



**POLICY AND PRACTICE  
FOR THE PROTECTION  
OF GROUNDWATER**

**REGIONAL APPENDIX  
SOUTH WEST REGION**



*National Rivers Authority*



**POLICY AND PRACTICE  
FOR THE PROTECTION OF  
GROUNDWATER**

**South West Region Appendix**

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## **1. INTRODUCTION**

### **1.1 Purpose of the Regional Appendix**

This Regional Appendix to the NRA "Policy and Practice for the Protection of Groundwater" provides information specific to the South West Region. It includes:

- \* description of South West Region
- \* geology and hydrogeology
- \* particular groundwater problems
- \* main office locations and contacts relevant to groundwater matters
- \* how to use the "Policy and Practice for the Protection of Groundwater" prior to the introduction of new vulnerability maps

This is one of ten regional appendices which complement the national policy. Emphasis is given to the important features of the South West Region such as the vulnerability of particular strata.

### **1.2 South West Region**

The area covered by the South West Region of the NRA is shown in Figure 1 on page 3. It has generally mild winters, high annual rainfall, steep catchments, non-glaciated landforms, deeply weathered soil profiles and an extensive coastline.

The Region crosses four county boundaries incorporating the whole of Devon and Cornwall, together with small parts of Somerset and Dorset. The total land area is approximately 10,800 sq km. The resident population is approximately 1,500,000, but during the summer months this is boosted by a considerable influx of holiday visitors. Important industries include tourism, agriculture, fishing and mineral extraction.

### **1.3 Importance of groundwater within the Region**

Groundwater provides an important source of water; for private water supplies present throughout the Region, for limited but strategically important public supply and also for support of river flows particularly during prolonged dry periods. Extensive mining and mineral extraction has important resource and pollution implications for the Region.



### **1.3.1 Private Supplies**

There are estimated to be 20,000 to 30,000 private groundwater sources throughout the Region. These include wells, boreholes and springs which provide water for domestic use, agricultural uses such as watering of livestock or irrigation, commercial uses such as for water bottling and for industrial processes. Whilst the Major Aquifers in the east of the Region generally provide the highest yields, the remainder is underlain by Minor Aquifers from which significant supplies can be obtained. Indeed, many rural areas throughout Devon and Cornwall rely on private groundwater sources as mains water is often unavailable.

### **1.3.2 Public Supply**

Approximately 9% of public water supply in the Region is obtained from groundwaters, the majority abstracted from Major Aquifers in East and Mid Devon. Abstraction boreholes within the Permian sandstones in the Western Exe Aquifer and Crediton Trough, and the Triassic sandstones in the Otter Valley provide significant yields. Spring sources derived from the Upper Greensand and boreholes in the Lower Chalk also provide water into public supply. These sources are strategically important since the more remote areas of East Devon are not fully integrated into the main surface water distribution network.

