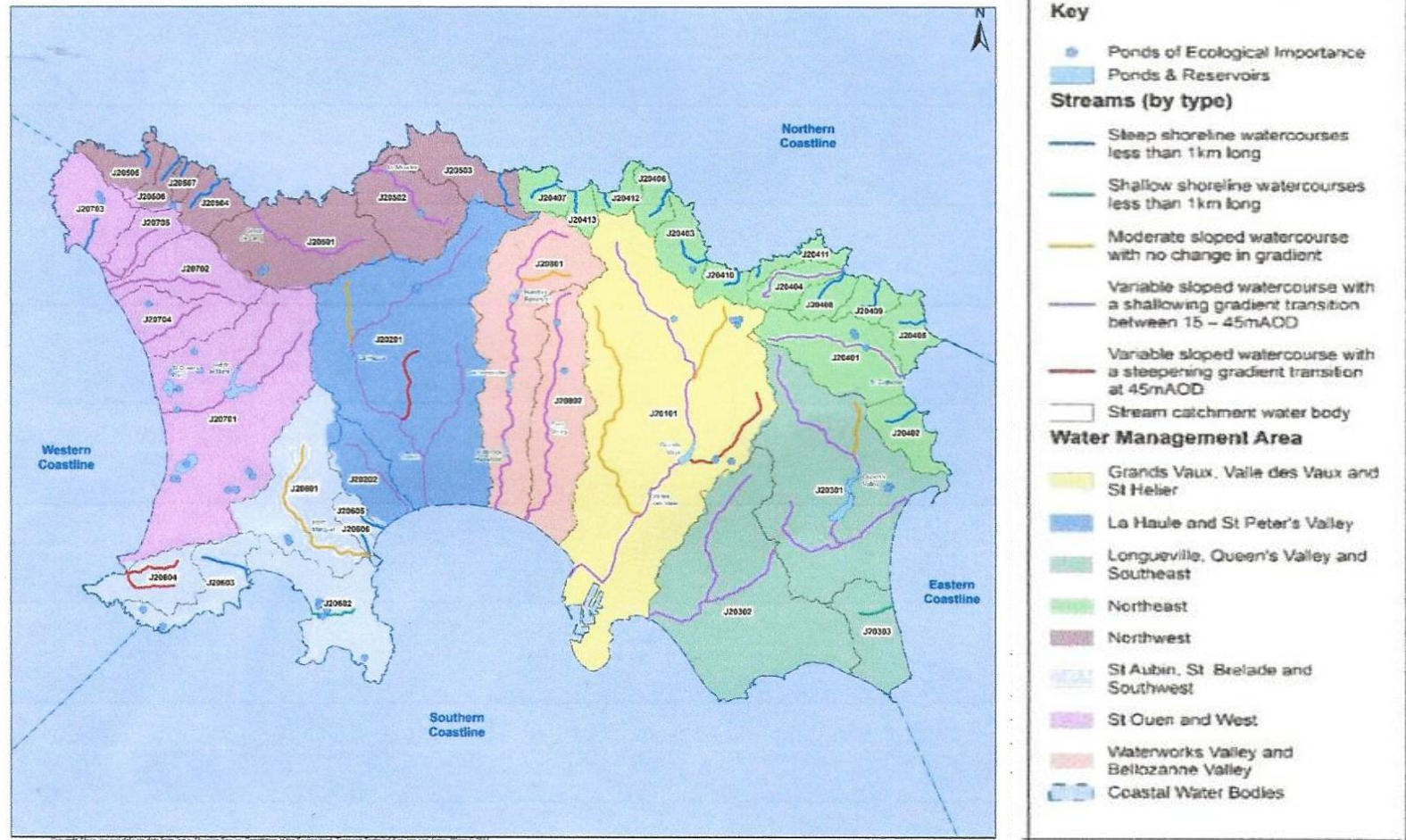


Fig. 2.

