

5 Summary

A total of 30 geological sites were visited and assessed across East Lothian, and are recommended as Local Geodiversity Sites. Combined, the sites represent a wide range of geological and geomorphological features, including excellent examples of geological strata and landforms that characterise the geology and landscape of Southern Scotland as well as unique sites of international importance for geological research (Table 7). Together these sites display the geological strata, structure and features of the main geological units that crop out in East Lothian area, along with many landforms and features associated with geomorphological processes that have sculpted the landscape during Quaternary and recent times.

East Lothian has rich geodiversity and strong historic associations between its people and its landscape and resources. Many of the geodiversity sites could be enhanced to encourage visitors and students to learn more about how the geology and geomorphological processes influence the form and nature of the regions landscape.

(Table 7) Summary of ratings for East Lothian Geodiversity sites

	Site No.	Feature Type	Feature(s)	Overall Rating: Quality	Overall Rating: Rarity
Gala Law	(ELC_1)	Bedrock exposure	Gala Group	Moderately good sedimentology and palaeontology	Local lithostratigraphy and paleontology
Burn Hope	(ELC_2)	Bedrock exposure	Great Conglomerate Fm	Excellent geomorphology, good lithostratigraphy and sedimentology	National geomorphology, regional lithostratigraphy
Gin Head (nr Tantallon Castle)	(ELC_3)	Bedrock exposure	Ballagan Fm	Excellent palaeontology	International paleontology
Dunbar Shore	(ELC_4)	Bedrock exposure	Kinnesswood Fm, volcanic vents, Ballagan Fm, Devonian rocks, Geomorphology	Excellent igneous geology, sedimentology and geomorphology	Regional lithostratigraphy, sedimentology, igneous geology and National Quaternary and coastal geomorphology
North Berwick Shore	(ELC_5)	Bedrock exposure	Garleton Hills Volcanic Fm, volcanic vents, Aberlady Fm	Excellent igneous geology	Regional igneous geology and lithostratigraphy
Yellow Craig Shore	(ELC_6)	Bedrock exposure	Garleton Hills Volcanic Fm, volcanic vents, Gullane Fm	Excellent lithostratigraphy and igneous geology	Regional lithostratigraphy and igneous geology
Old Markle Quarry	(ELC_7)	Bedrock exposure	Garleton Hills Volcanic Fm	Good igneous geology	Regional igneous geology
Blaikie Heugh – Balfour Monument	(ELC_8)	Bedrock exposure	Garleton Hills Volcanic Fm	Moderately good igneous geology	Regional/national igneous geology
Kippielaw Quarry	(ELC_9)	Bedrock exposure	Garleton Hills Volcanic Fm	Poor igneous geology	Local igneous geology

Peppercraig Quarry (ELC_12)	.								.	.
Gullane Shore (ELC_13)	.			.					.	.
Kilspindie (ELC_14)	.	.		.		.	.
Prestonpans Shore (ELC_15)		.	.			.	.	.		.
Cockenzie –										
Port (ELC_16)			.	.	.					
Seton Shore										
Esk Valley (ELC_17)						.				
Pencaig Wood (ELC_18)						.				.
Quarry North										
Berwick (ELC_19)	.								.	.
Law Kidlaw (ELC_20)						.				.
Quarry Cheese Bay (ELC_21)	.							.		
Garleton Hills (ELC_22)									.	.
Kidlaw Erratic (ELC_23)									.	.
Lochmuses (ELC_24)									.	.
Seacliff–Scourghall Shore (ELC_25)									.	.
Thornloch (ELC_26)									.	.
Whitehill (ELC_27)									.	.
Tyne Estuary (ELC_28)									.	.
Gullane Bents (ELC_29)									.	.
Aberlady Bay (ELC_30)									.	.

Key to columns

1	Site No.
2	Lower Palaeozoic strata
3	Devonian strata
4	Kinnesswood Formation
5	Ballagan Formation
6	Garleton Hills Volcanic Formation
7	Gullane Formation
8	Aberlady Formation
9	Lower Limestone Formation
	Limestone Coal Formation

10	Upper Limestone Formation
11	Passage Formation
12	Coal Measures
13	Early Carboniferous Volcanic Plugs and Vents
14	Carboniferous to Early Permian Sills
15	Carboniferous to Early Permian Dykes
16	Geological Structures
17	Fossils and Paleontology
18	Geomorphology
19	Quaternary Deposits/Feature
20	Economic Heritage
21	Built Heritage

5.1 Bedrock exposures

In total, 21 sites have been identified as local geodiversity sites for their bedrock exposures. The Lower Palaeozoic, Devonian and Carboniferous sedimentary rocks which underlie much of central and southern Scotland are well exposed in many places in East Lothian. The geodiversity sites display a wide range of features that are characteristic of these rocks, their relationships with associated extrusive and intrusive igneous rocks, and regional patterns of deformation including folding and faulting.

