

# Information Sheet on Ramsar Wetlands (RIS)

*Categories approved by Recommendation 4.7, as amended by Resolution VIII.13 of the Conference of the Contracting Parties.*

Note for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Bureau. Compilers are strongly urged to provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of maps.

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## 1. Name and address of the compiler of this form:

Parque Natural das Serras de Aire e Candeeiros  
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FOR OFFICE USE ONLY.

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Designation date

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Site Reference Number

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## 2. Date this sheet was completed/updated:

24.06.2005

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## 3. Country: PORTUGAL

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## 4. Name of the Ramsar site:

Mira Minde Polje and related Springs

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## 5. Map of site included:

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps.

a) **hard copy** (required for inclusion of site in the Ramsar List): yes

b) **digital (electronic) format** (optional): yes

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## 6. Geographical coordinates (latitude/longitude):

Mira-Minde polje: 39°32' N- 8°42' W  
Alviela Springs: 39° 26'45"N – 8°42'40"W  
Almonda Springs: 39°30'15" N – 8°36'40"W  
Vila Moreira Springs: 39° 29' 55"N - 8°40'45"W  
Central coordinate: 39°29' N - 8°38' W

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## 7. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

**Largest Town:** Santarém (about 40 Km distant); **Region:** Centre/West of Portugal; Lisboa – Vale do Tejo (NUT III).

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## 8. Elevation: (average and/or max. & min.)

Mira-Minde *polje* - Flooding area: Minimal underground elevation 90m; Minimal surface elevation 190m; Maximal surface elevation 200m.

Alviela Springs - Flooding area: Minimal underground elevation 55m; Maximal underground elevation 60m; Minimal surface elevation 50m; Maximal surface elevation 55m.

Almonda Springs - Flooding area: Minimal underground elevation 60m; Maximal underground elevation 65m; Minimal surface elevation 60m; Maximal surface elevation 62m.

Vila Moreira springs - Flooding area: Minimal underground elevation Unknown; Maximal underground elevation Unknown; Minimal surface elevation 90m; Maximal surface elevation 91m.

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**9. Area:** (in hectares)

Mira-Minde polje and related caves:	550,4 ha
Alviela Springs:	17,9 ha
Almonda Springs:	87,6 ha
Vila Moreira Springs:	5,8 ha
	Global area: 661,7 ha

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**10. Overview:**

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

The Mira Minde Polje (4 kilometres long and 1,5 kilometres wide) represents a typical phenomenon of a developed karst. Located in Aire and Candeeiros Mountains Natural Park – the most important Portuguese limestone karstic region. The Mira-Minde Polje is a hydrological active phenomena, with regular winter floods due to the existence of four temporary springs in his boundary, related with one of the most important and expressive national net of underground karstic streams. It has also an important associated fauna and flora. The Mira-Minde *Polje* is also part of the recharge area of the two most important karstic aquifers and karstic springs in Portugal, Alviela and Almonda springs (each one with more than 100Mm<sup>3</sup> debit / year). The connection between the karst depression and these two springs, by underground drainage, as well with a third one, the temporary Vila Moreira Spring, was proved by the use of radioactive salts, water tracing and part of the underground stream trajectory is also studied by speleologists.

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**11. Ramsar Criteria:**

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

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**12. Justification for the application of each Criterion listed in 11. above:**

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

**Criterion 1:** A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

The Mira-Minde polje, as well as Alviela, Vila Moreira and Almonda springs, represents a typical phenomenon of a developed karst. The Mira-Minde *polje* and his flooding episodes with extremely high fluctuations of ground water level (> 100m), is a rare example in the West Mediterranean Biogeographic region. The Alviela spring (at the moment, known as one of the 20 explored deepest in the world), is locally connected to a cave complex that represents the most significant fluvio karstic phenomena in Portugal, with a cluster of blind valleys, karstic windows, exurgencies, small canyons, etc.. This cave complex keeps, from April to late September, a several number of bats reproductive colonies (more than 5000 bats). On the other hand, Almonda spring is related with the most extensive Portuguese cave with a development known to be beyond 12Km. This cave is also an important Paleolithic site. These springs are also responsible for the supply of tow affluents of the right margin of Tagus River, Alviela and Almonda rivers. Together they have 60 000 ha of hydrographical basin and they are responsible for important riparian ecosystems and agriculture wetlands. The Vila Moreira spring, in spite of its temporary working, is extremely important under the hydrogeological point of view, assuming that it is a overflow spring of Alviela Spring.

The most abundant habitats of Directive Habitats in polje are: Mediterranean temporary ponds (3170) – priority habitats types, Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation (3150) and Mediterranean tall humid grasslands of the *Molinio-Holoschoenion* (6420)

**Criterion 2:** A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

The Mira-Mind polje is extremely important to the conservation of several species and habitats. See criterion 4, n°18, 19 and 20 of this sheet and, as well **Annex I and Annex II**.