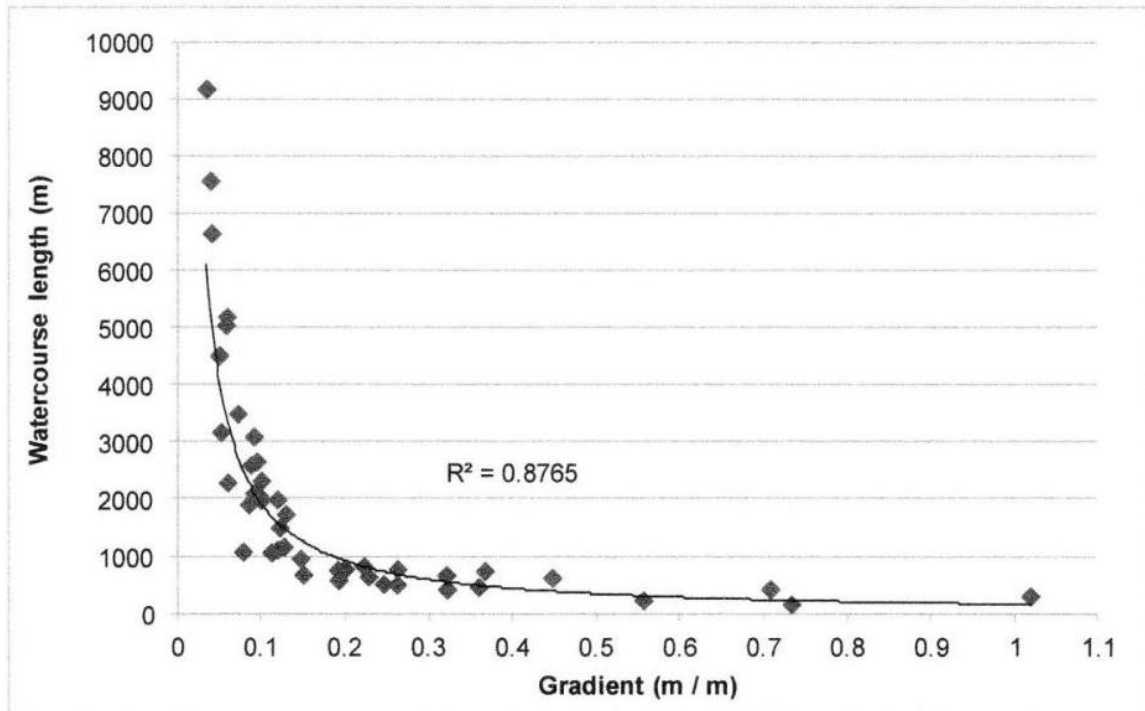


Fig. 3.

JERSEY GEOPARK. KEY HABITAT AREA DESCRIPTION (see also Jersey Zoo).

1. All grassland habitats.

1a. Acid grassland with/without bracken, scrub, trees.

1b. Marshy grassland with/without bracken, scrub, trees and other combinations.

- 1c. Neutral grassland with/without bracken, scrub, trees and other combinations.
- 1d. Coastal grasslands (including maritime cliff) with/without other coastal habitats.
- 1e. Other grasslands (mostly not ground truthed)
2. Bracken with/without other habitats.
3. Coastal heath land with/without other coastal habitats.
4. Woodland.
 - 4a. Broad leaved plantation.
 - 4b. Broad leaved semi natural woodland.
 - 4c. Conifer plantation.
 - 4d. Mixed conifer/broad leaved plantation
 - 4e. Other woodland (not ground truthed)
5. Scrub.
 - 5a. Gorse dominated scrub.
 - 5b. Other scrub.
6. Dune communities with/without bracken, bare sand.
7. Ruderal.
8. Open water including swamp and marginal vegetation.
9. salt marsh.
9. Salt marsh.
10. Strandline.
11. Quarry.
12. Amenity grassland
13. Arable
14. Bare ground.

SPECIES AND HABITATS (BIODIVERSITY)(see also JERSEY ZOO).

Cold-blooded animal protection and monitoring.

Agile frog protection plans.

Grass snake facts.

Lizard protection and monitoring.

Toad monitoring.

Endangered and protected birds.

Barn owl protection and monitoring.

Herring gull protection and monitoring.

Protected birds.

Puffin nesting and breeding.

Fish and shellfish regulations and monitoring.

Lobsters facts and fishing regulations.

Ormer fishing and possession regulations.

