ANNEXE 5- GEOLOGY AND LAND SCAPE

1- LAS LORAS GEOPARK PROJECT. GEOLOGICAL SITES.

Main geological interest: (Str) Stratigrphy, (Sed) Sedimentology, (Gm) Geomorphology, (Pal) Paleontological, (Tec) Tectonic, (Pet) Petrologic-geochemical, (Min) Minero-metallogenic, (Cri) Mineralogic-chrystallographic, (Hyd) Hydrogeology, (Ed) Edaphologic, (Ar) Archeology. In blue those out of the limits but close.

Main use: (C) Scientific, (D) Didactic/educational, (E) Environmental, (H) Historic-artistic, (L) landscape, (S) Sport, (G) Geoturistic.

Value: (1) International, (2) National, (3) Regional, (4) Local

LIG	Cod	SITES	PLACE	Geological interest	Main Use	Value	UTM – X	UTM - Y	DESCRIPCIÓN	Public interpretation	Degree of protection
♦ **VC001 LA LORA DE VALDIVIA KARST (VC01)**	01.01	Las Hoyas de la Lora de Valdivia (Aligned doline field)	Revilla de Pomar	Gm, Hyd	D, L, G	1	409300	4735300	Sinkholes field aligned along the main directions of jointing of Coniaciense limestone. Lapiaces, torcas y uvalas (Rinnenkarren, sinkholes and uvalas)	Panels+leaflets, trail	**Natural space in process, RN2000 ZEC**
	01.02	Covalagua Spring and tufa limestone (travertine systems?)	Revilla de Pomar	Gm Hyd	D, E, G	1	407600	4736000	Travertinic building in the Ivia river spring, with waterfalls and terraced tuff formations.	Panels+leaflets, trail	**Natural space in process, RN2000 ZEC**
	01.03	Los Franceses Cave	Revilla de Pomar	Gm	L, G, H	2	408730	4736095	Cave with speleothems variety (Natural Monument) Sightseeing to the cave and interpretation center. The part of infiltrated water flows through a Upper Cretaceous sandy limestones, oolitic and rudiste.	Panels+leaflets, trail http://www.antigua.lacuevadelosfranceses.es/ http://info.igme.es/ielig	**Natural space in process, RN2000 ZEC Inventory LIG Nº20134001 (IGME)**
	01.04	El Toro cave	Revilla de Pomar	Gm, Ar	H	4	409120	4737530	Large cavity in the upper levels of karst, archaeological sites and bioespeleologic.		**Natural space in process, RN2000 ZEC**
♦ **VC002 LAS TUERCES KARST (VC02)**	02.01	Las Tuerces ruiniform landscape	Villaescusa de las Torres	Gm	D, E, L, G	1	397000	4734300	Ruiniform and street karst. Erosive resulting from the Santonian karst limestone.	Panels+leaflets, trail http://info.igme.es/ielig	**Natural space in process, RN2000 ZEC Inventory LIG Nº20133006 (IGME)**
	02.02	Recuevas Valley Poldjé	Gama	Gm, Tec	D, E, L, S, G	1	400100	4733750	Karst Platea for emptying the anticlinal core limestones and dolomites of the Campanian	Leaflets, trail	**Natural space in process, RN2000 ZEC**

	02.03	Horadada Canyon	Mave – Olleros de Pisuerga	Gm, Sed	D, E, L, G	1	395800	4734150	6.5 km canyon, carved by the river Pisuerga-Turonian-Coniacian marl and limestone (stratigraphic sequence). Caves of archaeological interest. (point bars)	Leaflets, trail	**Natural space in process, RN2000 ZEC**
♦ **VC003 LA LORA DE PATA DEL CID KARST (VC03)**	03.01	Cueva del Agua sinkhole	Basconcillos del Tozo	Gm, Hyd	D, L, S, G	2	419110	4729200	Valle and the sink of Huron and Mundilla streams. Water Cave: 3.3 Km partially flooded galleries.	Leaflets, trail	**Natural park, RN2000 ZEPA+ZEC**
	03.02	Puente del Diablo – Cueva del Moro spring	Barrio-Panizares	Gm, Hyd	L, G	4	419960	4729530	Natural bridge. Rocky pavement with geometric pattern by jointing on the great sinkhole.	Leaflets	**Natural park, RN2000 ZEPA+ZEC**
	03.03	Pozo La Torca spring	Barrio-Panizares	Hyd	L, S	4	420525	4731640	Huron River karst spring Torcas aligned along the Ayoluengo fault system.	http://grupoedelweiss.com/web/	**Natural park, RN2000 ZEPA+ZEC**
	03.04	Fuente de La Cueva tufa limestone	Villaescobedo	Gm, Hyd	E, L	2	411510	4734060	Temporary active spring karst in times of heavy rainfall or snowmelt, with formation of travertine deposits in the vicinity.	http://grupoedelweiss.com/web/	**RN2000 ZEPA+ZEC**
	03.05	Pozo Corvera spring	Valdeajos	Gm, Hyd	L, S	4	422400	4732920	Dolina permanently flooded overflowing in times of heavy rainfall. Set deep cracks and cavities aligned along the Ayoluengo fault system.	http://grupoedelweiss.com/web/	**RN2000 ZEPA+ZEC**
♦ **VC004 LAS LORAS STRUCTURAL RELIEFS (VC04)**	04.01	Monte Bernorio synclinal upland- ***"hanging syncline"***	Villarén de Valdivia	Gm, Str, Ar	C, D, H, G	2	402242	4738744	Cretaceous syncline upland in which one can recognize the Upper Cretaceous stratigraphic units, regardless of interesting modeling of these materials.	Panels, leaflets, trail http://info.igme.es/ielig	**Inventory LIG Nº133005 (IGME)**
	04.02	Peña Los Campos Cluse	Becerril del Carpio	Gm	G	3	391805	4729795	Spectacular waterfall on a limestone of the Upper Cretaceous	Leaflets	
	04.03	Structural plane, sinclinal upland and Peña Mesa 'cluse'	Rebolledo de la Torre	Gm, Tec	D, L, E, G	3	400125	4727945	Cluse in materials of the southern flank of the syncline of Peña Mesa. Differential erosion of the strata of Turonian limestones form spectacular steep steps.	Panels+leaflets, trail	**RN2000 ZEPA+ZEC**
	04.04	Castillo del Moro synclinal upland	Castrecías	Gm, Tec	C, D, L	4	401865	4729130	Anticlinal depression and synclinal upland (inverted relief) in Castrecías	Leaflets	**RN2000 ZEPA+ZEC**

