Rhaetian Railway (Switzerland / Italy)

No 1276

Official name as proposed by the States Parties: Rhaetian railway in the Albula/Bernina Cultural Landscape

Location: Canton Graubünden, Switzerland
Province of Sondrio,
Region of Lombardy, Italy

Brief description:

The property consists of the bringing together of two historic mountain railway lines, set in their landscapes. The nominated property forms a corridor that crosses the Swiss Alps, to the south of the upper valley of the Rhine, by two passes. It follows the valley and the pass of the Albula, and then crosses the upper valley of the Engadin (Saint-Moritz), before crossing the pass of the Bernina (2,253 m) and descending to the Adda, in the Italian Veltin.

These two complementary lines were built at the start of the 20th century, and electric power was introduced quite rapidly. Together, they today form a 130 km portion of the regional network of the metre gauge Rhaetian railway in the setting of the Graubünden Alps.

Category of property:

In terms of the categories of cultural property set out in Article 1 of the 1972 World Heritage Convention, this is a *site*.

1. BASIC DATA

Included in the Tentative List: 28 December 2004

International Assistance from the World Heritage Fund for preparing the Nomination: None

Date received by the World Heritage Centre: 21 December 2006

Background: This is a new nomination.

Consultations: ICOMOS has consulted its International Scientific Committee on Historic Gardens and Cultural Landscapes and the TICCIH.

Literature consulted (selection):

Dinhobl, G. & C Schuhböck, *Semmering Railway*. Vienna, Alliance for Nature, 1998.

ICOMOS thematic study, *Railways as World Heritage Sites*, 1999.

Technical Evaluation Mission: 20-24 August 2007

Additional information requested and received from the States Parties: ICOMOS sent a letter to the States Parties on 7 December 2007 concerning the following points:

- The need to reformulate the criteria of the nominated property.

- The need to reconsider the core zone of the nominated property, in the zone of Thusis and the Rhine bridge.

- The need to reconsider the core zone associated with the cultural landscape concept.

- The need to confirm the implementation of the International Management Association.

- The need to consider a significant strengthening of the presentation to the public of the heritage values of the nominated property.

ICOMOS received an answer from the States Parties dated 27 February 2008 including a substantial amount of additional documentation.

Date of ICOMOS approval of this report: 11 March 2008

2. THE PROPERTY

Description

The nominated property consists of the bringing together of two metre-gauge mountain railway lines, one of which crosses the Albula pass and the other the Bernina pass. They were built at the start of the 20th century to open up communications for the upper valley of the Engadin (region of Saint-Moritz) and meet the growing need for transport, linked to developments such as mountain tourism and the birth of winter sports.

1- The Albula line: Opened in 1904, it forms the north-western part of the nominated property, from Thusis to Saint-Moritz. Its total length, including the Pontsérina branch line, is 67 km. The lowest point is the point of departure at Thusis at 687 m, and the highest point is the tunnel under the Albula pass, at 1,819 m. The maximum slope is 35/1000, with a minimum curve radius of 120 m.

Designed in accordance with 19th century principles based on steam traction requiring limited slopes in the mountains, the Albula line has an impressive set of bridges and engineering structures:

- 42 tunnels and covered galleries (16.5 km)
- 144 viaducts and bridges (2.9 km).

The Albula line was converted after World War One to AC single-phase 16.7 Hz 11kV traction. The power cars are supplied with electricity through catenaries.

The successive sections of the Albula line are as follows:

a) Thusis – Filisur (23 km): through the gorges of the Schin and the valley of Landwasser, up to the Filisur branch towards Davos.

The line leaves Thusis, on the banks of the Upper Rhine, which it quickly crosses on what was originally a metal bridge, today replaced by a concrete structure. The line then immediately enters the gorges of the Schin. The significant technical features here are the Solis and Mistail viaducts, and the Tiefencastel tunnel.

Just before arrival at Filisur, the crossing of the Landwasser valley provides one of the line's most celebrated landscapes, with a curved masonry viaduct formed of five 20 m arches with piers of up to 65 m. It leads directly into a tunnel in the cliff.

b) Filisur – Préda (22 km): the gradual elevation of the line required major engineering structures, including a set of bridges and tunnels. The layout of the line is complex and spectacular, including three single spirals and a triple spiral between the stations of Bergun and Préda. These railway line spirals constitute the typical landscapes associated with the Albula line.