The oldest sedimentary strata in East Lothian are turbidite sequences from the Lower Palaeozoic, which are exposed at the north margin of the Lammermuir Hills and the southern edge of the LC area ([ELC_1](#)) along with overlying Devonian-aged conglomerates ([ELC_2](#)). The Ballagan Formation (seen at Gin Head, [ELC_3](#)) and Dunbar, ([ELC_4](#)) represents some of the oldest rocks of the Carboniferous, recording a time where the climate was wet and warm, and vegetated fluvial and coastal environments dominated the area.

In the early Carboniferous, volcanic activity caused by upwelling of magma through the crust resulted in the formation of extrusive igneous rocks including lavas and tuffs of the Garleton Hills Volcanic Formation. The volcanic rocks are exposed well at a variety of locations throughout East Lothian, but particularly along North Berwick Shore ([ELC_5](#)) and Dunbar ([ELC_4](#)) where relationships between lavas, tuffs and the sedimentary rocks can be studied. The Yellowcraig Shore ([ELC_6](#)) also provides an opportunity to study the relationship between the extrusive volcanic rocks and their relation with later intrusive igneous rocks. The resistant volcanic rocks underlie the elevated terrain and escarpments of the Garleton Hills. These rocks were historically worked for road stone from numerous small quarries across the region. The type locality of the 'Markle Basalt', a regionally recognised type of basalt is found within the Old Markle Quarry ([ELC_7](#)) near East Linton.

Cessation of volcanism in the East Lothian area during early to mid-Carboniferous times brought renewed deposition of sediments in a range of environments including terrestrial fluvial systems, swampy forests, deltas and shallow seas. In strata of the Gullane Formation, exposed at Gullane Point ([ELC_13](#)), and the Aberlady Formation ([ELC_5](#)) and ([ELC_14](#)), sedimentary features associated with deposition in shallow marine, deltaic and fluvial settings are well preserved. Cyclic deposition of sandstone, mudstone/siltstone, limestone and later coal, occurred throughout the remainder of Carboniferous times. Key limestone horizons, formed during periods of marine inundation, are important regional stratigraphic markers in these sequences. Rare natural exposures of the Hurllet Limestone (base of the Lower Limestone Formation), and the Index Limestone (base of the Upper Limestone Formation) can be seen at Kilspindie ([ELC_14](#)) and Prestonpans Shore ([ELC_15](#)) respectively. The intervening coal-bearing Limestone Coal Formation is also exposed at the coast at Prestonpans Shore and the shore section between Cockenzie and Port Seton ([ELC_16](#)). The youngest Carboniferous sedimentary strata seen in East Lothian belong to the Coal Measures Group, which can be seen along the coast at Cockenzie to Port Seton ([ELC_16](#)) and inland along the Esk Valley ([ELC_17](#)). Historically, the younger strata of Carboniferous age, found to the north of the Southern Upland Fault, have provided the most economically important geological resources in East Lothian; these strata have been mined and quarried for coal, limestone and sandstone for a range of usages.

Intrusion of igneous rocks into the sedimentary strata occurred during the late Carboniferous to early Permian with the formation of numerous sills and dykes that can be seen in many of the coastal exposures, and in inland quarries such as Pencraig Quarry ([ELC_18](#)) and Kidlaw Quarry ([ELC_20](#)).

Five sites were noted for their palaeontological value, of which two are of international significance. At Cheese Bay ([ELC_21](#)) a diverse range of fossils from the early Carboniferous, including (at the time) the earliest known example of a tetrapod were historically recovered from within the Gullane Formation. However, even earlier tetrapod fossils were later found within rocks belonging to the Ballagan Formation (e.g. at Gin Head, [ELC_3](#)). These rare early tetrapod fossils are not thought to be found elsewhere in the world, and the study of the fossils and the palaeoenvironments in which the creatures lived and evolved is an area of current international research.