### **1.3.3 River Support**

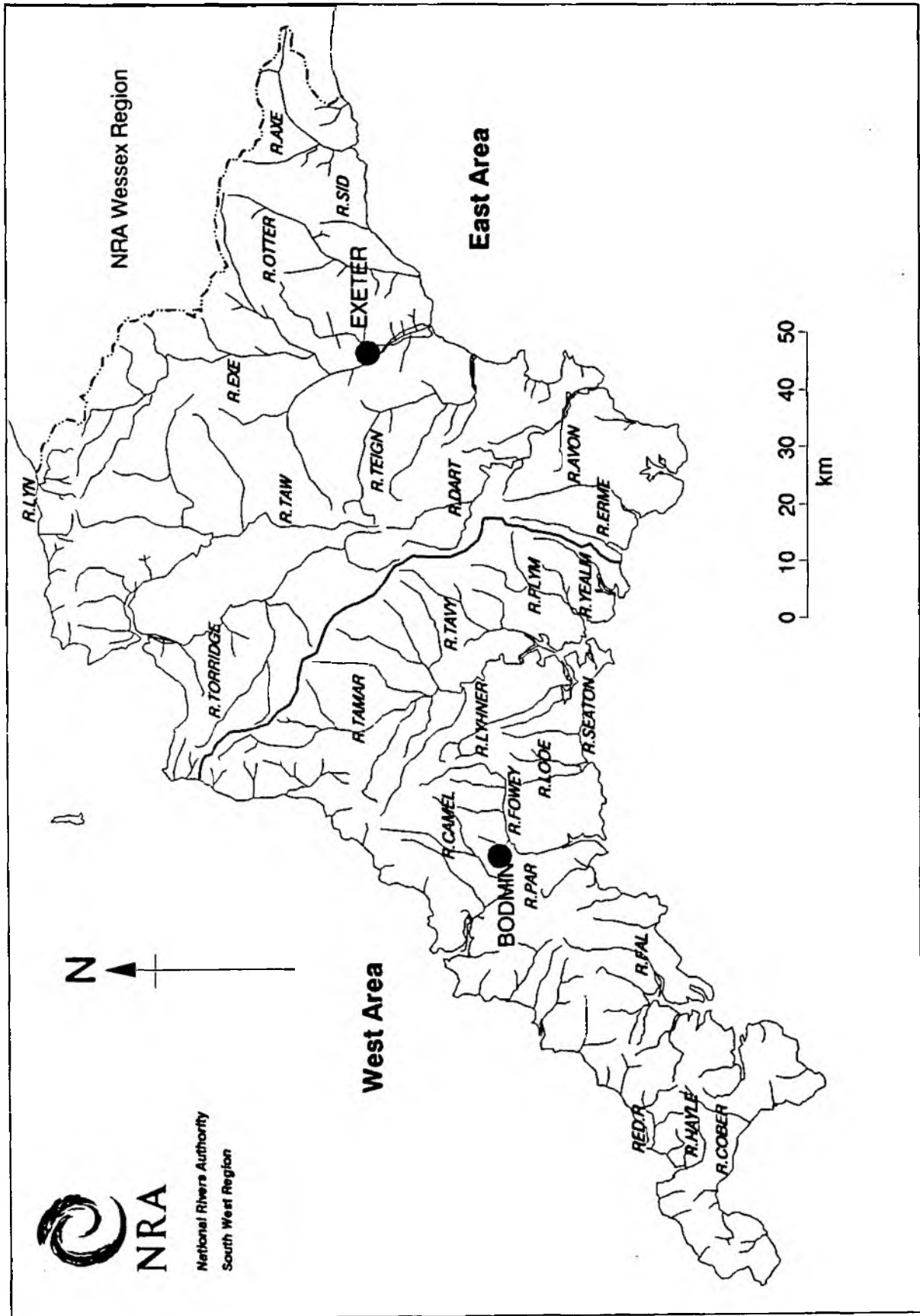
Groundwater from both Major and Minor Aquifers plays an important role in maintaining river flows, particularly during dry periods. The Major Aquifers in the east of the Region are highly permeable forming extensive natural underground reservoirs. These provide steady recharge into rivers such as the Axe, Otter and Culm maintaining flows even during extended periods of dry weather. Groundwater storage in the Minor Aquifers underlying the remainder of the Region is generally restricted to fissures and fractures and weathered zones. This results in localised, more rapid groundwater drainage to rivers which recess to very low flows in dry weather.

### **1.3.4 Mine Drainage**

Many areas of Cornwall and West Devon have been subject to mining activity. Mine workings which extend below the water table result in locally increased groundwater storage and the associated engineered drainage can change surface and groundwater flow regimes. Mine systems can cause rapid migration of pollutants particularly through shafts and adit systems. A number of adits and flooded shafts are now also used for private and public water supplies.

# South West Region - Location Map

Figure 1



## **2. THE GEOLOGY AND HYDROGEOLOGY OF SOUTH WEST REGION**

The geology of the South West Region is shown in Figure 2 on page 13.

The Region is underlain by rocks formed from the Devonian period to Recent times. Small outcrops of older Ordovician age sediments have been mapped on the Lizard. A brief description of the geology in the Region together with flow mechanism, main locations and geological classification of the main formations are included in Table 1 on page 7.

Table 2 on page 12 summarises the Major, Minor and Non-Aquifer classification for the principle geological formations present in the Region. This classification is linked to the Groundwater Protection Policy statements and matrix tables given in Appendix 1 of the main Policy and Practice document.

### **2.1 Major Aquifers**

These are restricted to the younger rocks in the east of the Region. They include; Permian sandstones, Triassic conglomerate and sandstone, and the Cretaceous chalk and greensand.

#### **2.1.1 Permian**

The Permian aquifer comprises the sand and breccia horizons below the Lower Marls and undergoes lateral change over the area of its outcrop. To the south west of the Exe Estuary the aquifer consists of dune sands underlain and overlain by breccio-conglomerates, whilst to the north west (Crediton Trough) and north (Culm Valley) the deposits are more highly cemented fluviatile breccias and subordinate sands. Pumping tests have indicated permeability up to 4 metres per day within the uncemented dune sand deposits. The Permian aquifer is exploited for public supply from boreholes to the west of the Exe Estuary and also in the Coleford and Knowle area of the Crediton Trough. There are also many private domestic, agricultural and industrial supplies abstracted throughout the Permian outcrop.

#### **2.1.2 Triassic**

The Triassic aquifer lies between the Lower Marls and Upper Marls and comprises 20 to 25m of large, uncemented pebbles and cobbles (Budleigh Salterton Pebble Beds), overlain by approximately 140m of sandstones with occasional marl bands (Otter Sandstone). Pumping tests indicate a permeability between 1 and 6 metres per day. The aquifer extends as a narrow band along the Otter Valley and north towards Wellington. Within the Otter Valley it forms the most important aquifer in the Region with significant public supply groundwater abstraction in the areas of Otterton, Colaton Raleigh, Dotton, Harpford and Greatwell. There are also numerous private groundwater abstractions throughout the Triassic outcrop.

### 2.1.3 Cretaceous

The chalk from which other Regions derive considerable groundwater supplies occurs only as isolated outliers on the hills of East Devon and in most cases drains freely into the underlying Upper Greensand.