The development of the upper valley of the Albula also called for major protective constructions: a set of avalanche protection walls, retaining walls, and the passing of the line through covered galleries. At the time, the works were the most substantial of their type ever carried out in the Swiss Alps and probably anywhere in Europe.

c) Préda – Spinas (6 km): the line leaves Val Préda to enter the Upper Engadin by an ascending rectilinear tunnel 5.87 km long under the Albula pass. The highest point on the line is at the exit from the tunnel (station of Spinas, 1,819 m).

d) Spinas – Saint-Moritz (11 km): the line descends into the valley of the Upper Engadin until it reaches the stations of Bever and Samedan, where there is a direct branch for Pontsérina (5 km) and the Bernina pass line, and then rises slightly up to the station of Saint-Moritz, at a little over 1,700 m, on the banks of the lake and at the foot of the town.

2- The Bernina pass line, which is 61 km long, was opened in 1910. It forms the south-eastern part of the nominated property, linking the Upper Engadin to the valley of the Adda at Tirano (Italy).

This second line intended to open up the Upper Engadin was designed from the outset for electric traction, but with direct current (*DC*) at 750 V, using catenaries.

Its construction principles are quite different from those of the Albula line. The Bernina line was designed to follow an existing mountain road, which results in steep gradients (up to 70/1000) and short curve radii (up to only 45 m). Its engineering structures are therefore fewer in number, and it crosses the Bernina pass in the open (2,253 m), before descending into the valley of the Adda (429m).

Its engineering structures consist of:

- 13 tunnels and galleries (4 km)
- 52 viaducts and bridges (700 m).

The sections of the Bernina line are as follows:

a) Saint-Moritz – Morteratsch (12 km): this section travels through the Upper Engadin close to the main tourism and winter sports facilities, including the famous resort of Saint-Moritz and its lake. The line then passes via Pontsérina and joins the connecting line coming directly from the Albula pass. The line then starts to rise through the alpine pastures.

b) Morterasch – Scala (12 km): the line rises along the sides of the pass, resulting in steeper gradients of 70/1000, and a spectacular set of tight bends and snow and avalanche protection structures. The track layout here is quite significantly different from that of the initial road.

The mountain and glacier landscapes at this point are amongst the most spectacular on the line.

The pass is crossed at the station of Ospizio, a former hostel for travellers (Ospizio-Bernina Station) at an altitude of 2,253 m. The line runs next to the White Lake, which forms part of a hydroelectric dam system.

c) Scala – Poschiavo (20 km): This is the main descent towards the valley of Poschiavino, with a difference in level of more than 1,200 m, and steep gradients of around 70/1000, which passes through galleries at two points and has two spectacular tight bends.

d) Poschiavo – Campocologno (16 km): The line follows the road over a portion that is horizontal or with a slight downward incline, and then runs alongside the Lake of Poschiavo, which forms part of a hydroelectric power system linked to the electric traction of the railway. The line then resumes its descent down steep inclines requiring tight bends and a circular loop at Brusio. The hydroelectric power station of Campocologno is the historic source of hydroelectric power supply for the Bernina line.

e) Campocologno – Tirano (3 km): The line crosses the border with Italy, while continuing to follow a steep incline. It arrives in the valley of the Adda and enters the town of Tirano, running along the road and then crossing the suburb of Madonna di Tirano.

3- The nominated properties in the immediate environment of the line: these are the built structures used for railway functions, consisting in particular of the stations, of which there are 36, and their facilities (platforms, sheds, etc.). There is great stylistic diversity, partly as a result of the many restorations, reconstructions and extensions. To take one example, the station of Célerina has been rebuilt or extended on four occasions since its initial creation in 1903.

To these are added some buildings used as living quarters or for technical purposes, directly linked to the activities of the railway companies, including a remarkable set of wooden structures at the station of Stugl, dating from 1904.

History and development

Human settlement in this region of the Alps certainly dates back to the Neolithic period. The Bronze Age was an important settlement stage, and was linked to the presence of mines. Communities were then present in the Upper Engadin. Transalpine routes existed for commercial exchanges, which continued in the Iron Age, between the Etruscans and the Celts, and then after the Roman conquest (15 BCE).

In the Middle Ages, the transalpine route was an important element of identity for mountain-dwelling communities, who participated in transport across the passes and who were in charge of maintenance, in return for toll charges.

In the 15th and early 16th centuries, the control of the future Canton Graubünden (Dreï Buden) extended over the two passes of Albula and Bernina, particularly from the Veltin valley to the south-east of the Bernina pass.