	04.05	Peña Lora synclinal upland	Quintanas de Valdelucio	Gm, Tec	C, E, L	3	404935	4729420	Syncline upland affected at the top by an erosional surface.		**Natural park, RN2000 ZEPA+ZEC**
	04.06	Peña Ulaña Synclinal upland and 'cluse'	San Martín de Humada	Tec, Str, Gm, , Ar	C, E, H, L, G	2	415892	4720893	Syncline with a broad erosional surface at the top, occupied by an extensive Iron Age settlement of the Iron Age.	Leaflets http://info.igme.es/ielig	**Natural park, RN2000 ZEPA+ZEC Inventory LIG Nº166007 (IGME)**
	04.07	Peña Castillo synclinal upland	Ordejón de Abajo	Gm, Tec	D, E, L	4	413185	4721460	Small suncline upland forming a "muela"		**Natural park, RN2000 ZEPA+ZEC**
	04.08	Peña Amaya structural plane and synclinal upland	Amaya	Gm, Tec, Ar	D, E, H, L, G	3	405570	4723285	Syncline upland, affected by an erosional surface at the top, and with a structural surface in the middle, inhabited by different peoples throughout the ages	Leaflets, trail	**Natural park, RN2000 ZEPA+ZEC**
♦ **VC005 RUDRÓN AND HIGHT EBRO CANYONS (VC05)**	05.01	Valcabado view point	Revilla de Pomar	Gm, Tec	D, E, L, G	3	409870	4737130	Lookout over the valley of Valderredible where monoclinal relief on the sandstones and clays of the Aptian-Albian is observed.	Panels+leaflets	**Natural space in process, RN2000 ZEC**
	05.02	Rudrón canyons	Hoyos del Tozo	Gm	D, E, L, G	2	424225	4727590	River canyon originated by the Rudrón river passing through the Mesozoic carbonate sediments (Coniacian-Santonian-Campanian) of la Lora structural platform	Panels+leaflets http://info.igme.es/ielig	**Natural park, RN2000 ZEPA+ZEC Inventory LIG Nº20135001 (IGME)**
	05.03	Ebro canyons	Escalada	Gm, Str, Hyd	D, E, L, S, G	2	435480	4740015	Canyon excavated by the Ebro river in Cretaceous limestone and marl, with a depth of about 200 m. and a width of 200-500 m. where numerous karst phenomena (natural bridge, caves, shelters, terraces of tufa, etc.) are observed	Panels+leaflets http://info.igme.es/ielig	**Natural park, RN2000 ZEPA+ZEC Inventario de LIG Nº135001 (IGME)**
	05.04	Oxbow	Valdelateja	Gm	D, E, L	4	436915	4735860	Meander embedded and abandoned of Rudrón river.		**Natural park, RN2000 ZEPA+ZEC**
	05.05	Orbaneja waterfall and tufa limestone building	Orbaneja del Castillo	Gm, Hyd	D, E, L, G	2	435365	4742860	Travertínico building and spring and development of tuff terraced.	Panels+leaflets	**Natural park, RN2000 ZEPA+ZEC**
	(05.06)	Pozo Azul spring	Covanera	Hyd	E, L, S, G	3	434803	4731770			**Natural park, RN2000 ZEPA+ZEC**
	(05.07)	Travertine building	Tubilla del Agua	Gm, Hyd	D, E, L, G	4	434530	4728265		Panels+leaflets	**Natural park, RN2000 ZEPA+ZEC**
	(05.08)	El Tobazo (tufa limestone)	Villaescusa de Ebro	Gm, Hyd	D, E, L	4	432490	4741405			

♦ **VC006 MESOZOIC SEDIMENTARY PALEOENVIRONMENT(VC06)**	06.01	Quintanilla de las Torres Lower Cretaceous section	Quintanilla de las Torres	Sed, Str	C	2	402392	4741694	Recognition and observation of the Lower Cretaceous clastic facies in this area of the Cantabrian Mountains.	Leaflets http://info.igme.es/ielig	**Inventory LIG Nº133002 (IGME)**
	06.02	Ornithópod fossil	Aguilar de Campoo	Pal	C	2	394125	4741150	Ornithopod vertebral remains of Lower Cretaceous (Berriasian) in the red sandstones of fluvial origin of Fm Arcera (Cabuérniga Group).		
	06.03	Fossil trees Aguilar swamp	Aguilar de Campoo	Pal	C	4	394595	4740220	Cycadal tree fossil trunks in Lower Cretaceous materials		
	06.04	Mártires de Aguilar Triassic section-Jurassic. Aguilar de Campoo	Aguilar de Campoo	Str, Sed	C, D, G	2	396642	4738994	Stratigraphic section where you can see the lithological and sedimentological characteristics of the higher terms of the Triassic (f. Keuper) and Lower Jurassic (Lias).	Leaflets http://info.igme.es/ielig	**Inventory LIG Nº133003 (IGME)**
	06.05	Peña La Parte	Aguilar de Campoo	Sed, Gm	C, D, L	4	396115	4737765	Enclave of Jurassic limestones in the Triassic red clays in the Aguilar de Campo diapiric anticline		
	06.06	A fern-bennettitalean floral assemblage in Tithonian-Berriasian travertine deposits	Villela	Pal	C	2	394537	4727783	Macrofloral fossil assemblage discovered in travertine deposits of the Tithonian-Berriasian Aguilar Formation. The assemblage includes megaremains of a single species of Filicales and of eleven taxa identified as Bennettitales		
	06.07	Utrillas Formation in the road slope	Olleros de Pisuerga	Sed, Str	C	2	394492	4733143	Clastic sequences outcrop Aptian - Albian and Albian - Cenomanian Utrillas facies where conglomerates, sandstones and shales deposited versicolor average rate on a fluvial braided evolving transition to a medium associated with a complex estuary are observed.	Leaflets http://info.igme.es/ielig	**Inventory LIG Nº133007 (IGME)**
	06.08	Jurassic section- Facies "Purbeck"	Becerril del Carpio	Str, Sed	C	2	393792	4729893	Jurassic full cross section in which both the carbonate facies known Lias - Dogger and the Purbeck facies.	http://info.igme.es/ielig	**Inventory LIG Nº133009 (IGME)**