The Upper Greensand can provide significant yields, mainly from springs draining the near horizontal beds. Many such springs have been tapped for domestic and agricultural supplies with the largest being exploited for public supply providing typical yields of 1 mega litre per day. The high storage capacity within these rocks results in a high base flow component to the rivers in East Devon, particularly the Culm, Axe, Upper Otter, and Sid, maintaining flows even during drought conditions. The lower beds of the Upper Greensand aquifer are unconsolidated fine sands and silty sands. Borehole sources are unusual, because they cannot normally deliver acceptable yields due to sand ingress and collapse.

## 2.2 Minor Aquifers

The majority of the Region is underlain by "hard rocks" comprising of indurated Devonian and Carboniferous sediments which have undergone varying degrees of metamorphism, and also Igneous and Metamorphic rocks. These rocks have low porosity and intergranular permeability. Consequently, storage and movement of groundwaters is restricted to fractures and weathered zones. However, a combination of intense structural deformation and deep weathering of strata (which has not been stripped by glaciation as in central and northern parts of England) has resulted in these rocks yielding significant supplies. As a consequence of shallow water tables, low porosity and rapid flow, groundwater in these minor aquifers are often vulnerable to surface water and local groundwater contamination.

### 2.2.1 Devonian and Carboniferous

The Devonian and Carboniferous strata are generally well cemented and have low intergranular permeability. These rocks have undergone much structural change which has resulted in widespread folding and faulting, and it is within associated fractures and fissures that storage of groundwater exists. The yield available is therefore highly variable and relies on the interconnection of fractures. Many small private supplies for domestic and agricultural purposes rely on these aquifers and some experience a fall in yield during late summer conditions owing to the storage limitations inherent in these rocks.

A series of Lower Carboniferous cherts, shales and limestone deposits outcrop at a number of locations. The main outcrops are formed by, the Coddan Hill Cherts, the Westleigh Limestone Group and the Bampton Limestone Group located in Mid and North Devon. The limestone beds are generally thin and interbedded with shales and cherts making them very different to the better known more massive Carboniferous limestones which elsewhere in the country have been classified as Major Aquifers. In this region their variable permeability and limited extent makes them unsuitable for large abstractions for public supply, although they do provide many small private groundwater supplies.

Isolated outcrops of Middle Devonian Limestone in the Torquay, Newton Abbot and Plymouth areas form locally important and well fissured aquifers. Yields up to 250,000 litres per day have been obtained from a number of boreholes. However, whilst the permeability is generally very high, resulting in rapid drainage of recharge, these rocks have a low storage capacity which limits their suitability for public supply abstraction. They are also highly susceptible to contamination from ground and surface activities.

## **2.2.2 Igneous and Metamorphic**

Similar conditions prevail in the igneous and metamorphic rocks as in the other "hard rock" Minor Aquifers. Groundwater storage is generally within fissures which are often poorly interconnected and hence initial high yields are rarely sustainable. Significant yields can however be obtained from these rocks where the effect of weathering, mineralisation or mining activities has increased the groundwater storage.

## **2.2.3 Jurassic**

In the east of the Region the Bridport and Yeovil Sands have been investigated to determine their use for public supply. Yields were found to be extremely variable and generally too low for large scale development. However, there are many domestic and agricultural supplies obtained from this strata and springs provide a high base flow component to rivers.

## **2.2.4 Quaternary**

Superficial deposits are present throughout the Region and provide good groundwater supplies in some places, although usually at the expense of river flow. Public supply abstractions are made at several locations such as Taw Marsh where water within the coarse grained granite derived gravels is exploited and also in the lower Dart Valley where radial collector wells in the river gravels are used. Coastal blown sand deposits are present in several places and can provide good yields although saline intrusion may be induced. The lacustrine deposits present within the Bovey Basin in South Devon can also provide high yields from the sandy and lignitic horizons.

## **2.3 Non-Aquifers**

The Mercia Mudstone and the Lower Lias are both considered Non-Aquifers within the Region. The Mudstone comprise of a sequence of mudstones, siltstones and sandy silt deposits of low permeability, although small yields have been obtained in some areas for domestic and agricultural purposes. The Lower Lias outcrops in the extreme east of the Region and comprises a considerable thickness of mudstones with subordinate thin bands of limestone. Also generally of low permeability, the Blue Lias, at the base of the succession, has a higher limestone content than overlying beds and does yield limited supplies.