However, the Albula/Bernina route was not one of the main Roman roads, and it is first mentioned in the High Middle Ages, in connection with the mines. Other transalpine routes then existed to link the Upper Engadin to the lower valleys.
The Albula/Bernina road did not really exist until the 16th century, in connection with the French post, to maintain a safe route between Paris and Venice.

The construction of roads across the Alps, in the modern sense of carriageway with even slopes and crossings made safe by engineering works, appeared at the start of the 19th century, subsequent to the Italian campaigns of Napoleon Bonaparte, including in particular the Saint-Bernard pass in Switzerland (completed in 1820). The Bernina pass road was completed in 1842 and the Albula pass road in 1866. A veritable staging post was built in 1871 (Ospizia Bernina).

The first hotel was built at Saint-Moritz in 1857 and in the same year another at Lake Poschiavo, directly linked to the road. Summer tourism then developed, providing new leisure activities for the aristocracy and the upper middle class, particularly under the influence of the British elites. There were four "Grand Hotels" at Saint-Moritz in 1900. The necessity of increased and more regular transport services, particularly in winter, became a prerequisite for the economic future of the mountain-dwellers and the development of a promising tourism activity.

The creation of a steam traction branch line to connect the metre-gauge network already existing in the Canton Graubünden in the Upper Engadin was considered during the 1890s, departing from Thusis via a tunnel under the Albula pass. Significant economic and cultural stakes were involved, for the future of this mountainous region and for the cultural and linguistic cohesion of the Canton Graubünden. The construction of the railway began in 1898, and it was opened in 1904, under the responsibility of the Rhaetian Railway, under the control of the canton. The upper valleys were then linked to each other by a veritable regional metre-gauge network, of which the nominated property forms the most spectacular part. It joins up with the canton capital Chur, where it is connected to the general standard-gauge Swiss railway network.

The rapidly growing levels of traffic were initially handled by steam traction, particular thanks to the excellent mountain steam engines of the world-renowned Swiss manufacturer Anatole Mallet. The efficiency of electric traction had however demonstrated its value in the mountains by 1900-1910, in both Switzerland and elsewhere. A single-phase AC electrification programme was drawn up for the Albula line in 1913, and was implemented in 1919.

The Bernina pass railway was planned slightly later than the Albula pass line, but it is based on different technical conceptions (see Description of Property) and it was built by another company. They use the same gauge, but the power cars and the trains were not compatible at the time: DC for one and steam followed by AC for the other, while radii of curvature and vehicle gauge are smaller on the Bernina line.

As a result of the economic difficulties resulting from World War Two, the Bernina line came under the control of Rhaetian Railway in 1944. The DC power supply was then raised from 750V to 1000V; the gauge was widened; then, recently, power cars and trains capable of operating on both electrical systems were introduced, belatedly bestowing a genuinely transalpine function on the two historic lines. Further gauge widening is under way, resulting in changes to engineering structures (See Section 3 - Authenticity).

The opening of the railway lines accompanied and supported a remarkable increase in tourist activity, particularly in the development of winter sports, of which Saint-Moritz may be considered one of the great founding sites.

A second hotel boom took place in the period preceding World War One.
The remarkable role played by the region of Saint-Moritz in the creation and development of winter sports was recognised when the first Winter Olympic games were held there in 1928, and subsequently in 1948.

Values of the Rhaetian railway in the Albula/Bernina Cultural Landscape

The two lines constitute an exemplary railway development in the Central Alps at the start of the 20th century. They offer both a wide range of solutions for the establishment of a railway in a mountain environment in which conditions are often severe, together with a remarkable degree of stylistic homogeneity and high technical quality. Almost all the viaducts and bridges on the Albula line and the most significant ones of the Bernina line are in ashlar, reflecting a significant return to ashlar in Swiss public works and representing a wider comeback of masonry architecture amongst civil engineers in Western Europe.

The lines also enabled an exemplary opening up of the area, continuing that initially set in motion by the Alpine road works in the region, in the direction of the upper valley of the Engadin. They gave rise to an exceptional

degree of development of Alpine tourism and made a decisive contribution to the birth of winter sports, which in turn have established a new relationship between European civilisation and the mountains. The two lines have never ceased to operate, in a mixed-use mode that is typical of mountain disenclavement: diversified goods transport, local passengers and access to winter sports resorts for tourists. The use may be described as intense and permanent compared with other infrastructures of a comparable nature.

The line is moreover situated in remarkable natural landscapes, linked to the high Alps, and in cultural landscapes that bear the traces of the village life, rural life and tourist frequentation that reflect a longstanding human presence.