	06.09	Utrillas Formation in San Pelayo hermitage	Villacibio	Sed, Str	C, D, L, H	3	397590	4731205	Partially cemented sandstones with cross rolling logs and debris liminotic tree trunks deposited in continental during middle Albian-Cenomanian	Leaflets	
	06.10	Fossil area in Rebolledo de la Torre	Rebolledo de la Torre	Pal	C	3	397815	4726685	Gray bioclastic limestone and marl of Bajocian sponges in life position, with cephalopods, echinoderms, bivalves, gastropods, and corals.		**RN2000 ZEPA+ZEC**
	06.11	Basic operation of lignite	Rebolledo de la Torre	Sed, Min	C, D, G	4	399005	4728055	Old mine workings for the exploitation of lignite in the Lower Cretaceous detrital levels.	Panels+leaflets	**RN2000 ZEPA+ZEC**
	06.12	Jurassic section- Facies "Purbeck"	Ordejón de Abajo	Str, Sed	C	2	411592	4721943	Purbeck basal conglomerates, with boulders of flushing limestone. Lacustrine limestones and calcareous oncolytic and swamp facies.	http://info.igme.es/ielig	**RN2000 ZEPA+ZEC Inventory LIG Nº166006 (IGME)**
	06.13	Tozo Fossil area (Upper Cretaceous)	La Rad – Hoyos del Tozo	Pal	C	4	424620	4725940	Area with abundant marine fossils from the Upper Cretaceous.	Leaflets	**Natural park, RN2000 ZEPA+ZEC**
	06.14	Santonian Rudistas	Solanas de Valdelucio	Sed, Pal	C	3	413240	4727395	Bioconstruction limestone with rudists in life position of the upper Cretaceous.		**RN2000 ZEPA+ZEC**
♦ **VC007 STRATIGRAPHIC SEQUENCES FROM THE OCCIDENTAL MARGIN OF THE BASQUE-CANTABRIAN BASIN**	07.01	Aguilar limestone Formation (a) and Corvio Member (b)	Aguilar de Campoo	Str, Sed	C, D, G	1	395689	4739112	The Campoo Group is the oldest of several tectnosatratigraphic units that made up the Upper Jurasic-Lower Cretaceous syn-rift succession. They are lacustrine sediments that constitute the infilling of an asymmetric and complex semigraben.	Leaflets	
	07.02	Middle-Upper Jurassic section	Camesa de Valdivia	Str, Sed	C, G	2	399342	4738594	Stratigraphic cross section ranging from the rithmite of Lias - Dogger at the top to the hanging wall Purbeck facies.	Leaflets http://info.igme.es/ielig	**Inventory LIG Nº133004 (IGME)**
	07.03	Monte Bernorio Upper Cretaceous section	Villarén de Valdivia	Str, Sed	C	4	402260	4737580	Upper Cretaceous stratigraphic sequence.	Panels	
	07.04	Transgressive-regressive parasequences	Olleros de Pisuerga	Str, Sed	C	3	394700	4733500	Parasequences indicative of smaller scale transgressive-regressive episodes superimposed on the overall	Leaflets	

									transgressive trend.		
	07.05	Jusassic section (Toarcian-Malm)	Rebolledo de la Torre	Str	C	2	397792	4726593	Stratigraphic cross section - sedimentological Jurassic (Toarcian - Malm) of reduced thickness.	Leaflets http://info.igme.es/ielig	**RN2000 ZEPA+ZEC Inventory LIG Nº133010 (IGME)**
	07.06	Rebolledillo Upper Cretaceous section	Rebolledillo de la Orden	Str, Sed	C	2	396662	4723443	Stratigraphic sequence of the upper Cretaceous marginal, with significant sedimentary hiatuses	http://info.igme.es/ielig	**RN2000 ZEPA+ZEC Inventory LIG Nº165002 (IGME)**
	07.07	Utrillas Formation in quarry	Basconcillos del Tozo	Str, Sed, Min	C	3	419950	4727140	Stratigraphic cross section of Utrillas facies with layers of tar sands and kaolin sands.		**Natural park, RN2000 ZEPA+ZEC**
	07.08	Utrillas Formation in quarry	Montorio	Str, Sed	C	4	435375	4717085	Utrillas facies stratigraphic cross section with sand and sedimentary conglomerates that show microstructures		
	07.09	Peña Amaya Cretaceous section	Amaya	Str, Sed, Min, Gm, Pal	C	2	404342	4722743	Full sequence from Utrillas facies of the Upper Cretaceous limestones. Estuarine fluvial facies, coal and limestone shallow shelf bars.		**RN2000 ZEPA+ZEC Inventory LIG Nº166001 (IGME)**
	07.10	Mesa de Albacastro and Salazar de Amaya Valley	Salazar de Amaya	Str, Sed	C	2	402072	4722993	Recognition of the upper and lower Cretaceous in this area as well as detrital material Neogene the northern edge of the Duero river.		**RN2000 ZEPA+ZEC Inventory LIG Nº165001 (IGME)**
	07.11	Molino de Bernabé Cretaceous section	Ordejón de Abajo	Str, Sed, Gm, Tec, Pal	C, G	2	412842	4721893	Syncline in the Cenomanian limestones. Shallowing cycles. Neritic abundant fauna. Source.		**RN2000 ZEPA+ZEC Inventario de LIG Nº166002 (IGME)**
	07.12	Hormicedo Marine Jurassic section	Villalbilla de Villadiego	Sed, Gm	C	2	418742	4716043	Complete Series marine Jurassic, with abundant fauna. Dolomitic lower Lias, rhythmic series marl-calcareous Upper Lias and Dogger with abundant macrofauna		**RN2000 ZEPA+ZEC Inventory LIG Nº166008 (IGME)**
	07.13	Lías and Dogger rythmic series in Ayo. Fuentesnaldo	Villamartín de Villadiego	Str, Pal	C	2	407442	4722893	Rhythmic series of Lias and Dogger with abundant fauna		**RN2000 ZEPA+ZEC Inventory LIG Nº166005 (IGME)**
	07.14	Amaya Lower Cretaceous series	Amaya	Str	C	3	405335	4722030	Detrital series, Weald and Utrillas facies		**RN2000 ZEPA+ZEC**
♦ **VC008**	08.01	Villaescusa de Ecla	Villaescusa de Ecla	Tec, Str, Hyd	C, G	2	387892	4731793	Anticlinal structure which can		**Inventory LIG Nº133008**