TABLE 1

## THE GEOLOGY AND HYDROGEOLOGY OF THE SOUTH WEST REGION

AGE/ROCK TYPE	MAIN LOCATIONS	DESCRIPTION	FLOW MECHANISMS	GEOLOGICAL CLASSIFICATION
<b>Tertiary</b> <b>Recent &amp; Pleistocene</b> - Alluvium and valley/ river gravels	Throughout Region	Cobbles and gravels interbedded with sand, silt and clay. In W. Cornwall many have been worked for metalliferous placer deposits. Locally important for water supply but in hydraulic connection with surface water. Gravel aquifers at Totnes and Taw Marsh are used for public water supply.	Intergranular	Drift
- Head	Widespread	A heterogeneous mix of local rock types in a sand silt and clay matrix.	Intergranular	Drift
- Raised beaches	Coastal areas, especially W. Cornwall	Often sand gravel and cobbles. Insignificant water resources due to isolated occurrence.	Intergranular	Drift
- Blown sand	Taw/Torridge Estuary, Perranporth, Hayle and elsewhere	Coarse aeolian wind blown dune sands mainly along the north coast. Locally used for water supply. High yields can be obtained.	Intergranular	Drift
- Marine & estuary alluvium	Estuary areas	Mainly intertidal.		Drift
- Peat	Throughout region. Concentrated on granite moorlands	Boggy areas of moorland are important for river headwaters.		Drift
- Boulder clay and glacial sand/ gravel	Barnstaple area	Small area of boulder clay and lake clays, used in local potteries. Gravels shallow and in hydraulic continuity with surface water.	Impermeable intergranular in gravels	Drift



TABLE 1 (continued)

## THE GEOLOGY AND HYDROGEOLOGY OF THE SOUTH WEST REGION

AGE/ROCK TYPE	MAIN LOCATIONS	DESCRIPTION	FLOW MECHANISMS	GEOLOGICAL CLASSIFICATION
<b>Jurassic</b> - Sandstones and limestones	W. Dorset	The Bridport and Yeovil Sands and Inferior Oolite can yield locally important supplies. Also supply major springs important to the River Axe headwaters.	Intergranular/Fracture	Minor Aquifer
<b>Lower Jurassic (Lias)</b> - Shales, clays marls and limestones	E. Devon, W. Dorset and S. W. Somerset	Generally low permeability mudstones although blue lias limestones can yield small amounts of hard water.	Fracture	Non-Aquifer
<b>Triassic</b> - Mercia Mudstones - (mudstones and siltstones)	S. E. Devon, W. Dorset and S. W. Somerset	Low permeability, generally regarded as Non Aquifer, although some horizons can support some small supplies.	Fracture/Intergranular in permeable horizons	Non-Aquifer
- Pebble Beds - Sherwood Sandstone	Otter Valley, S. E. Devon and S. W. Somerset	Consisting of the pebble beds and overlying sandstone formations, this is the major groundwater resource in the region. Extensively developed for public supply in the Otter Valley with high yields.	Intergranular/Fracture	Major Aquifer
<b>Permian</b> - Sandstones and breccia- conglomerate	S. Devon, Teign-Exe Estuary areas, Exe and Clyst Valleys	This is an important aquifer used for public supply as well as agricultural, domestic and industrial use. Permeability varies considerably with lithology and degree of cementation. Substantial yields obtained.	Intergranular/Fracture	Major Aquifer
- Littleham Mudstones	Lower Exe, Clyst and Culm Valleys	Underlain by Major Aquifer, although many private supplies are drawn from sandier horizons within the marls and mudstones.	Intergranular/Fracture within sandstone horizons	Minor Aquifer overlying Major Aquifer

TABLE 1 (continued)

## THE GEOLOGY AND HYDROGEOLOGY OF THE SOUTH WEST REGION

AGE/ROCK TYPE	MAIN LOCATIONS	DESCRIPTION	FLOW MECHANISMS	GEOLOGICAL CLASSIFICATION
<b>Devonian (undifferentiated)</b> - Slates and grits Some thin limestones and cherts	Central to W. Cornwall	Extensive thermal metamorphism around the granite contact, associated with hydrothermal mineralisation and widespread underground mine workings. Locally important for private supplies. Some public supply from old adits, shafts.	Fracture (local conduit flow in mined areas)	Minor Aquifer
<b>Igneous and Metamorphic</b> - Devonian diabase and metadolerite	As volcanics and intrusives within the Devonian sediments	Quarried in areas. Hydrogeologically similar to surrounding sediments, although often higher yields obtained in shallow weathered zones. Mainly private supplies, but some public supply is obtained in West Cornwall.	Fracture	Minor Aquifer
- Lizard Complex	Lizard Peninsular, Cornwall Start Point, Devon	Heavily metamorphosed and structurally deformed igneous rocks. Small supplies from fracture zones.	Fracture	Minor Aquifer
- Granites (Permian)	Dartmoor, Bodmin Moor, St. Austell, Carnenellis, Lands End and other areas	These rocks have very low primary permeability, although fracture flow can be significant at shallow depth. Yields often adequate for private supplies.	Fracture	Minor Aquifer
- Exeter Traps	Exeter - Crediton area	Vesicular basalt lavas. Yields are higher than other fissured rocks due to the vesicular porosity. Private water supplies are obtained.	Fracture	Minor Aquifer

TABLE 1 (continued)