Scallop fishing and stocks.

Tagged rays.

Habitat preservation and protection.

Protected wetlands.

Seashore.

Shallow seas.

Woodlands.

Insect monitoring, decline and diseases.

Asian Hornet sightings, identification and reporting

Butterfly monitoring scheme.

How to encourage bees into your garden

Reporting an Oak Processionary Moth sighting.

Ticks and Lyme disease.

Protecting mammals.

Bat roosts, protection and conservation.

Hedgehog preservation.

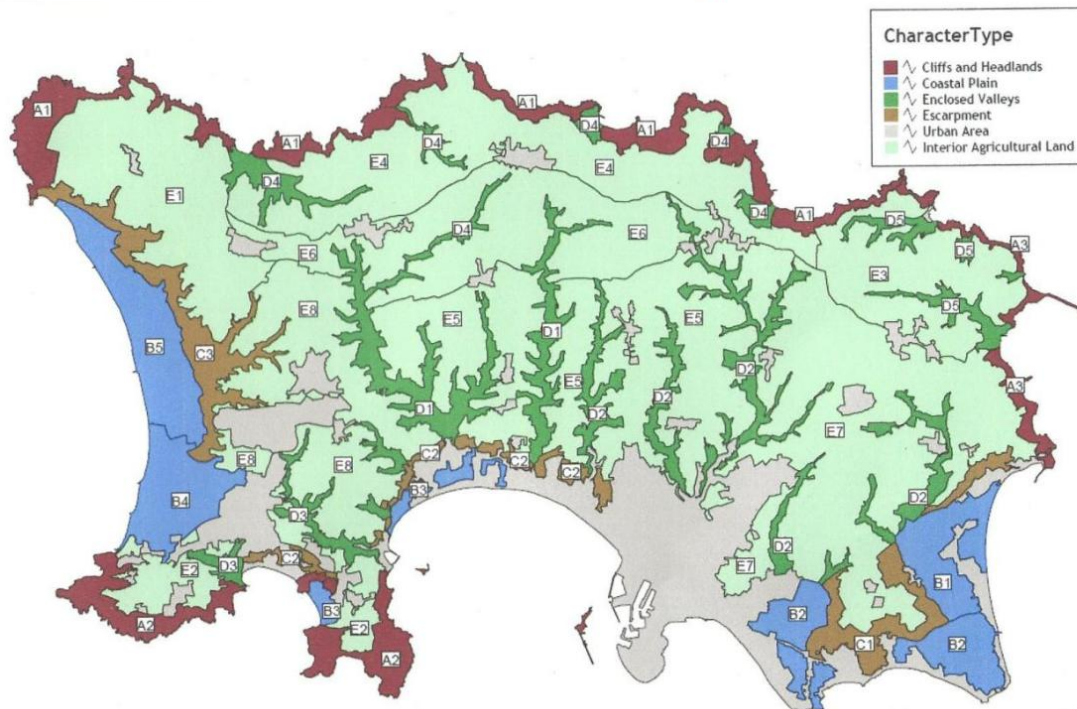
Protected species and wildlife licensing.

Protecting and monitoring marine life.

Red squirrel threats and habitats.

JERSEY GEOPARK. Botany. Woodland, Farmland, Hedgerow & Field.

Island Plan. 2011. Physical



Valley woodland (dark green); farmland (light green patchwork)
www.ramblingbadgers.walkingplaces.co.uk. Cliff walk (brown).



Valley, plateau, coastal plain & dune vegetation.



Hedgerow & farmland.



JERSEY GEOPARK. Entomology, Order Coleoptera; garden insects, beetles.



JERSEY GEOPARK. Entomology, Order Lepidoptera, moths.



JERSEY GEOPARK. Zoology. Reptilia, suborder Lacertilia, Green Lizard.



JERSEY GEOPARK. Zoology. Family Anatidae, duck & ducklings, land habitat.



Other examples.



Jersey Zoo. Durrell Wildlife Conservation Trust; with its own habitats.