ALPINE STRUCTURES FROM THE BASQUE-CANTABRIAN BELT		Anticline							follow the contour of the fold due to the inversion of the relief. Loamy in its core and a carbonated flanks, with a good part of the Upper Cretaceous series.		**(IGME)**
	08.02	Cretaceous-Terciary Contact	Villaescusa de Ecla	Tec	C	3	387030	4731185	Contact between materials of the Upper Cretaceous and Tertiary in the core of the syncline Villaescusa de Ecla		
	08.03	Knee fold	Rebolledo de la Torre	Tec	C, L	3	398745	4727000	Picturesque natural selection of a knee fold	Leaflets	**Natural park, RN2000 ZEPA+ZEC**
	08.04	Subvertical layers and thrust fold	Gama	Tec	C	3	400920	4733435	Steep ridges and reliefs subvertical layers N flank of the syncline of Las Tuerces	Panel, Leaflets	**Natural space in process, RN2000 ZEC**
	08.05	Fold in Jurassic materials	Villela-Castrecías	Tec	C	3	397635	4725660	Alpine folding pattern in the Jurassic materials 'Folded Band'		**RN2000 ZEPA+ZEC**
	08.06	Corralejo syncline	Corralejo de Valdelucio	Tec	C	3	413665	4727710	Synclinal fold, with the southern flank beveled by the of Ubierna Fault		**RN2000 ZEPA+ZEC**
	08.07	Fold enclosuere in Humada anticline	Talamillo del Tozo	Tec	C, D, L	2	422500	4720800	Fold enclosure of Humada anticline		**RN2000 ZEPA+ZEC**
	08.08	Syncline excavatec in Valderrique	Villanueva de Puerta	Tec, Gm	C, D, L	3	419250	4720500	Synclinal fold excavated to the Coniacian carbonate levels forming a "val".		**RN2000 ZEPA+ZEC**
♦ **VC009 UBIERNA FAULT AND ASSOCIATED STRUCTURES**	09.01	Aguilar Fault Los Mártires de Aguilar quarry	Aguilar de Campoo	Tec, Gm	C	2	396214	4739097	Fault scarp in Jurassic limestones, where the gap fault, mirror, stretch marks, steps and iron oxides failure is observed.		**Inventory LIG Nº133001 (IGME)**
	09.02	Villela Fault	Rebolledillo de la Orden	Tec	C	2	397025	4723825	The Villela Fault System is located between the Ubierna and Ventaniella Faults and represents an intriguing structure that is divided in different segments. Those oriented WNW–ESE strike parallel to the Ubierna Fault and represent right-lateral faults with a reverse component. The WSW–ENE striking segment represents the contractional horsetail		**RN2000 ZEPA+ZEC**