3. OUTSTANDING UNIVERSAL VALUE, INTEGRITY AND AUTHENTICITY

Integrity and Authenticity

Integrity

The integrity of the infrastructures and the integrity of the technical functioning of the line on these infrastructures are fully ensured, and seem to be guaranteed for the future (See Section 5, Guarantees and management). This does not mean, on the other hand, that the railway traction techniques used are the same as those used originally They have been subject to adaptations and innovations that are directly linked to their initial mission of providing transport and safety.

The integrity of the railway landscapes – i.e. both the landscapes seen by the railway passenger and the landscapes of the railway set in its environment – is generally of good quality. It is indeed remarkable in the case of landscapes that express the rural mountain civilisation of the Graubünden, and of landscapes that show the lines of force of railway civil engineering in the most spectacular sites.

The integrity of the nominated property site has however been affected by some substantial changes, directly linked to rail traffic activity itself, particularly in the stations and urban centres (See: Authenticity).

ICOMOS considers that the integrity of the whole of the railway line is good. It has all the elements necessary for the expression of its outstanding universal value, and in particular sufficient size and technical completeness. Its level of maintenance is moreover excellent over the long period for which it has been used.

Authenticity

The authenticity of the civil engineering infrastructures is generally good and indeed excellent in many cases. The bridge crossing the Rhine at Thusis has been rebuilt for civil engineering reasons on technical bases that are not the same as the original bridge. It cannot therefore be described as authentic, but it is essential to the property's functional integrity. Concerning the bridge, it should be noted that the initial bridge (1901) was not in keeping with the general architectural concept of the line, which was based on classical stone arches. Today this is one of the key points of the value of the property as a monument. The original bridge was a metal girder bridge of the most commonplace type. The reconstructed bridge (1993) is a fine reinforced concrete arch with piers, the general elegance of which is in continuity with the works of the Swiss engineer Robert Maillet, whose bridges have been internationally acclaimed. The bridge contributes to an improvement in the quality of the general aesthetics of the infrastructures, but is not authentic or directly related to the initial architectural values.

Some slight modifications have been made to the layout for geographical reasons, and to improve operation. The gauge of the Bernina line has been widened to enable the uninterrupted passage of trains between the two lines. The use of concrete has been inevitable on such a linear structure, but this use remains discreet in most cases, and in recent work the concrete has been treated to make it resemble the appearance of stone, and thus ensure visual continuity with the parts that are genuinely original.

The technical authenticity of the line is an open and delicate question. It must be seen in relation first to the dynamic of innovations and improvements inherent in this field of heritage, and secondly to the continuity of railway operation and its long-term success. For example, there are the issues of changes in traction energy and the renewal of train sets.

Detailed architectural authenticity, particularly of stations and their annexes, is extremely variable from place to place. Generally speaking, the main stations, which are the most frequented, are the least authentic. The platforms have been extended and raised for operational reasons, which are related to the issue of technical authenticity. Their visual treatment by the Company's architects reflects more of an effort to express images of modernity, which vary depending on the period, rather than an architectural reflection linked to the heritage, until recently.

There does not seem moreover to have been a standard station plan at the origin, but rather an adaptation to the raw materials available and the climatic conditions of the place concerned. The resulting impression is one of great variability in the quality and authenticity of the built structures, linked to the history of the companies. Some secondary stations or buildings do, however, embody a good degree of authenticity.

ICOMOS considers that the conditions of integrity and authenticity have been met.

Comparative analysis

The file makes an in-depth comparative study of similar properties, both in terms of technology and construction period. In view of the number of railway lines built throughout the world in around 1900-1910 in mountainous areas, a choice had to be made between properties that may potentially be considered to have exceptional value or are already inscribed on the World Heritage List. It has been adequately justified, and the comparative analysis has been considered at length by a group of international experts.

Rack trains have however been rapidly considered, and then left out of the comparison, although the historic and monumental archetype in this case is a Swiss construction: the railway of the Jungfrau (3,454 m).

The comparisons are made on the following bases:

- Construction period
- Economic importance
- Performance and technical importance
- Cultural landscapes
- Present and future.

ICOMOS acknowledges the significant documentation effort made in the comparative study. It considers a large number of mountain railways of the same period, in various parts of the world, which are either already inscribed (Semmering in Austria, Darjeeling and Nilgiri in India) or not inscribed (Yunnan in Vietnam and in China, Eritrea, Ecuador, the Yellow Train in France and the Saint-Gothard in Switzerland, and the Denver & Rio Grande in the US).