The park is located at Les Augrès Manor, Trinity, Jersey, The park is situated in 32 acres (13 ha) of landscaped parkland and water - gardens. The Trust has a strong commitment to looking after the Island's native wildlife, and large areas within the grounds have been designated native habitat areas. The extensive planting of flowering and fruiting trees throughout the grounds also serves to attract a plethora of wild birds and insects. Included in the former are several species of bird which used to be commonly seen in island gardens but have become increasingly scarce, including the house sparrow and song thrush. There are over 50 nest - boxes positioned around the grounds, which are used by a variety of birds including barn owls, kestrels, swallows and martins. Other animals which are commonly seen within the grounds are the red squirrel, bank vole, and the short - toed treecreeper (Wikipedia).

Durrell Wildlife Park was established in 1959, then known as Jersey Zoo. It was opened by Gerald Durrell and is now operated by the Durrell Wildlife conservation trust. It is home to over 130 different species of animals and mainly concentrates on the conservation of rare and endangered species including the Black Lion Tamarin, Pygmy Hogs, Pink Pigeons, Mountain Chicken Frogs, and many more.

Jersey Zoo began as the first ever conservation - themed zoo. 60 years later, Gerald Durrell's animal haven is the natural place to discover some of the world's most incredible creatures. Whether you're after fun, tranquillity, knowledge or a place to soak up the sunshine, this stunning 32 - acre park with valleys, woodland and some of the world's rarest animals is the perfect chance to experience 'the jewel in Jersey's crown'. The Trust is home to 1,400 mammals, birds, reptiles and amphibians and over 130 endangered species. Sumatran orang-utans, Andean bears and Montserrat orioles, rescued from beneath the smouldering volcano, live in lush, spacious environments which closely replicate their native habitats. Madagascar lemurs and tiny lion tamarinds from Brazil roam free in woodland, leaping through the trees. Other exhibits include a walk through aviary and a cloud forest housing otters, coatis and howler monkeys.

JERSEY GEOPARK. Littoral habitat, various marine flora & calcareous algae.



Selected References.

- Bishop, A. C. & Bisson, G. 1989. Classical areas of British Geology: Jersey: description of 1:25,000 Channel Islands Sheet 2. (London HMSO for British Geological Survey).
- Davis, D. 1996. Important Geological Localities of the Island of Jersey. Possible sites of Special, or Special Scientific, Interest: A First Listing. Unpubl. Rpt. Environmental Services, States of Jersey.
- D'Lemos, R. S., Strachan, R. A. & Topley, C. G., 1990. The Cadomian Orogeny. Geological Society Special Publication No. 51. Geological Society, London.
- Double, P. 2005. Channel Islands Flora. MSP Channel Islands.
- French Patrimoine Géologique. 1999. Colloquium entitled The Second National Day of Geological Heritage, Lille.
- Helm, D. G. 1984. The tectonic evolution of Jersey, Channel Islands. Proc. Geol. Assoc. Vol. 95. pp. 1 - 15.
- Jersey Association of Men of the Trees. 1997. Trees in Jersey.
- Jones, R. L., Keen, D. H., Birnie, J. F. & Waton, P. V. 1990. Past Landscapes of Jersey. Société Jersiaise.
- Marine Biology Section. 2016. Seashore Life of Jersey. Soc. Jers.
- Nichols, R. A. H., Blampied, S. 2016. Jersey's Geological Sites of Special Interest. States of Jersey & Société Jersiaise.
- Nichols, R. A. H. & Hill, A. E. 2016. Jersey Geology Trail. Charonia Media
- Patten, M & Finlaison, M. 2001. Patterns in a Prehistoric Landscape. Soc. Jers.
- Roberts, K. & Neale, S. 2014. Challenges for the Water Environment of Jersey. Atkins Ltd. Water Management Plan 2017 - 2027. States of Jersey.
- States of Jersey. 2015. State of Butterflies in Jersey.

Websites. www.prehistoricjersey.net (J. Percival)

www.gov.je/environment

www.societe-jersiaise.org.

www.jerseygeologytrail.net (Ralph Nichols)

Other publications include texts and maps on;

Bird Reports. La Société Jersiaise.

Bats. Bat Reports. www.gov.je/environment

Squirrels. Routes. “

Owls. Sites. “

Part of the built environment.





shutterstock.com • 1156135060