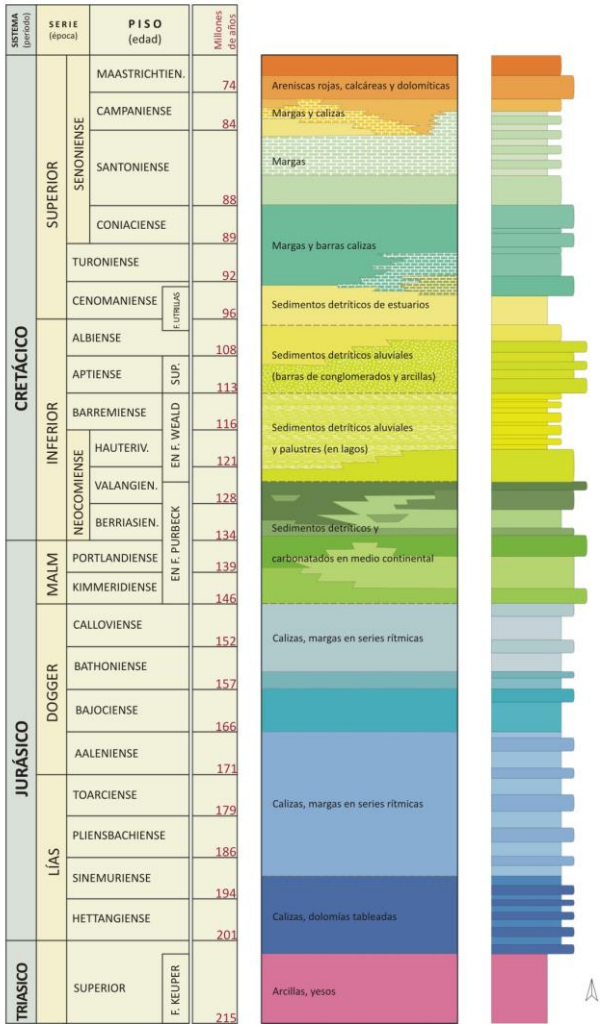
									termination of the fault.	
	09.03	Solanas de Valdelucio extensional duplex	Solanas de Valdelucio	Tec	C	2	412180	4727190	R1 echelon faults associated with shearing movements of Ubierna fault	**RN2000 ZEPA+ZEC**
	09.04	Ubierna Fault in Úrbel	Úrbel del Castillo	Tec	C	1	431780	4718190	The Ubierna Fault System is an WNW–ESE elongated highly deformed overstep area between the Ubierna and the Ventaniella faults. It divides the Upper Jurassic to Lower Cretaceous Basque-Cantabrian Basin to the north, and the Cenozoic Duero Basin to the south	**RN2000 ZEPA+ZEC**
	09.05	Ubierna Fault in Valdehayas (Thrust front in Valdehayas)	La Piedra – Fuente Úrbel	Tec	C	2	426110	4720670	Transect fracturing system that forms the boundary between the morfoestructural units 'Burgalesa Platform' and 'folded Band' is shown.	**RN2000 ZEPA+ZEC**
	09.06	Thrust front and gorge of Paraíso river	Rioparaíso	Tec, Gm	C	2	412710	4718420	Paraiso river course wedged in Mesozoic and Tertiary limestone conglomerates that over-ride .	**RN2000 ZEPA+ZEC**
	09.07	Basconcillos Fault	Basconcillos del Tozo	Tec	C	3	418390	4727900	Structure associated with Ubierna-Humada-Villela system faults	**Natural park, RN2000 ZEPA+ZEC**
	09.08	Thrust front in Peña Mesa	Castrecías	Tec	C	3	400085	4729165	Front thrust outcrop of Triassic materials	**Natural park, RN2000 ZEPA+ZEC**
	09.09	Strike slip faults in Villamartín	Villamartín de Villadiego	Tec	C	3	406095	4725590	Falla "strike slip" dextral, which moves the syncline Peña Castro	**RN2000 ZEPA+ZEC**
	09.10	Ubierna Fault in Solanas	Solanas de Valdelucio	Tec	C	1	414090	4726500	Transect where is observed Ubierna Fault cutting structures of 'Folded Band'.	**RN2000 ZEPA+ZEC**
	09.11	Humada Fault	Humada	Tec	C	3	409240	4725015	Fractur area associated to the Ubierna system	**RN2000 ZEPA+ZEC**
	09.12	Thrust front in Salazar de Amaya	Salazar de Amaya	Tec	C	2	401210	4720540	Front thrust of Cretaceous materials over Tertiary conglomerates.	**RN2000 ZEPA+ZEC**
	09.13	Thrust front in Villanueva de Puerta	Villanueva de Puerta	Tec	C	2	420450	4715580	Thrust of Jurassic deposits on Cretaceous	**RN2000 ZEPA+ZEC**
♦ **VC010 DIAPIRIC STRUCTURES**	10.01	Diapiric outcrop-ophites	Quintanilla Pedro Abarca	Tec, Pet	C	2	433070	4713325	Diapiric structure with very weathered outcrop ophites.	**RN2000 ZEC**
	10.02	Diapiric structure in	Grijera	Tec, Gm	C	3	398045	4741425	Diapiric Triassic outcrops in the	

		Aguilar							valley of Aguilar de Campo.		
♦ **VC011 AYOLUENGO OIL FIELD**	11.01	Ayoluengo oil field	Ayoluengo	Min	C, G	1	427640	4733145	The Ayoluengo acreage, located in the La Lora concession area, has a long history of oil production, going back to the 1960s. A total of 54 wells were drilled within the field boundary north of Burgos, targeting reserves in Purbeck aged sandstone formations at between 900 and 1400 metres below surface.	Panels, leafles	**Natural park, RN2000 ZEPA+ZEC**
	11.02	Ayoluengo Fault and associated sturctures	Ayoluengo	Tec	C	2	428925	4733690	NNE - SSW striking left-lateral Ayoluengo Fault System		**Natural park, RN2000 ZEPA+ZEC**
♦ **VC012 ACTIVE GEOLOGICAL PROCESSES**	12.01	Heardward erosion-river capture- Pisuerga river	Aguilar de Campoo	Gm	D, G	4	397090	4738045	Catch a river retrogressive erosion.		
	12.02	Quarry millstones	Aguilar de Campoo	Min	D, H, G	4	394985	4739955	Old quarry on sandstones and conglomerates of Cretaceous where rocks were extracted to manufacture millstones	Leaflets	
	12.03	El Cuevatón hermitage	Cezura	Sed, Gm, Ar	D, H, L, G	3	404030	4740220	Rock hermitage dug in Cretaceous sandstones- Utrillas facies		
	12.04	Vegetable macro-remains of Holocene	Lomilla	Pal, Ar	D, H	3	392165	4734135	Site with abundant fossil plant material (wood, bark, fruits of the genus Pinus) Holocene		
	12.05	Arroyo Pastruela waterfall	Rebolledillo de la Orden	Gm, Hyd	D, L	4	397840	4724255	Waterfalls temporary active at times of heavy rainfall or snowmelt.		**RN2000 ZEPA+ZEC**
	12.06	Source of the Odra river (Yeguamea warterfall)	Fuenteodra	Gm, Hyd	D, L, G	3	407340	4727285	Waterfalls and seasonal spring in the south of Peña Lora where the Odra River rises slope.	Leaflets	**RN2000 ZEPA+ZEC**
	12.07	Cueva del Gato spring	Ordejón de Abajo	Gm, Hyd	D, P, G	4	413390	4722195	Spring temporary source of the river The Ordejones.		**RN2000 ZEPA+ZEC**
	12.08	Travertine and waterfalls of Molino del diablo	Barriolucio	Gm, Hyd	D, H, L, G	3	411370	4727495	Travertine waterfalls near the source of the river Lucio, Peña Lora North Slope.		**RN2000 ZEPA+ZEC**
	12.09	Peat explotation	Basconcillos del Tozo	Ed, Min	D, G	4	418470	4727615	Background bog valley of the Lower Cretaceous detrital levels. Flora Microreserve.		**Natural park, RN2000 ZEPA+ZEC**
	12.10	Peatbog	Úrbel del Castillo	Ed	D, E, G	4	431560	4718780	Background bog valley on		**RN2000**