## THE GEOLOGY AND HYDROGEOLOGY OF THE SOUTH WEST REGION

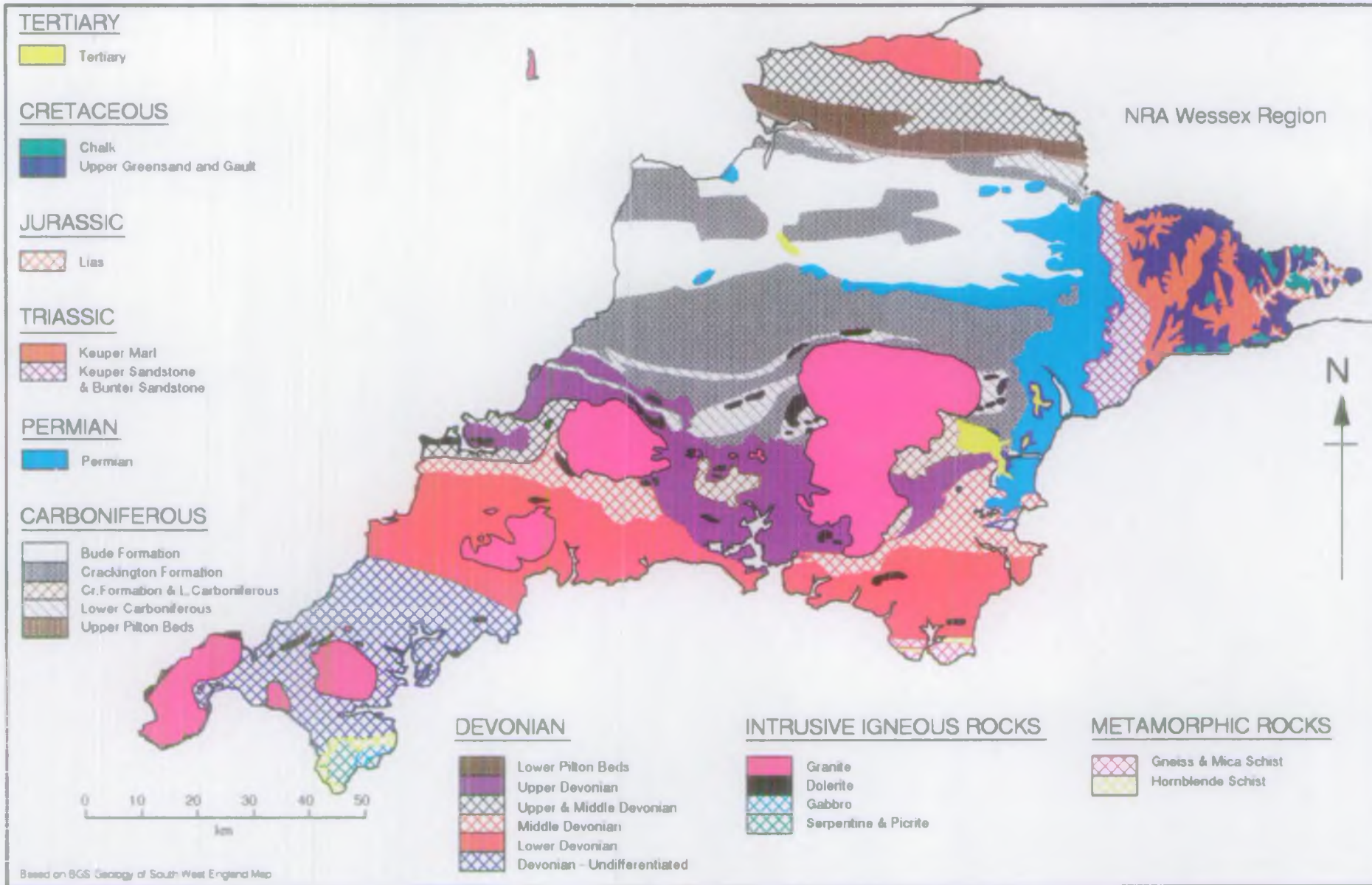
AGE/ROCK TYPE	MAIN LOCATIONS	DESCRIPTION	FLOW MECHANISMS	GEOLOGICAL CLASSIFICATION
<b>Carboniferous</b> (Dinarian) - Shales, cherts Some limestones and tuffs	E. Cornwall, W. Devon, Teign Valley and North Cornwall, N. Devon, S. Exmoor, Central Devon	Generally of low permeability, but many private supplies are obtained. Fracture zones within the limestones and cherts can provide significantly greater yields.	Fracture	Minor Aquifer
(Namurian/Westphalian) - Shales, sandstones and silt/mudstones	N. Cornwall, N. Devon S. Exmoor, Central Devon Teign Valley	Locally important for private supplies.	Fracture	Minor Aquifer
<b>Upper Devonian</b> - Slates and grits Some thin limestones and tuffs	Central - E. Cornwall, S. Devon, Torbay, N. Cornwall, N. Devon and Exmoor	Metalliferous mining and stone quarrying. Provides locally important supplies particularly within grits.	Fracture	Minor Aquifer
<b>Middle to Upper Devonian</b> - Limestone	Plymouth/Plymstock, Newton Abbot, Torquay, Ashburton/ Buckfastleigh	Important mineral resources with active deep quarrying. Groundwater yields can be high, but rapid depletion often occurs due to low storage. Private supplies obtained. Groundwater catchments can be totally separate from surface water catchments.	Fracture	Minor Aquifer
<b>Lower Devonian</b> - Slates and grits Some thin limestones and cherts	Central Cornwall, S. E. Cornwall and S. Devon N. Devon	Locally important for private supplies.	Fracture	Minor Aquifer