ICOMOS considers that most of the railway lines presented include interesting and valuable elements, over a relatively short and particularly fertile period in the development of mountain territories (mid-1890s - World War One). They are furthermore often complementary in their heritage and historic contributions, and overall they illustrate a technical model that was being introduced, but also a new economic and social model for mountain societies, which does not exclude nuances in objectives and differences in technical choices.

ICOMOS considers that the most favourable points in favour of the exceptional universal value of the nominated property pointed out in the comparative study are:

- A very good technical achievement in terms of railway civil engineering, at altitudes rising to over 2,000 m, which is however neither particularly early nor highly original in design terms. It includes in particular a very homogeneous set of masonry structures of very high quality, and a track layout that is sometimes spectacular with its spirals and tight bends. A comparison with the Semmering railway (Austria), inscribed on the World Heritage List in 1998, the founding archetype of the transalpine line, would however be excessive, as the transalpine aspect of the Albula and Bernina lines is relatively late, and secondary in traffic terms, and for a long period a passenger transfer was necessary to cross the Alps. On the other hand, the nominated property is relatively comparable in its disenclavement goals to the Indian railways already inscribed.

- Remarkable economic and social results, over a long period, particularly in the development of mountain tourism and the birth of winter sports.

- A notable technical test bed for various traction techniques, which was extended through continuous innovation in operating resources. The history of uses of these two lines is probably one of the most successful and effective over a long period. It provides a guarantee of the quality of use to come, from the viewpoint of the overall concern of heritage conservation.

- Mountain and rural landscapes of high quality that are remarkably preserved.

ICOMOS considers that the comparative analysis justifies consideration of this property for the inscription on the World Heritage List.

Justification of the Outstanding Universal Value

The nominated property is considered by the States Parties to have outstanding universal value as a cultural property for the following reasons:

- The property constitutes a unique example of a mountain railway line fully integrated in the cultural and natural landscapes of the Alps.
- The Albula line is a very comprehensive example of a railway line of great quality, particularly because of its outstanding civil engineering monuments, embodying a neo-classical stone arch approach, with large partly underground spirals in harmony with the landscape setting, and its large tunnel at the summit.
- The technical performance of the Bernina electric adhesion and traction line on gradients of up to 70/1000 and up to an altitude of more than 2,000 metres.
- An early and exemplary railway construction resulting in the double disenclavement of a high alpine valley, the Upper Engadin.
- A line that through the very high quality of its railway construction has acted as a technical example, and today constitutes an archetype of the golden age of mountain railway construction worldwide.
- Together the two initial historic lines today form a unique transalpine line, with substantial traffic levels, which has never been interrupted.
- The line expresses the creative genius linked to the encounter and exchanges between highly diverse cultural and linguistic communities.

Criteria under which inscription is proposed

The property is nominated on the basis of cultural criteria (i), (ii) and (iv).

Criterion (i): represent a masterpiece of human creative genius.

In the States Parties' view, the nominated property is an outstanding masterpiece of creativity generated by the interaction of major aesthetic standards, engineering genius, technical innovation and perfection in terms of know-how for an exceptionally successful ensemble. It is the product of exceptional large-scale cooperation, in a remarkable spirit of innovation in the face of the difficulties to be overcome.

ICOMOS considers that the nominated property bears witness to a technical design of a high level, whose realisation was of high technical, architectural and environmental quality.

ICOMOS considers however that the technological and architectural choices made at the time of construction formed part of a general trend that was already under way and represented technical solutions already successfully tried on other lines. The nominated property is more of an original technical synthesis of high quality among others of the same period built in similar conditions, than a masterpiece of human creative genius, embodying outstanding universal value.

ICOMOS considers that this criterion has not been justified.

Criterion (ii): exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design.

In the view of the States Parties, the nominated property is a pioneering work of modern engineering and architectural constructions that exhibits an important interchange of human values relating to technical innovation at the start of the 20th century. It is an excellent example of a harmonious relationship between human action and a natural Alpine environment of great beauty; a sublime experience of a relationship between nature, culture and technology.

ICOMOS considers that the historic railways of the Albula and Bernina form an outstanding technical, architectural and environmental ensemble. The two lines, today unified in a single transalpine line, embody a very comprehensive and diversified set of innovative solutions that bears witness to an important interchange of human values in the development of mountain railway technology, in its architectural and civil engineering realisations, and in its aesthetic harmony with the landscapes through which they pass.

ICOMOS considers that this criterion has been justified.

Criterion (iv): be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history.