									Lower Cretaceous detrital levels.	**ZEPA+ZEC**
	12.11	Peatbog	La Piedra	Ed, Ar	C, H, A	2	428000	4720545	Background bog valley on Lower Cretaceous detrital levels.	**RN2000** **ZEPA+ZEC**
	12.12	Cuesta de la Nava Structural plane	Coculina	Gm	D, L, G	2	427492	4715393	Lower than correlated with structural surface on the moor Turonian limestone.	**RN2000** **ZEPA+ZEC** **Inventory LIG Nº166009 (IGME)**
	12.13	Los Piscárdanos	Congosto	Gm	D, L, G	3	409925	4722275	Odra River Canyon embedded in Mesozoic limestone formations over thrusting tertiary conglomerates	**RN2000** **ZEPA+ZEC**
	12.14	Úrbel river canyon and Valdegoba Cave	Huérmeces	Ar, Gm	C, L, G	4	436200	4710270	Urbel river canyon encased in Cretaceous carbonate with significant levels karst processes. Valdegoba cave fossils of Neanderthals.	Panel
	12.15	Iron mining	Rebolledillo de la Orden	Min	D	4	397000	4724400	Supergene iron, associated with a fracture zone in Jurassic limestone	
	12.16	Brullés river capture by Hormazuela one	Hormazuela	Gm	D	4	426015	4713275	Hormazuela river capture by the retrogressive erosion of the river Brulles	**Limit RN2000** **ZEPA+ZEC**

GEOLOGY AND LAND SCAPE		
2-GEOLOGICAL PERIODS	a.	Triassic
	b.	Jurassic
	c.	Cretaceous
	d.	Paleogene
	e.	Neogene
	f.	Quaternary
3-CLEARLY DEFINED ROCK TYPES	a.	Sandstone
	b.	Limestone
	c.	Conglomerate
	d.	Breccia
	e.	Mudstone
	f.	Coal
	g.	Dolomite
	h.	Tufa
	i.	Marl
	j.	Biocalcarenite
	k.	Ophites

LITOSTRATIGRAPHIC COLUMN
(Basque-Cantabrian Basin. Simplified)



4- Geological and geomorphological features	Description	General Sites	Photos	Photos
River forms and sediments	• Flood plain and terraces, Pisuerga River • Bed load deposition • Cascades • Gullies and ravines • Gorges • Canyons • Headward erosion-river capture	**VC005** **VC012**		
Hillslope forms	Colluvial sedimentss.	**VC012**		
Lacustrine forms and sediments	Small lakes due to Triassic mudstone (Keuper sequences)	**VC012**		
	Cluse (water gap) and Ruz:	**VC008, VC009**		

Structural forms	Inverted relief, synclinal uplands, “hanging syncline”	**VC004.**		
	Anticline fold Syncline fold Knee fold Fold enclosure	**VC008**		
	Crest	**VC004**		
	Normal and reverse faults Thrusts	**VC009**		
Structural forms	Structural planes	**VC004** **VC012**		

Diapiric structures	Keuper sequences and ophites related	**VC010**		
	Exokarstic			
Karstic geomorphology	Doline: Aligned doline field Uvalas	**VC 001, VC002, VC003**		
	Poldje	**VC 001, VC002, VC003**		
	Lapiaces: *Holhkarren*. Limestone pavement	**VC 001, VC002, VC003**		

	Joints, Macrolapiaz and street karst Ruiniform karst.	**VC 001, VC002, VC003**		
	Karstic valleys: Cliff. Natural bridges	**VC 001, VC002, VC003**		
	Tufa and travertine buildings : Springs Sinkholes Waterfall	**VC 001, VC002, VC003**		
	Endokarstic			
	Caves and sinks and springs Espeleotemas: stalagtites, stalagmites, columns	**VC 001, VC002, VC003**		

Public Interpretation of the Geopark's sites of interest

Cod	SITES	Public interpretation
VC01.01	Las Hoyas de la Lora de Valdivia (Aligned doline field)	**Panels+leaflets, trail**
VC 01.02	Covalagua Spring and tufa limestone (travertine systems?)	**Panels+leaflets, trail**
VC 01.03	Los Franceses Cave	**Panels+leaflets, trail http://www.antigua.lacuevadelosfranceses.es/ http://info.igme.es/ielig**
VC 02.01	Las Tuerces ruiniform landscape	**Panels+leaflets, trail http://info.igme.es/ielig**
VC 02.02	Recuevas Valley Poldjé	**Leaflets, trail**
VC 02.03	Horadada Canyon	**Leaflets, trail**
VC 03.01	Cueva del Agua sinkhole	**Leaflets, trail**
VC 03.02	Puente del Diablo –Cueva del Moro spring	**Leaflets**
VC 03.03	Pozo La Torca spring	**http://grupoedelweiss.com/web/**
VC 03.04	Fuente de La Cueva tufa limestone	**http://grupoedelweiss.com/web/**
VC 03.05	Pozo Corvera spring	**http://grupoedelweiss.com/web/**
VC 04.01	Monte Bernorio synclinal upland. "hanging syncline"	**Panels, leaflets, trail http://info.igme.es/ielig**
VC 04.02	Peña Los Campos Cluse	**Leaflets**
VC 04.03	Structural plane, sinclinal upland and Peña Mesa 'cluse'	**Panels+leaflets, trail**
VC 04.04	Castillo del Moro synclinal upland	**Leaflets**
VC 04.06	Peña Ulaña Synclinal upland and 'cluse'	**Leaflets http://info.igme.es/ielig**
VC 04.08	Peña Amaya structural plane and synclinal upland	**Leaflets, trail**
VC 05.01	Valcabado view point	**Panels+leaflets**
VC 05.02	Rudrón canyons	**Panels+leaflets http://info.igme.es/ielig**
VC 05.03	Ebro canyons	**Panels+leaflets http://info.igme.es/ielig**
VC 05.05	Orbaneja waterfall and tufa limestone building	**Panels+leaflets**
VC 06.01	Quintanilla de las Torres Lower Cretaceous section	**Leaflets http://info.igme.es/ielig**
VC 06.04	Mártires de Aguilar Triassic section-Jurassic	**Leaflets http://info.igme.es/ielig**
VC 06.07	Utrillas Formation in the road slope	**Leaflets http://info.igme.es/ielig**
VC 06.08	Jurassic section- Facies "Purbeck"	**http://info.igme.es/ielig**
VC 06.09	Utrillas Formation in San Pelayo hermitage	**Leaflets**
VC 06.11	Basic operation of lignite	**Panels+leaflets**
VC 06.12	Jurassic section- Facies "Purbeck"	**http://info.igme.es/ielig**
VC 06.13	Tozo Fossil area (Upper Cretaceous)	**Leaflets**
VC 07.01	Aguilar limestone Formation (a) and Corvio Member (b)	**Leaflets**
VC 07.02	Middle-Upper Jurassic section	**Leaflets http://info.igme.es/ielig**
VC 07.03	Monte Bernorio Upper Cretaceous section	**Panels**
VC 07.04	Transgressive-regressive parasequences	**Leaflets**
VC 07.05	Jusassic section (Toarcian-Malm)	**Leaflets http://info.igme.es/ielig**
VC 07.06	Rebolledillo Late Cretaceous section	**http://info.igme.es/ielig**
VC 08.03	Knee fold	**Leaflets**
VC 08.04	Subvertical layers and thrust fold	**Panel, Leaflets**
VC 11.01	Ayoluengo oil field	**Panels, leafles**
VC 12.02	Quarry millstones	**Leaflets**
VC 12.03	El Cuevatón hermitage	
VC 12.06	Source of the Odra river (Yeguamea warterfall)	**Leaflets**
VC 12.14	**Úrbel river canyon and Valdegoba Cave**	**Panel**