TABLE 2

GEOLOGICAL CLASSIFICATION OF AQUIFERS IN THE SOUTH WEST REGION

MAJOR AQUIFERS	MINOR AQUIFERS		NON AQUIFERS
<p>Highly permeable formations usually with the known or probable presence of significant fracturing.</p> <p>Highly productive strata of regional importance. Often used for large potable abstractions.</p>	<p>Fractured or potentially fractured but without high intergranular permeability.</p> <p>Generally only support locally important abstractions.</p>	<p>Variably porous/permeable but without significant fracturing.</p> <p>Generally only support locally important abstractions.</p>	<p>Formations with negligible permeability.</p> <p>Only support very minor abstractions, if any.</p>
<p><b>Permian breccias, conglomerates and sandstones</b></p> <p><b>Triassic sandstones and pebble beds</b></p> <p><b>Cretaceous greensand and chalk</b></p>	<p><b>Devonian slates and grits</b> <b>Devonian limestones</b></p> <p><b>Carboniferous cherts and limestone</b></p> <p><b>Igneous and metamorphic rocks</b></p>	<p><b>Eocene/Oligocene sand and gravels</b></p> <p><b>River gravels</b> <b>Glacial sands and gravels</b></p> <p><b>Wind blown sand</b></p>	<p><b>Mercia mudstones</b> <b>Lias clays</b></p>



South West Region Geology Map

Figure 2



### **3. PARTICULAR GROUNDWATER PROBLEMS IN THE REGION**

The widespread use and availability of groundwaters, and high groundwater vulnerability of much of the Region warrants stringent protection measures. In particular, many of the Minor Aquifers have a high groundwater vulnerability due to thin soil cover, the absence of glacial or alluvial deposits, fractured bedrock nature, and high water table.

The following notes, subdivided into the main policy statements sections A to H, highlight some of the activities within the South West Region which present a threat to groundwaters.

#### **3.1 Policy A – Control of groundwater abstractions**

There are approximately 7,000 groundwater abstraction licences throughout the Region, which provide private domestic, agricultural, commercial and public water supplies. Parts of Devon are within Groundwater Exclusion Zones within which abstraction licenses are not required and no control is possible. The number of legal, but non-licensable groundwater sources brings the total number of groundwater sources requiring protection to between 20,000 and 30,000.

#### **3.2 Policy B – Physical disturbance of aquifers and groundwater flow**

A number of activities occur in the Region which physically disturb aquifers and groundwater flow. Deep quarrying and gravel or mineral extraction, mining, civil engineering and construction works, and agricultural field drainage are of particular concern.

#### **3.3 Policy C – Waste disposal to land**

There are approximately 250 licensed waste disposal sites throughout the Region. The majority are licensed for inert wastes, although some sites are permitted to accept semi-inert, domestic, commercial and industrial wastes.

The majority of the Region is underlain by vulnerable aquifers and there are few locations where natural containment of wastes is possible. Therefore disposal of wastes with a high pollution potential will normally only be acceptable with engineered containment. Disposal of leachate, derived from infiltration and drainage through wastes, can prove difficult where discharge to sewer is not possible.

#### **3.4 Policy D – Contaminated land**

Whilst the Region is not affected by large numbers of industrial sites there are more than 2000 mines recorded with associated contaminated spoil and over 200 closed waste disposal sites have been identified.

Mining was widespread throughout Cornwall and West Devon during the 18th and 19th Century and vast amounts of spoil contaminated with heavy metals such as arsenic, copper, nickel, zinc, lead etc. were tipped, usually close to the site of extraction. Many of these mine spoil tips remain contaminated although the level of contamination varies considerably.

### **3.5 Policy E – The application of sludges and slurries to land**

There are approximately 20,000 farms and smallholdings in the Region of which 8,000 are dairy farms collecting and storing large volumes of silage and animal slurries. Appropriate disposal to land is particularly important in the Region due to the vulnerability of many underlying groundwaters. There is also a growing requirement for disposal of treated sewage sludge to land as disposal routes to sea are stopped and sewage treatment works are developed.

### **3.6 Policy F – Discharges to underground strata**

Many areas in the Region are not served by mains drainage or are subject to sewerage restrictions. In these areas disposal of sewage is typically to cess pits and septic tanks, many of which discharge to ground via soakaways. The proliferation of septic tank discharges is undesirable in some areas due to the vulnerability of local groundwater and widespread use for potable supply.

Discharge of surface water runoff to ground occurs throughout the Region. Adequate interception facilities are essential to protect vulnerable groundwaters.