5.2 Quaternary and Recent deposits and landforms

The topography across much of inland East Lothian is dominated by landforms sculpted by glacial erosion of the resistant volcanic rocks of the Garleton Hills Volcanic Formation and intrusive igneous sills, dykes and plugs. Excellent examples of glacially sculpted bedrock and related landforms occur within the Garleton Hills ([ELC_22](#)) and Whitekirk ([ELC_27](#)) sites. At Whitekirk Golf and Country Club the layout of the fairways closely follows the orientation of the ice-moulded bedrock ridges and grooves carved in the lavas. The most prominent ice-scoured feature of East Lothian is perhaps the crag and tail feature of North Berwick Law ([ELC_19](#)), a classic example of a lowland glacial landform. Roche moutonnée forms also occur in the Garleton Hills and near Kingston, south of North Berwick. Generally west of Haddington, the moulding is orientated slightly north of east, then sweeps round to slightly south of east in the eastern part of the area (Kendall & Bailey, 1908).

The lower ground is extensively mantled by a variable cover of glacial till which is well exposed in the Keith Water SSSI (Gordon & Sutherland, 1993). Erratic boulders, including metamorphic rocks of Highland origin, commonly occur along the coast and are particularly well displayed on the shore platforms where they have been washed out from the till. Good examples occur at Aberlady Bay ([ELC_30](#)), Tynninghame and Seacliff-Scoughall Shore ([ELC_25](#)). The most remarkable erratic is at Kidlaw ([ELC_23](#)), where a mass of limestone c. 0.2km² forms the largest known erratic in Scotland (Kendall & Bailey, 1908).

The vast quantities of meltwater produced by the melting of the last ice sheet formed distinctive assemblages of landforms, including meltwater channels cut in bedrock, and mounds, ridges and terraces of sand and gravel on the lower ground. Particularly good examples of meltwater channels occur at Rammer Cleugh SSSI (Gordon & Sutherland, 1993), around Kidlaw and between Garvald and Innerwick. Associated glacial deposits, including kame terraces and ice-marginal lake deltas, occur along the northern flanks of the Lammermuir Hills from Humbie to Oldhamstocks and in the region of Tynemouth to the county boundary. Some of the best examples of glacial landforms at High Latch/Longyester (Sissons, 1958) have either been removed by sand and gravel quarrying or lie within an area where there is planning consent for further extraction.

As the last ice sheet receded, relative sea-level rose and the sea invaded the lower parts of the coastline, forming raised shorelines and extended estuaries at Aberlady Bay and along the lower Tyne. Relative sea level then fell but rose again during the early Holocene before falling to its present level. These changes are represented by raised beaches and staircases of raised shorelines, for example at Gullane Shore ([ELC_13](#)), Aberlady Bay ([ELC_30](#)) and the Tyne Estuary & Belhaven Bay ([ELC_28](#)). In an embayment at Lochhouses ([ELC_24](#)), layers of marine deposits occur behind the coastal dune barrier (Newey, 1965; Robinson, 1982). One of these sand layers is attributed to a tsunami generated by a massive submarine landslide in the Storegga area off the coast of south-west Norway 8100 years ago (Smith et al., 2004). Raised, intertidal and submerged erosional shore platforms of various ages also occur along the coast at Seacliff-Scoughall Shore ([ELC_26](#)), Thorntonloch ([ELC_27](#)) and the coastal bedrock sites. Some are till covered, as at Dunbar ([ELC_4](#)), and pre-date the last glaciation.

Excellent examples of depositional coastal systems are also found in East Lothian, including the sand flats and dune systems at Gullane Bents ([ELC_29](#)), Aberlady Bay ([ELC_30](#)), and in the huge swathes of sand found in the intertidal zone within the Tyne Estuary & Belhaven Bay ([ELC_28](#)). Smaller pocket beaches and extensive areas of mudflats and

saltmarshes are also found along the East Lothian coast (e.g. at Aberlady Bay and the Tyne Estuary). The varied and dynamic environments of the East Lothian coast will continue to evolve under the action of waves, wind and potentially rising sea level. This dynamism is most evident on the soft sandy reaches of the coast in the form of erosion at Gullane and the formation and dynamics of sediment bars and spits in the Tyne Estuary & Belhaven Bay and Aberlady Bay. However, it is also apparent in the breakup and weathering of shore platforms (e.g. Seacliff-Scoughall Shore [\(ELC_26\)](#) and Thorntonloch [\(ELC_27\)](#)).