**Criterion 3:** A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

All the proposed areas are extremely important as territorial feeding for bats species, supporting a collection of endemic, rare and threaten flora's species, with a special importance in regional context and biogeographically important. Including 9 species of Bryophytes and 84 species of Vascular Plants (attached Annex I).

**Criterion 4:** A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Alviela and Almonda springs, as well the related caves, are both a very important nest site, above all concerning to Alviela, assuming that nine of the bats species are included in the Portuguese Red Book.

Birds species that nest in the polje: *Fulica atra*; *Bulbucus ibis*

Bat species of the polje:

Bat species	C. Berne	Annex II Dir. Habitats	Portuguese Red book
<i>Rhinolophus ferrumequinum</i>	II	II	In danger
<i>Rhinolophus hipposideros</i>	II	II	In danger
<i>Rhinolophus euryale</i>	II	II	In danger
<i>Rhinolophus mehelyi</i>	II	II	In danger
<i>Myotis myotis</i>	II	II	In danger
<i>Myotis blythii</i>	II	II	In danger
<i>Myotis daubentonii</i>	II		not threatened
<i>Myotis emarginatus</i>	II	II	In danger
<i>Myotis nattereri</i>	II		In danger
<i>Myotis bechsteinii</i>	II	II	In danger
<i>Pipistrellus pipistrellus</i>	II		not threatened
<i>Pipistrellus kubli</i>	II		not threatened
<i>Nyctalus leisleri</i>	II		vulnerable
<i>Eptesicus serotinus</i>	II		not threatened
<i>Plecotus auritus</i>	II		Indeterminate
<i>Miniopterus schreibersii</i>	II	II	vulnerable
<i>Tadarida teniotis</i>	II		rare

**13. Biogeography** (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation): Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) **biogeographic region:** Mediterranean Region

b) **biogeographic regionalisation scheme** (include reference citation): Natura 2000.

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#### 14. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

The Mira-Minde polje is a flat flooded closed karst depression with 4 kilometres long and 1,5 kilometres wide. It is the most representative karst depression in Portugal, located in *Maciço Calcário Estremenho* (Estremenho Limestone Mountains), a 80,000 ha geomorphologic unit, mostly formed by middle Jurassic limestone, with well-defined limits. In the west, by the Candeeiros mountain, that has an altitude of 6,00 m over a length of about 30 Km, and southern and eastern slopes connected with terrain of the tertiary Tagus basin along an extensive fault scarp. The highest point is 670m, at the Aire Mountains located on the Northeast side of this unit. The Mira-Minde depression is limited in the west by the escarpment of Minde and Mira Coast, in the Northeast we observe the scarps of S.Mamede plateau and in Southeast Aire mountain scarp. These scarps do closely show the geological formations of that limestone region.

In raining seasons the polje becomes a large wet season lake, the Mira-Minde Lake, due to the flow of the four temporary springs, “Olho de Mira”, “Poio”, “Contenda” e “Regatinho”. All located in the north limit of that depression. These springs are the surface origin of the superficial streams that sinks in several typical ponors, located in the middle of Mira-Minde depression. Inside these karstic phenomena the fluctuation in water level is about one hundred meters, normally in dry season the groundwater level is about 100m, regarding the flat elevation is 190m.

All the referred springs are connected with important underground galleries. In close connection with “Poio” and “Contenda” springs, we find the most representative national cave system – The “Moinhos Velhos Cave” with development of almost 10 Km. “Regatinho” is probably in connection with another very important cave “Algar da Lomba”. “Olho de Mira” acts as a public water supply to the local parishes of Mira d’ Aire and Minde. Finally “Contenda Cave” acts as a overflow spring of “Moinhos Velhos system”.

In the bottom of the depression we observe a reasonable deposit of quaternary detritic sediments, formed by fragmentary limestone in argillaceous and silt matrix.

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#### 15. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

The catchment area of this cluster, is about 28,000ha of middle Jurassic and can be considered as having a high degree of organisation by the use of an extensive cave complex. Superficial drainage is almost absent, presenting, however, a great variety of typical dissolution limestone phenomena of the karst regions, such as Potholes, Caves, Dolines, Uvalas, Dry valleys, Canions, Pocket valleys, Ponors, etc..

It has a tempered climate, on Mediterranean and Atlantic transition; the dryer season (summer) is the hotter season of the year, with water deficit. The major of precipitation is in winter, and without snowfall. The annual average precipitation is about 900 mm and 1300 mm, in winter. The annual average temperature is between 13° and 15° C. The evapo-transpiration is near 600 mm. The wind is common, particularly N and NW. The annual sunstroke values are 2300 h to 2400 h, with 110 h in January and 260h / 290h in July.