In the view of the States Parties, the Rhaetian railway of the Albula and Bernina, in its landscape setting, is an outstanding example of a technical ensemble that illustrates the apogee of the golden age of mountain railways. It has also had a powerful influence on perceptions of the Alps in the 20th century.

ICOMOS considers that the nominated property very significantly illustrates the development of mountain railway lines at high altitude in the first decade of the 20th century. It constitutes a consummate example of high quality forming the basis of the long-term development of human activities in the mountains.

It also offers diversified landscapes in association with the railway that are emblematic of this period of a flourishing relationship between man and nature.

ICOMOS considers that this criterion has been justified.

ICOMOS considers that the nominated property meets criteria (ii) and (iv) and that outstanding universal value has been demonstrated.

4. FACTORS AFFECTING THE PROPERTY

Sociocultural and technical factors

Changes in uses and traffic needs, and essential safety concerns have led the Rhaetian Railway Company to constantly adapt its rolling stock, its train access facilities and infrastructures. For example, the increase in speed has led to a change of track profiles on bends and the widening of the passing length. This has resulted in the Rhaetian Railway constructing concrete cantilever track bases on the traditional bridges.

Demographic trends and economic development are variable depending on the types of land use. They are liable to change landscapes.

Classical urban development, with substantial industrial activities and a strong growth in residential property, can only really affect the two terminal towns of the line.

The development of tourism could profoundly affect the landscape if it were not well controlled in terms of land use, architecture and technical infrastructures. However, some elements must be renewed or changed, as they have an important role in local economies (for example, the Bergun ski lift).

The mountain agricultural sector has played a key role in the constitution of Alpine landscapes. Its activities today are focused on labelled regional products of a traditional nature and with high value added. They constitute in themselves a significant aspect of heritage, and should continue to move in this direction.

The other mountain economic activities such as forestry are managed in a spirit of sustainable development. The quarries and mines no longer play more than a local role, or have been shut down.

The transformation and modernisation of hydroelectric facilities may however have a notable effect on landscapes, unless care is taken to avoid this.

Natural factors and impact of climate change

In addition to the general effects of climate change in the mountains, such as the melting of ice and permanent snow, the climate change taking place has modified the situation of the permafrost in a way that could directly affect the property and its immediate environment. Mountain slopes have become more unstable, and are likely to create rock falls or mudslides.

Landslides and avalanches have always affected mountain infrastructures. They are tending to become more frequent and more intense.

Effects are also in evidence in relation to technical elements of the line that must be taken into account by the engineers: ballast drainage is less effective, excessive

summer expansion of masonry structures and influence on track curves.

Risk preparedness

From its origins, the railway infrastructure has included technical devices, which are sometimes on a very large scale, to protect against natural risks arising from well identified geographic and geological situations.
The devising of protective measures against natural disasters is enshrined in Swiss law.
The cantons draw up risk maps and registers for the observation of natural dangers. These form the basis for land use, the management of technical protection systems and landscape management.
A permafrost study centre has been set up at Pontsérina.

ICOMOS considers that the main threats to the property are natural disasters relating to the situation of the mountains.

5. PROTECTION, CONSERVATION AND MANAGEMENT

Boundaries of the nominated property and buffer zone

The property consists of the railway line, with a main line length of 128 km, all the stations except Thusis (which has been too substantially altered), the auxiliary technical structures of the line (points, sidings, etc.), and built elements with a railway function (platforms, sheds, etc.)

The nominated property has a surface are of 152.4 hectares, of which 3.0 hectares are in Italy.

The nominated property has three buffer zones:

1) A Primary Buffer Zone consists of the immediate environment of the line with great value as authentic cultural landscape, directly linked to the perceptions of the railway passenger, or as cultural elements directly supporting the presence of the line in the landscape. It is closely associated with the nominated property and its study has been analysed in very great detail by the States Parties.

The primary buffer zone has a surface area of 5,436.0 hectares, of which 28.4 hectares are in Italy.

2) A second zone, which is much smaller and immediately adjacent to the nominated property (*Near Buffer Zone*) completes the property in a rural and urban residential zone that is not directly concerned by the property's exceptional universal value. Its surface area is 1,140.4 hectares, of which 76.4 hectares are in Italy.

3) The larger zone (*Distant Buffer Zone*) relates to the elements of landscape and environment that are visible from the railway line. These are protected natural landscapes and mountain agriculture landscapes. This zone has a surface area of 102,809 hectares.