Geomorphological activity has also continued inland during the Holocene. Gullying is widespread in the Lammermuir Hills, notably represented at Oldhamstocks Burn GCR site and by the development 'badland' topography at Burnhope [\(ELC_2\)](#). The postglacial rivers have also adjusted to changing discharges and sediment loads indicated by terrace formation, floodplain development, abandonment of meanders and fossil channels as along the lower River Tyne (Jackes, 1973).

5.3 Geodiversity and community

The form of the landscape of East Lothian, particularly the hills and coastal headlands formed of ice-moulded igneous rock, has been central to the settlement and development of the region's towns and villages. The strong relationship between the geology and landforms, and the location of military sites and harbours can be seen at Dirleton Castle [\(ELC_10\)](#) and Dunbar [\(ELC_4\)](#).

The historic use of the area's geological resources is also indicated at the geodiversity sites. Several of the bedrock exposures have been historically quarried for road metal (e.g. Kippielaw Quarry [\(ELC_9\)](#) and Craigs Quarry [\(ELC_11\)](#)) as well as building stone (e.g. Pepperraig Quarry [\(ELC_12\)](#) and North Berwick Law [\(ELC_19\)](#)). Coal resources from the Coal Measures Group strata to the west of the area have been important for development of local industries, and local stone has been used in the construction of many historic buildings in Dunbar, North Berwick and Haddington.

Many of the geodiversity sites are located within areas that are used for recreation and/or associated with scenic areas popular with tourists. Several also are located partially or wholly within areas that are protected for their biodiversity or ecology as Local Nature Reserves as at Aberlady Bay [\(ELC_30\)](#), and within the large Firth of Forth SSSI. The association of many of the geodiversity sites with the John Muir Way provides a key opportunity to develop their educational value. The addition of geological information to existing sign boards, provision of leaflets or online information, and the creation of 'geo-trails' would increase access to geological information about the sites for a range of potential community and educational users. Building links between schools and their local geodiversity sites is another potential development of the educational potential of East Lothian's geodiversity.

Several of the sites have significant associations with past or current scientific research; the region has been at the forefront of research into volcanology, Carboniferous depositional environments, lowland glaciation, coastal processes and now tetrapod evolution for over a century.

5.4 Limitations and potential further assessments

The geodiversity sites identified and assessed in this study represent additional sites that complement the existing protected geological SSSIs (Table 2). However, coastal geodiversity sites lying within the large Firth of Forth SSSI have been included as these areas contain many geological features that have not been included as notified features of the SSSI. These areas are of particular importance in East Lothian and merit recognition for the quality and diversity of their geological features and landforms.

Many of the geodiversity sites are part of dynamic erosional and depositional coastal systems. In addition to natural changes in landform morphology and the extent of bedrock exposures that may arise due to ongoing erosion or deposition, the geodiversity sites may be affected by climate or sea level change. The 'soft' depositional sand flats and dune systems of coastal sites (such as Gullane Bents, Aberlady Bay and the Tyne Estuary & Belhaven Bay) are likely to be most susceptible to such changes, and these may also be at risk from intrusive land management practices. In

mitigation of the risks, however, these geodiversity sites are coincident with areas that are already well protected and managed for the importance of their biodiversity and ecosystems. As far as possible, the management of these sites should aim to maintain the natural processes.

Inland quarry sites are susceptible to natural degradation through vegetation growth and weathering, but may be more at risk from waste tipping and, in some cases, development. Sandstone quarries at Gullane, reportedly the source of local stone for Dirleton Castle and other local buildings are now degraded and show no exposures. A survey of building stones and local quarry sites would help to identify, and if necessary protect, sources of local stone, providing important information relating to the preservation of local historic buildings.

The dominance of pastoral agricultural land in East Lothian is a positive aspect of the condition of inland landforms and is conducive to their long term preservation. The condition of landform features may be detrimentally affected by afforestation and development, which may obscure their morphology.

Sand and gravel extraction may also be a risk to areas of the glaciofluvial sand and gravel deposits that occur within the region. Nationally important examples of these deposits and associated meltwater channels are represented by features within the Rammer Cleugh SSSI. However, there are several other potentially regionally important examples in East Lothian which could be surveyed in future assessments. Some of the best remaining examples of glaciofluvial deposits occur at High Latch/Longyester, but these features lie within an area for which there is planning consent for further sand and gravel extraction. Depending on the final restoration conditions of the site, it may be possible to identify conservation sections in these glaciofluvial deposits at the end of working, providing an opportunity to enhance the geodiversity of the region.