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#### 16. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

The Mira-Minde polje is closely connected to two of the most important national karstic springs: The “Nascente do Rio Almonda” and vaclusian rising of “Nascente do Rio Alviela”. This last one is the most important in Portugal, with maximum discharges over 1Mm<sup>3</sup>/day and about 30 000 m<sup>3</sup>/day in the dry season. The mean anual discharge is 120Mm<sup>3</sup>. This circumstance and its close position to the capital, made this spring to be the most important Lisbon supplier since 1880. Even nowadays it is a most relevant public supply of the region. Following in importance is the Almonda spring with an annual discharge of 100 Mm<sup>3</sup>. The Vila Moreira spring is a temporary trou-plain of Alviela Spring

Finally, considering the subterranean circulation of Mira-Minde polje in association to the urban pressure and the results of the flow, this region is a fulcrum point for the control of this water quantity once it is, at the same time, an area of confluence and of drainage of subterranean discharge.

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## 17. Wetland Types

### a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar “Classification System for Wetland Type” present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

**Marine/coastal:** A • B • C • D • E • F • G • H • I • J • K • Zk(a)

**Inland:** L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va •  
Vt • W • Xf • Xp • Y • Zg • Zk(b)

**Human-made:** 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

### b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

These areas include both Karstics types, with a main domination of Zk(b) Type.

The surface is formed by N.

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## 18. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site.

Mira-Minde polje has important habitat types and communities with interest for conservation. The most abundant habitats (of Directive Habitats) in polje are:

- Mediterranean temporary ponds (3170) – priority habitats types
- Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation (3150)
- Mediterranean tall humid grasslands of the *Molinio-Holoschoenion* (6420)

Around the depression area we find other important habitats types (of Directive Habitats). See attached – Annex I.

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## 19. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

We can find, in those areas, not only species and communities characteristic from the habitats mentioned before, but also a collection of endemic, rare and threaten flora’s species, with a special importance in regional context and biogeographically important. Including 9 species of Bryophytes and 84 species of Vascular Plants (attached Annex I).

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## 20. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Particularly important for the birds and amphibians’ communities, specially because of its importance as a laying and larva’s development place for many amphibians species – an amphibian’ s nursery.

**Polje** is also quite important as a source of water and food for other kind of species not so dependent from wet habitats.

Amphibians species: *Pelobates cultripes*; *Triturus boscai*; *Triturus marmoratus*; *Alytes obstetricans*; *Discoglossus pictus*; *Pelodytes punctatus*; *Bufo calamita*; *Salamandra salamandra*; *Bufo bufo*.

Birds species: *Tachybaptus ruficollis*; *Anas platyrhynchos*; *Gallinula chloropus*; *Alcedo atthis*; *Riparia riparia*; *Motacilla cinerea*; *Cetti cetti*.

Reptiles species: *Mauremys leprosa*; *Atrix maura*; *Natrix natrix*

Birds species that nest in the polje: *Fulica atra*; *Bulbucus ibis*

Mammals present in area: *Arvicola sapidus*; *Mustela putorius*; *Lutra lutra*

In the Caves of Mira–Minde polje we can see some troglobies and troglophiles invertebrates species: *Platyderus lusitanicus* (Coleoptera – Carabidae); *Folsomia candida* (Colembola); *Gyas titanus* (Arachnida – Opiliones); *Medetera petrophila* (Diptera – Dolichopodidae); *Asellus sp* (Isopoda – Asellidaa).

Alviela Caves supports a high number (more then 5000 individuals) of eleven different bats species, see Annex II.

## 21. Social and cultural values:

e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

The Mira-Minde polje has in its North and Eastern limits, two important regional industrial localities, Mira de Aire (4100 hab.) and Minde (3300 hab.) villages. It is also at about 10 Km south of Fátima, a catholic sanctuary with international expression (seven millions of annual visitors and peregrines).

## 22. Land tenure/ownership:

**(a) within the Ramsar site:** **Mira-Minde polje:** Almost private; **Alviela spings:** Public and private; **Almonda springs:** Public and private; **Vila Moreira:** Public and private.