In its letter of 7 December 2007, ICOMOS encouraged the States Parties to focus its attention on cultural landscapes, in the sense this term is used in Annex 3 of the *Operational Guidelines for the Implementation of the World Heritage Convention*. A certain number of landscapes of this type, associated with the line, were initially considered as forming part of the nominated property. ICOMOS recommended either extending their geographical definition and making the conceptual study more thorough, or considering them as an important value supporting the property. The latter viewpoint was finally adopted by the States Parties, together with the creation of a specific additional buffer zone.

ICOMOS considers the final result of the definition of the nominated property and its three buffer zones as satisfactory. ICOMOS stresses the effort made in the typology of buffer zones, in order to determine the values and challenges specific to cultural and natural landscapes directly related to the property, and preserve its environment. This effort makes a major contribution to the expression of outstanding universal value.

ICOMOS considers that the boundaries of the core and buffer zones of the nominated property are adequate.

Ownership

The railway line, its buildings and annexes (including those in Italy are the property of the Rhaetian Railway Company.

The hydraulic facilities and various pieces of land linked to the spaces are municipal properties.

The other properties in the nominated zone are private properties.

Protection

Legal Protection

The railway facilities are governed by federal legislation (Article 87 of the Constitution, Law of 20 December 1957). All changes to railway infrastructure is subject to planning approval under federal law.

The nominated property is also covered by national heritage protection provisions (Article 78 of the Constitution, Law of 1st July 1966). These texts set out the competency of federal and cantonal bodies for the examination of land use projects, consultations and application authorisations. They also cover the protection of the natural heritage (decree of 10 August 1977).

The management of territorial space is subject to the federal constitution (Article 75, Law of 22 June 1979). It requires each canton to comply with a *Cantonal Structure Plan* and *Land-use Planning* document whose detailed implementation and building permit procedures are handled by the municipal authorities.

The Structure Plan of the Canton Graubünden is a land use and prospective tool that will play an important role in the long-term management of the nominated property (See: Management). It manages requirements that are specific to the property (compulsory submission of projects, high level of architectural requirements that are controlled, and possible financial aid for owners) and to

the buffer zones (compulsory submission of projects, harmonisation of constructions in order to respect landscapes and cultural values).

For the Italian part, the main national and regional protection and management laws apply. In practice, the nominated property is essentially controlled by the general regulatory plan for the Commune of Tirano.

Buffer zones:

The protection of the cultural landscapes in the Primary Buffer Zone will be immediately officially recorded in the Cantonal Structure Plan if the property is inscribed on the List. Its protection regime is identical to that of the nominated property.

The Near Buffer Zone depends on the land use laws and regulations linked to town planning and economic activities, whose overall management is handled through the Cantonal Structure Plan and by the municipal authorities concerned.

The legal protection of the Distant Buffer Zone depends on the various federal, cantonal and local laws and regulations relating to the protection of nature and the environment. Its overall management is handled through the Cantonal Structure Plan.

Effectiveness of protection measures

ICOMOS considers that the measures taken are adequate to ensure the protection of the property, deal with possible threats and guarantee the expression of the property's exceptional universal value.

ICOMOS considers that the legal protection and the application structures for the three proposed buffer zones are adequate.

ICOMOS considers that the legal protection in place is adequate.

Conservation

Inventories, recording, research

There is an inventory of the Albula railway (published at Trin in 2000) and one of the Bernina railway (published at Coire in 2005).

There is a general inventory of Swiss historic monuments and heritage sites. The part relating to the Canton Graubünden has just been reprinted (Bern 2005).

The archive centres relating to the site are at Coire, both for the cantonal archives and the archives of the railway company.

A meeting of an international group of experts was held on the occasion of the World Heritage nomination.

ICOMOS considers that the condition of the inventories and archives is satisfactory. ICOMOS recommends that the research efforts undertaken should be continued, and aid given for historical studies relating to the nominated property, its conservation and to similar properties throughout the world.

Present state of conservation

ICOMOS considers that the state of conservation of the property is good, bearing in mind the remarks concerning the authenticity and the integrity of the nominated property, mainly relating to the real estate properties directly associated with the technical management of the line.

Active conservation measures

The conservation measures are reflected in the implementation of the various plans for the use, functioning and protection of the nominated property. For the line itself, this means the technical and architectural management of the railway company. For the cultural landscapes (buffer zone), it means the Cantonal Structure Plan and the International Association for the management of the site.

ICOMOS considers that the conservation measures are adequate.

Management

Management structures and processes, including traditional management processes

An international association (Swiss-Italy) for the management of the site is in charge of general coordination. It includes representatives of the various national, regional and local bodies, and of the Railway Company. These bodies guarantee the financial resources and their involvement in the plans and programmes.