[References](#)

Table 7: Summary of ratings for East Lothian Geodiversity sites	Site No.	Feature Type	Feature(s)	Overall Rating	
				Quality	Rarity
Gala Law	ELC_1	Bedrock exposure	Gala Group	Moderately good sedimentology and palaeontology	Local lithostratigraphy and paleontology
Burn Hope	ELC_2	Bedrock exposure	Great Conglomerate Fm	Excellent geomorphology, good lithostratigraphy and sedimentology	National geomorphology, regional lithostratigraphy
Gin Head (nr Tantallon Castle)	ELC_3	Bedrock exposure	Ballagan Fm	Excellent palaeontology	International paleontology
Dunbar Shore	ELC_4	Bedrock exposure	Kinnesswood Fm, volcanic vents, Ballagan Fm, Devonian rocks, Geomorphology	Excellent igneous geology, sedimentology and geomorphology	Regional lithostratigraphy, sedimentology, igneous geology and National Quaternary and coastal geomorphology
North Berwick Shore	ELC_5	Bedrock exposure	Garleton Hills Volcanic Fm, volcanic vents, Aberlady Fm	Excellent igneous geology	Regional igneous geology and lithostratigraphy
Yellow Craig Shore	ELC_6	Bedrock exposure	Garleton Hills Volcanic Fm, volcanic vents, Gullane Fm	Excellent lithostratigraphy and igneous geology	Regional lithostratigraphy and igneous geology
Old Markle Quarry	ELC_7	Bedrock exposure	Garleton Hills Volcanic Fm	Good igneous geology	Regional igneous geology
Blaikie Heugh – Balfour Monument	ELC_8	Bedrock exposure	Garleton Hills Volcanic Fm	Moderately good igneous geology	Regional/national igneous geology
Kippelaw Quarry	ELC_9	Bedrock exposure	Garleton Hills Volcanic Fm	Poor igneous geology	Local igneous geology
Direlton Castle	ELC_10	Bedrock exposure	Garleton Hills Volcanic Fm	Excellent igneous geology	Local igneous geology
Craigs Quarry	ELC_11	Bedrock exposure	Garleton Hills Volcanic Fm	Moderately good igneous geology	Local igneous geology
Peppercraig Quarry	ELC_12	Bedrock exposure	Garleton Hills Volcanic Fm	Poor igneous geology	Local igneous geology
Gullane Shore	ELC_13	Bedrock exposure	Gullane Fm, igneous sills, Quaternary landforms	Excellent sedimentology	Regional lithostratigraphy
Kilspindie	ELC_14	Bedrock exposure	Lower Limestone Fm, Aberlady Fm, igneous sill	Excellent paleontology	Regional paleontology and lithostratigraphy
Prestonpans Shore	ELC_15	Bedrock exposure	Upper Limestone Fm, Limestone Coal Fm	Excellent lithostratigraphy	Regional lithostratigraphy and paleontology
Cockenzie – Port Seton Shore	ELC_16	Bedrock exposure	Lower Coal Measures, Passage Fm, Upper Limestone Fm	Excellent lithostratigraphy	Regional lithostratigraphy
Esk Valley	ELC_17	Bedrock exposure	Middle Coal Measures	Excellent lithostratigraphy	Regional lithostratigraphy
Penrcraig Wood Quarry	ELC_18	Bedrock exposure	Igneous sill, geomorphology	Good geomorphology, poor igneous geology	Local geomorphology and igneous geology
North Berwick Law	ELC_19	Bedrock exposure	Geomorphology, volcanic vent	Good geomorphology, good igneous geology	Regional geomorphology and igneous geology
Kidlaw Quarry	ELC_20	Bedrock exposure	Volcanic plug	Good igneous geology	Regional/national igneous geology
Cheese Bay	ELC_21	Bedrock exposure	Palaeontology, Gullane Fm	Excellent palaeontology	International paleontology
Garleton Hills	ELC_22	Landform/Quaternary	Ice moulded bedrock	Excellent geomorphology	Regional geomorphology
Kidlaw Erratic	ELC_23	Landform/Quaternary	Glacial erratic	Excellent geomorphology	Regional/national geomorphology
Lochhouses	ELC_24	Landform/Quaternary	Tsunami deposit	Good geomorphology	Regional geomorphology
Seacliff – Scoughall Shore	ELC_25	Landform/Quaternary	Shore platform	Excellent geomorphology	Regional/national geomorphology
Thorntonloch	ELC_26	Landform/Quaternary	Coastal landforms	Good/excellent geomorphology	Regional geomorphology
Whitekirk	ELC_27	Landform/Quaternary	Glacial erosion	Good geomorphology	Regional geomorphology
Tyne Estuary & Belhaven Bay	ELC_28	Landform/Quaternary	Geomorphology	Excellent geomorphology	Regional geomorphology
Gullane Bents	ELC_29	Landform/Quaternary	Sand dune restoration	Good/excellent geomorphology	Regional geomorphology
Aberlady Bay	ELC_30	Landform/Quaternary	Coastal landforms	Good/excellent geomorphology	Regional geomorphology