### **3.7 Policy G – Diffuse pollution**

Diffuse pollution due to intensive agricultural practices is of concern in areas of the Region where groundwater is vulnerable. Long term records from sources in the Major Aquifers generally show a slow rising trend in nitrate concentrations measured over tens of years. However, concentrations vary considerably with only a few sources approaching or exceeding the drinking water standard of 50 mg/l as NO<sub>3</sub>. These public water supplies need to be blended with low nitrate waters before use. Elsewhere in the Minor Aquifers high nitrate levels are not uncommon. At present one Nitrate Advisory Area has been designated for groundwater at Colaton Raleigh (East Devon). In this area farmers have agreed to farm in such a way as to minimise nitrate leaching.

Pesticide residues have also been identified in some catchments.

### **3.8 Policy H – Additional threats to groundwater quality**

The production, storage and use of chemicals, storage of farm wastes and intensive livestock housing, graveyards and animal burial sites, sewage works, foul sewers and storm overflows, oil and petroleum storage and transport of liquids via pipelines etc. occur throughout the Region and can also represent a threat to groundwater quality.



#### 4. MAIN OFFICE LOCATIONS IN SOUTH WEST REGION

The main office locations in the South West Region are given in the following table. Beside each address is listed the principal staff responsible for all aspects of groundwater protection and pollution control as well as available data held on public registers. In addition the brief details of the main duties carried out by these sections where they relate to groundwater are given. The areas are shown in Figure 1 on page 3 which also outlines the South West Region.

TABLE 3

## MAIN OFFICE LOCATIONS IN SOUTH WEST REGION

AREA	ADDRESS TELEPHONE NO.	PRINCIPLE STAFF AND RESPONSIBILITIES	POLLUTION CONTROL CATCHMENT	LOCAL PLANNING AUTHORITY WITHIN AREA
Exeter (Headquarters)	Manley House, Kestrel Way, Exeter, EX8 2EL Tel:- (0392) 444000 Fax:- (0392) 444238	<p><b>Groundwater Officer</b></p> <p>All aspects of groundwater quality protection; waste disposal licence consultation, liaison with Waste Disposal Authorities; advice to internal staff, public, consultants and developers on groundwater quality matters; management of Nitrate Sensitive Areas; expertise on waste disposal and contaminated land.</p> <p><b>Freshwater Officer</b></p> <p>Setting of standards and objectives for groundwater and surface waters and for monitoring compliance.</p> <p><b>Quality Regulation Officer</b></p> <p>Issuing of discharge consents for surface water and groundwater.</p> <p>Maintenance of public register of water quality data and consents.</p> <p><b>Pollution Control Planner</b></p> <p>Responsible for pollution control emergency procedures. Waste disposal and contaminated land co-ordination.</p> <p><b>Pollution Control Officer</b></p> <p>All aspects of pollution control work.</p>	East Area	<p>Dartmoor National Park Exmoor National Park East Devon Exeter Mid Devon North Devon South Hams (part) South Somerset (part) Taunton Deane (part) Teignbridge Torbay Torridge West Devon (part) West Dorset (part) West Somerset (part)</p>

TABLE 3 (continued)

MAIN OFFICE LOCATIONS IN SOUTH WEST REGION

AREA	ADDRESS TELEPHONE NO.	PRINCIPLE STAFF AND RESPONSIBILITIES	POLLUTION CONTROL CATCHMENT	LOCAL PLANNING AUTHORITY WITHIN AREA
Exeter (continued)		<p><b>Water Abstraction Officer</b></p> <p>Issuing of abstraction licences. Maintenance of abstraction licences on the public register.</p> <p><b>Hydrogeologist - Water Resources</b></p> <p>Assessment of groundwater abstraction proposals. Consultations on impact of quarrying and major civil engineering works on groundwater resources. Issuing Section 32(3) Consents to drill and test pump groundwater sources.</p> <p><b>Planning Liaison Officer</b></p> <p>Liaison with Local Authorities on all planning related matters in East Area.</p> <p><b>Also within each area office:- Flood Defence, Land Drainage, Conservation and Fisheries staff.</b></p>	East Area (continued)	See previous table

TABLE 3 (continued)

## MAIN OFFICE LOCATIONS IN SOUTH WEST REGION

AREA	ADDRESS TELEPHONE NO.	PRINCIPLE STAFF AND RESPONSIBILITIES	POLLUTION CONTROL CATCHMENT	LOCAL PLANNING AUTHORITY WITHIN AREA
<b>Bodmin (Cornwall and West Devon)</b>	Sir John Moor House Annexe Victoria Square Bodmin Cornwall PL31 1EB  Tel:- (0208) 78301 Fax:- (0208) 78321	<p><b>Pollution Control Officer</b></p> <p>All aspects of pollution control.</p> <p><b>Quality Regulation Planner</b></p> <p>Issuing of prohibition notices and discharge consents (West Area). Maintenance of West Area public register.</p> <p><b>Assistant Water Licensing Officer</b></p> <p>Liaison and assessment of water resource concerns Abstraction licence work.</p> <p><b>Planning Liaison Officer</b></p> <p>Liaison with local Authorities on all planning related matters in West Area.</p>	<b>West Area</b>	Caradon Carrick Kerrier North Cornwall Perwith Plymouth Restormel South Hams (part) West Devon (part)

## 5. USE OF THE POLICY AND PRACTICE FOR THE PROTECTION OF GROUNDWATER UNTIL THE NEW VULNERABILITY MAPS ARE PUBLISHED

There is a considerable amount of work involved in producing the new vulnerability maps for Resource Protection Areas and to define Source Protection Zones. This programme of work has already started but will continue for many months. Until the maps are available, maps associated with the old South West Region Aquifer Protection Policy will be used.