Scientific		
Cod	**SITES**	**Main Use**
VC04.01	Monte Bernorio synclinal upland. "hanging syncline"	**C, D, H, G**
VC 04.04	Castillo del Moro synclinal upland	**C, D, L**
VC 04.05	Peña Lora synclinal upland	**C, E, L**
VC 04.06	Peña Ulaña Synclinal upland and 'cluse'	**C, E, H, L, G**
VC 06.01	Quintanilla de las Torres Lower Cretaceous section	**C**
VC 06.02	Ornithópod fossil	**C**
VC 06.03	Fossil trees Aguilar swamp	**C**
VC 06.04	Mártires de Aguilar Triassic section-Jurassic	**C, D, G**
VC 06.05	Peña La Parte	**C, D, L**
VC 06.06	A fern-bennettitalean floral assemblage in Tithonian-Berriasian travertine deposits	**C**
VC 06.07	Utrillas Formation in the road slope	**C**
VC 06.08	Jurassic section- Facies "Purbeck"	**C**
VC 06.09	Utrillas Formation in San Pelayo hermitage	**C, D, L, H**
VC 06.10	Fossil area in Rebolledo de la Torre	**C**
VC 06.11	Basic operation of lignite	**C, D, G**
VC 06.12	Jurassic section- Facies "Purbeck"	**C**
VC 06.13	Tozo Fossil area (Upper Cretaceous)	**C**
VC 06.14	Santonian Rudistas	**C**
VC 07.01	Aguilar limestone Formation (a) and Corvio Member (b)	**C, D, G**
VC 07.02	Middle-Upper Jurassic section	**C, G**
VC 07.03	Monte Bernorio Late Cretaceous section	**C**
VC 07.04	Transgressive-regressive parasequences	**C**
VC 07.05	Jusassic section (Toarcian-Malm)	**C**
VC 07.06	Rebolledillo Late Cretaceous section	**C**
VC 07.07	Utrillas Formation in quarry	**C**
VC 07.08	Utrillas Formation in quarry	**C**
VC 07.09	Peña Amaya Cretaceous section	**C**
VC 07.10	Mesa de Albacastro and Salazar de Amaya Valley	**C**
VC 07.11	Molino de Bernabé Cretaceous section	**C, G**
VC 07.12	Hormicedo Marine Jurassic section	**C**
VC 07.13	Lías and Dogger rythmic series in Ayo. Fuentesnaldo	**C**
VC 07.14	Amaya Early Cretaceous series	**C**
VC 07.15	Villaescusa de Ecla Cenozoic section	**C**
VC 08.01	Villaescusa de Ecla Anticline	**C, G**
VC 08.02	Cretaceous-Terciary Contact	**C**
VC 08.03	Knee fold	**C, L**
VC 08.04	Subvertical layers and thrust fold	**C**
VC 08.05	Fold in jurassic materials	**C**
VC 08.06	Corralejo syncline	**C**
VC 08.07	Fold enclosuere in Humada anticline	**C, D, L**
VC 08.08	Syncline excavatec in Valderrique	**C, D, L**
VC 09.01	Aguilar Fault Los Mártires de Aguilar quarry	**C**
VC 09.02	Villela Fault	**C**
VC 09.03	Duplex extensional de Solanas de Valdelucio	**C**
VC 09.04	Ubierna Fault in Úrbel	**C**
VC 09.05	Ubierna Fault in Valdehayas (Thrust front in Valdehayas)	**C**
VC 09.06	Thrust front and gorge of Paraíso river	**C**
VC 09.07	Basconcillos Fault	**C**
VC 09.08	Thrust front in Peña Mesa	**C**
VC 09.09	Strike slip faults in Villamartín	**C**
VC 09.10	Ubierna Fault in Solanas	**C**
VC 09.11	Humada Fault	**C**
VC 09.12	Thrust front in Salazar de Amaya	**C**
VC 09.13	Thrust front in Villanueva de Puerta	**C**
VC 10.01	Diapiric outcrop- ophites	**C**
VC 10.02	Diapiric structure in Aguilar dip area	**C**
VC 11.01	Ayoluengo oil field	**C, G**
VC 11.02	Ayoluengo Fault and associated sturctures	**C**
VC 12.11	Peatbog	**C, H, A**
VC 12.14	Úrbel river canyon and Valdegoba Cave	**C, L, G**
TOTAL		**60**
94		**63,8%**