(Table 7) Summary of ratings for East Lothian Geodiversity sites.

Table 8: Geological Features Visible at Geodiversity Sites	Site No.	Lower Palaeozoic strata	Devonian strata Kinneswood Formation	Ballagan Formation	Garleton Hills Volcanic Formation	Gullane Formation	Aberlady Formation	Lower Limestone Formation	Limestone Coal Formation	Upper Limestone Formation	Passage Formation	Coal Measures	Early Carboniferous Volcanic Plugs and Vents	Carboniferous to Early Permian Sills	Carboniferous to Early Permian Dykes	Geological Structures	Fossils and Paleontology	Geomorphology	Quaternary Deposits/Feature	Economic Heritage	Built Heritage
Gale Law	ELC_1	•														•	•				
Barn Hope	ELC_2		•													•		•			
Gin Head (nr Tantallon Castle)	ELC_3			•												•	•				
Dunbar Shore	ELC_4		•	•									•		•	•		•	•	•	•
North Berwick Shore	ELC_5				•		•						•			•		•	•		•
Yellow Craig Shore	ELC_6				•	•							•	•		•					
Old Markie Quarry	ELC_7				•															•	
Blaikie Heugh – Balfour Monument	ELC_8				•																
Kippelaw Quarry	ELC_9				•																•
Dirleton Castle	ELC_10				•																•
Craigs Quarry	ELC_11				•																•
Peppercraig Quarry	ELC_12				•																•
Gullane Shore	ELC_13					•								•					•		•
Kilspindie	ELC_14						•	•						•			•	•			
Prestonpans Shore	ELC_15								•	•					•	•	•				•
Cockenzie – Port Seton Shore	ELC_16									•	•										•
Esik Valley	ELC_17											•									
Pencraig Wood Quarry	ELC_18													•							•
North Berwick Law	ELC_19				•													•			•
Kidlaw Quarry	ELC_20												•								•
Cheese Bay	ELC_21					•											•				
Garleton Hills	ELC_22																	•	•		
Kidlaw Erratic	ELC_23																	•	•		
Lochhouses	ELC_24																	•	•		
Seacliff – Scoughall Shore	ELC_25																	•	•		
Thornonloch	ELC_26																	•	•		
Whitekirk	ELC_27																	•	•		
Tyne Estuary	ELC_28																	•	•		
Gullane Beets	ELC_29																	•	•		
Aberlady Bay	ELC_30																	•	•		

(Table 8) Geological features present at the Geodiversity Sites.

SSSI	Type	Notified geological features	Site Code
Bangley Quarry	Geological	Mineralogy	145
Barns Ness	Geological and Biological	Stratigraphy (Lower Carboniferous)	153
Garleton Hills	Geological	Igneous petrology (Carboniferous – Permian)	671
Keith Water	Geological	Quaternary geology (glacial deposits)	828
Rammer Cleugh	Geological and Biological	Quaternary geology (glacial landforms)	1327
Traprain Law	Geological and Biological	Igneous petrology (Carboniferous – Permian)	1560
Firth of Forth	Geological and Biological	Stratigraphy, igneous petrology, palaeontology, Quaternary geology and geomorphology	8163
Bass Rock	Biological	-	155
Danskine Loch	Biological	-	496
Forth Islands	Biological	-	653
Lammer Law	Biological	-	903
Lammermuir Deans	Biological	-	904
North Berwick Law	Biological	(This site was formerly noted for igneous petrology)	1228
Papana Water	Biological	-	1270
Woodhall Dean	Biological	-	1646

(Table 2) Sites of Special Scientific Interest in East Lothian.