### 5.1 Existing Aquifer Protection Policy

The South West Region of the NRA and its predecessor South West Water Authority have operated an Aquifer Protection Policy since 1984.

The Aquifer Protection Policy recognised three main categories of land which required different degrees of protection. The protection zones were dictated by proximity to public supply and major potable abstractions and the potential of the strata for future public water supply abstractions.

**Zone 1** – included areas of the Major Aquifers within which important public supply sources existed and other areas which were considered to have potential for the development of public supply. This zone covered the outcrop of the Triassic Aquifer, the main exposures of Permian sandstone and groundwater catchments of major groundwater sources outside these areas.

In this zone the Authority asked for referral of all relevant development proposals and planning applications. Full protection of groundwater from pollution was a fundamental requirement of all development proposals.

**Zone 2** – included other areas of the Major Aquifers and the Minor Aquifers where some public supply sources have already been developed, but where only limited future development of sources was expected. This zone covered outcrops of highly fissured Devonian limestone, Permian breccia-conglomerates, Permian sandstone not included in Zone 1, the Cretaceous greensand and chalk strata, Jurassic sands and limestones, areas of permeable alluvium along the major valleys, and small outcrops of Recent blown sands and sand dune deposits.

In this zone the Authority asked for the referral of all relevant development proposals and planning applications, however no objections were made where the risk to groundwater was low or where a groundwater source was not threatened.

**Zone 3** – included all of the remaining areas of the Authority's Region where no potential for large scale development of public water supply sources exists, although there are many thousands of private licensed and unlicensed groundwater supplies which still require protection.

In this zone the Authority normally only objected to a development proposal which could result in pollution or derogation of an existing groundwater source.



## 5.2 Maps associated with Aquifer Protection Policy

The Aquifer Protection Policy was accompanied by two maps on an Ordnance Survey base of 1:100,000 scale. The three original zones are outlined on these maps.

These Aquifer Protection Policy maps will be used by the NRA in conjunction with the new Policy until new vulnerability maps are available.

Table 4 below shows how the new Zones and old Source Protection Zones relate.

Old SW Region Policy Aquifer Protection Zones	New National NRA Policy*	
	Source Protection Zones	Geological Classification
1	Inner, Outer (part) Catchment (part)	Major Aquifer
2	Inner, Outer (part) Catchment (part)	Major Aquifer Minor Aquifer
3	Inner, Outer (part) Catchment (part)	Minor Aquifer Non Aquifer

\* See national Groundwater Protection Policy for explanation of zones.

## 5.3 Transitional Arrangements

When applying the new Policy Statements the original Aquifer Protection Maps will be used as far as possible for the interim period until the new zones have been drawn up. The new Geological Classification is largely directly comparable and Major Aquifers can be related to Zones 1 and 2, Minor Aquifers with part of Zones 2 and 3, and Non-Aquifers with the remainder of Zone 3.

A national Groundwater Vulnerability Map scale 1:1,000,000 has been produced and is included within the main Groundwater Protection Policy and Practice document. The map shows the outcrop of the Carboniferous Limestone as Major Aquifer. However, in Mid and North Devon the limestone is associated with shales and cherts and due to its limited extent and absence of large groundwater sources it is considered to be a Minor Aquifer in the South West Region.

The vulnerability of the major aquifers has been identified, however a full assessment of groundwater vulnerability can only be achieved by local studies. A series of new Groundwater Vulnerability Maps will be produced on a scale 1:100,000 with each sheet covering one county area. These maps will be produced after considering the vulnerability of the groundwater, the geology and also soil type. This will result in a subdivision of Major Aquifers into high, intermediate and low vulnerability.

The Source Protection Zones are not defined on the existing maps. Each proposal for development will be considered in relation to the risk it poses to the abstraction in question. The first group of 16 Source Protection Zones will be produced for the Region by July 1993. Priority has been given to vulnerable sources of strategic importance. Source Protection Zones will be defined as soon as possible and when the necessity arises.



**NRA**

*National Rivers Authority*

To obtain copies of any of the following documents, please send cheque (made payable to the National Rivers Authority) or postal order to:

National Rivers Authority  
Newcastle-Upon-Tyne X  
NE85 4ET

- Policy & Practice for the Protection of Groundwater (including the Groundwater Vulnerability Map) Price £15
- Individual copies of the Groundwater Vulnerability Map Price £5
- Summary Leaflets for the Groundwater Protection Policy Document No Charge

Regional Appendices can be obtained from the appropriate regions free of charge

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