Education		
Cod	**SITES**	**Main Use**
VC 01.01	Las Hoyas de la Lora de Valdivia (Aligned doline field)	**D, L, G**
VC 01.02	Covalagua Spring and tufa limestone (travertine systems?)	**D, E, G**
VC 02.01	Las Tuerces ruiniform landscape	**D, E, L, G**
VC 02.02	Recuevas Valley Poldjé	**D, E, L, S, G**
VC 02.03	Horadada Canyon	**D, E, L, G**
VC 03.01	Cueva del Agua sinkhole	**D, L, S, G**
VC 04.01	Monte Bernorio synclinal upland. "hanging syncline"	**C, D, H, G**
VC 04.03	Structural plane, sinclinal upland and Peña Mesa 'cluse'	**D, L, E, G**
VC 04.04	Castillo del Moro synclinal upland	**C, D, L**
VC 04.07	Peña Castillo synclinal upland	**D, E, L**
VC 04.08	Peña Amaya structural plane and synclinal upland	**D, E, H, L, G**
VC 05.01	Valcabado view point	**D, E, L, G**
VC 05.02	Rudrón canyons	**D, E, L, G**
VC 05.03	Ebro canyons	**D, E, L, S, G**
VC 05.04	Oxbow	**D, E, L**
VC 05.05	Orbaneja waterfall and tufa limestone building	**D, E, L, G**
VC 06.04	Mártires de Aguilar Triassic section-Jurassic	**C, D, G**
VC 06.05	Peña La Parte	**C, D, L**
VC 06.09	Utrillas Formation in San Pelayo hermitage	**C, D, L, H**
VC 06.10	Fossil area in Rebolledo de la Torre	**C**
VC 06.11	Basic operation of lignite	**C, D, G**
VC 07.01	Aguilar limestone Formation (a) and Corvio Member (b)	**C, D, G**
VC 08.07	Fold enclosuere in Humada anticline	**C, D, L**
VC 08.08	Syncline excavatec in Valderrique	**C, D, L**
VC 12.01	Heardward erosion-river capture-Pisuerga river	**D, G**
VC 12.02	Quarry millstones	**D, H, G**
VC 12.03	El Cuevatón hermitage	**D, H, L, G**
VC 12.04	Vegetable macro-remains of Holocene	**D, H**
VC 12.05	Arroyo Pastruela waterfall	**D, L**
VC 12.06	Source of the Odra river (Yeguamea warterfall)	**D, L, G**
VC 12.07	Cueva del Gato spring	**D, P, G**
VC 12.08	Travertine and waterfalls of Molino del diablo	**D, H, L, G**
VC 12.09	Peat explotation	**D, G**
VC 12.10	Peatbog	**D, E, G**
VC 12.12	Cuesta de la Nava Structural plane	**D, L, G**
VC 12.13	Los Piscárdanos	**D, L, G**
VC 12.15	Explotación de hierro	**D**
VC 12.16	Brullés river capture by Hormazuela one	**D**
TOTAL		**38**
94		**40,4%**

Geoturism		
Cod	**SITES**	**Main Use**
VC 01.01	Las Hoyas de la Lora de Valdivia (Aligned doline field)	**D, L, G**
VC 01.02	Covalagua Spring and tufa limestone (travertine systems?)	**D, E, G**
VC 01.03	Los Franceses Cave	**L, G, H**
VC 02.01	Las Tuerces ruiniform landscape	**D, E, L, G**
VC 02.02	Recuevas Valley Poldjé	**D, E, L, S, G**
VC 02.03	Horadada Canyon	**D, E, L, G**
VC 03.01	Cueva del Agua sinkhole	**D, L, S, G**
VC 03.02	Puente del Diablo –Cueva del Moro spring	**L, G**
VC 04.01	Monte Bernorio synclinal upland. "hanging syncline"	**C, D, H, G**
VC 04.02	Peña Los Campos Cluse	**G**
VC 04.03	Structural plane, sinclinal upland and Peña Mesa 'cluse'	**D, L, E, G**
VC 04.06	Peña Ulaña Synclinal upland and 'cluse'	**C, E, H, L, G**
VC 04.08	Peña Amaya structural plane and synclinal upland	**D, E, H, L, G**
VC 05.01	Valcabado view point	**D, E, L, G**
VC 05.02	Rudrón canyons	**D, E, L, G**
VC 05.03	Ebro canyons	**D, E, L, S, G**
VC 05.05	Orbaneja waterfall and tufa limestone building	**D, E, L, G**
VC 06.04	Mártires de Aguilar Triassic section-Jurassic	**C, D, G**
VC 06.11	Basic operation of lignite	**C, D, G**
VC 07.01	Aguilar limestone Formation (a) and Corvio Member (b)	**C, D, G**
VC 07.02	Middle-Upper Jurassic section	**C, G**
VC 07.11	Molino de Bernabé Cretaceous section	**C, G**
VC 08.01	Villaescusa de Ecla Anticline	**C, G**
VC 11.01	Ayoluengo oil field	**C, G**
VC 12.01	Heardward erosion-river capture-Pisuerga river	**D, G**
VC 12.02	Quarry millstones	**D, H, G**
VC 12.03	El Cuevatón hermitage	**D, H, L, G**
VC 12.06	Source of the Odra river (Yeguamea warterfall)	**D, L, G**
VC 12.07	Cueva del Gato spring	**D, P, G**
VC 12.08	Travertine and waterfalls of Molino del diablo	**D, H, L, G**
VC 12.09	Peat explotation	**D, G**
VC 12.10	Peatbog	**D, E, G**
VC 12.12	Cuesta de la Nava Structural plane	**D, L, G**
VC 12.13	Los Piscárdanos	**D, L, G**
VC 12.14	Úrbel river canyon and Valdegoba Cave	**C, L, G**
TOTAL		**35**
94		**37,2%**