**(b) in the surrounding area:** All the surrounding areas, are, as well, public and private ownership.

## 23. Current land (including water) use:

### (a) within the Ramsar site:

**Mira Minde polje:** Nature Conservation  
Incipient Agriculture  
Tourism and Nature sports  
Water supply

**Alviela spings:** Nature Conservation  
Incipient Agriculture  
Tourism and Nature sports  
Water supply

**Almonda springs:** Urban and Industrial area

**Vila Moreira:** Nature Conservation  
Incipient Agriculture

### (b) in the surroundings/catchment:

**Mira Minde polje:** Urban and Industrial area (at the north boundary of the Mira Minde Polje)  
Nature Conservation  
Extensive Agriculture  
Tourism and Nature sports

<b>Alviela springs:</b>	Nature Conservation Extensive Agriculture Tourism and Nature sports
<b>Almonda springs:</b>	Urban and Industrial area Incipient agriculture
<b>Vila Moreira:</b>	Nature Conservation Incipient Agriculture Urban and Industrial area

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**24. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:**

**(a) within the Ramsar site:**

<b>Mira Mind Polje:</b>	Urbanism: Underground water pollution and Landscape negative impact Industry: Underground water pollution and Landscape negative impact
<b>Alviela Springs:</b>	Urbanism: Water pollution of Amiais stream. Industry: Water pollution of Amiais stream. Tourism: Over visitation
<b>Almonda Springs:</b>	Urbanism: Underground streams pollution in recharge area. Industry: Underground streams pollution in recharge area. Highway: Underground streams pollution in recharge area.
<b>Vila Moreira Springs:</b>	Tourism: Over visitation and infra structures Caving and speleological campaigns Forefall burn

**(b) in the surrounding area:**

<b>Mira Mind Polje:</b>	Urbanism: Underground water pollution and Landscape negative impact Industry: Underground water pollution and Landscape negative impact Highway: Underground water pollution and Landscape negative impact
<b>Alviela Springs:</b>	Urbanism: Landscape negative impact and Water pollution of Amiais stream Industry: Water pollution of Amiais stream.
<b>Almonda Springs:</b>	Urbanism: Underground streams pollution in recharge area. Industry: Underground streams pollution in recharge area. Highway: Underground streams pollution in recharge area.
<b>Vila Moreira Springs:</b>	Urbanism: Underground streams pollution in recharge area. Industry: Underground streams pollution in recharge area.

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**25. Conservation measures taken:**

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

Management Plan of Natural Park of Aire and Candeeiros Mountains; Municipalities Management Plans and Nature 2000 Network.

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**26. Conservation measures proposed but not yet implemented:**

e.g. management plan in preparation; official proposal as a legally protected area, etc.

None.

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**27. Current scientific research and facilities:**

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

**Scientific research:** Schematic Map of karstic aquifers of Natural Park; Underground hydrological evolution of Moinhos Velhos Cave; Underground hydrological evolution Almonda Cave; Inventory of troglonian macro-invertebrate fauna of Maciço Calcário Estremenho; Program to the sustainable management of Maciço Calcário Estremenho aquifers. Hydrogeological study of Mira-Mind Polje aquifer.

**Facilities:** Underground Interpretation Centre of Pena Cave; Underground Interpretation Centre of Almonda Cave; Bio speleological and Cave Habitats Reserch Center; Interpretation Centre and Cave Bats Observatory of Alviela Springs.

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**28. Current conservation education:**

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Natural Monument Centre of Dinossaurus steps; Ecomuseum of Mira de Aire Village; Natural Park Ecoteca Interpretation Centre; Underground Interpretation Centre of Pena Cave; Underground Interpretation Centre of Almonda Cave; Natural Park Information Centre of Minde Village; Interpretation Centre and Cave Bats Observatory of Alviela Springs; Natural Park Thematic Visits programs.

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**29. Current recreation and tourism:**

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

<b>Mira de Aire Cave:</b>	100 000 visitors/year
<b>Mira de Aire Aqua Park:</b>	12 000 visitors/year
<b>The Complex of Alviela Springs</b> (Fluvial beach; camping and Nature Sports):	100 000 visitors/year

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**30. Jurisdiction:**

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

Environment and Territory Management Ministry and Municipalities.

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**31. Management authority:**

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Natural Park of Aire and Candeeiros Mountains  
Parque Natural das Serras de Aire e Candeeiros  
R. Dr. Augusto César Silva Ferreira, Apart. 190, 2040-215 Rio Maior  
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**32. Bibliographical references:**

scientific/technical references only. If biogeographic regionalisation scheme applied (see 13 above), list full reference citation for the scheme.

ALMEIDA, C.; CRISPIM, J.A.; SILVA, M. L. (1995): "National Report for Portugal", in COST' action 65 - Hydrogeological Aspects of Groundwater Protection in Karstic Areas – Final Report, European Commission; p. 211-220.

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- FLEURY, E. (1940): **“Les eaux du groupe de l’Alviela ou des grandes réssurgences des calcaires jurassiques des Olhos d’ Água, d’ Ota et d’ Alenquer”** in Relatório sobre o tratamento das águas de Lisboa, Anexo IV; p.129-190. Lisboa.
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