The Swiss federal bodies concerned are the Offices (transport, culture, environment, statistics), and the Technical Appraisal Commissions (preservation of monument, protection of nature and cultural heritage).

The other protagonists in the field are:

- The Rhaetian railway company.
- The offices of the Canton Graubünden concerned (land management, nature and environment, agriculture, protection of monuments).
- The municipal authorities.
- The cultural and environmental associations.
- The national and local tourism organisations.

A series of consultation procedures leads to the devising and implementation of legal measures, plans and protection regulations, between the federal level, the canton, the communes and citizens. All the plans, programmes and projects can be consulted by ordinary citizens.

In connection with the future coordination of the property, two structures are currently being set up, in 2007-2008:

- The *international association*, comprising the delegates of the two States Parties and of the railway company.
- The *Régio+ association* will be in charge of communication and the promotion of the property. It was founded in December 2007.

The means made available for the operation of these two official associations have been guaranteed in the additional documentation sent by the States Parties.

Policy framework: Management plans and arrangements, including visitor management and presentation

The main programme of studies and action by partners form the management plan of the nominated property. They are coordinated in technical terms by the railway company, in land management terms by the Cantonal Structure Plan, and in terms of cultural values by the International Association. They consist in particular of the following programmes:

- The memorandum of understanding for the general management of the property and international cooperation.
- The action and study programmes of the international association (sustainable development, railway management, management of cultural landscapes, communication).
- The Cantonal Structure Plan, a special section for the nominated property will be created in the event of inscription.
- The land use plans.
- The communal plan of Tirano, approved by the region of Lombardy.

Involvement of local communities

Local communities participate in the International Management and Coordination Association. They implement the land use plans in the framework of the Cantonal Structure Plan. The commune of Tirano manages the Italian part of the nominated property.

ICOMOS considers that a substantial institutional coordination and management effort has been made, in particular by the creation of the International Association and the Régio+ association for the future coordination of the promotion of the property.

ICOMOS however considers that there is insufficient presentation to the public of the heritage values of the property, with regard to the founding aspects that justify its inscription: technical history (civil engineering and railway history) and social history linked to the creation of the railway (tourism, winter sports, habitat, etc.).

Resources, including staffing levels, expertise and training

The financial resources necessary for the management of the railway are guaranteed by the Rhaetian Railway Company.

The funds necessary for the conservation of the other properties are guaranteed, in accordance with schemes adapted for each case by: the owners, the communes and the specialised aid funds of the canton.

The human resources consist mainly of:

- The Association's three groups of experts.
- The technical and administrative personnel of the Rhaetian Railway Company.
- The specialist personnel of the various federal and regional offices.
- The specialist personnel of the municipal authorities.

ICOMOS considers that the management system for the nominated property is adequate, while expressing its wish for a reinforcement of the presentation to the public of the founding heritage aspects of the property.

6. MONITORING

The civil engineering and infrastructures of the railway track and buildings are assessed every 10 years in order to schedule renovation and maintenance work (Railway Company).

Passenger and freight transport is assessed each year (Railway Company).

Population and population trends are assessed at intervals of from one to four years depending on the topic. This consists of the census and statistics about jobs, travel, tourist frequentation (Federal statistics office, municipal authorities).

Changes in the land use plan are examined on a case-by-case basis (Cantonal land management office, municipal authorities).

The monitoring of new constructions is reviewed annually (Federal statistics office).

ICOMOS considers that the nominated property has adequate monitoring bodies and indicators for monitoring its outstanding universal value.

7. CONCLUSIONS

ICOMOS considers that the universal value of the Rhaetian Railway in the cultural landscape of the Albula and Bernina is justified, and the protection and management system is adequate for the expression of its universal value.

Recommendations with respect to inscription

ICOMOS recommends that the Rhaetian Railway in the Albula/Bernina Cultural Landscape, Switzerland and Italy, be inscribed on the World Heritage List on the basis of ***criteria (ii) and (iv)***.

Recommended Statement of Outstanding Universal Value

The Rhaetian Railway in the Albula/Bernina Landscape demonstrates outstanding universal value for the following reasons:

- The two lines of Albula and Bernina together represent an exemplary railway development for the disenclavement of the Central Alps at the start of the 20th century.

- Its socio-economic consequences were substantial and lasting for mountain life, the interchange of human and cultural values, and changes in the relationship between man and nature in the West.

- It offers a wide diversity of technical solutions for the establishment of the railway in often severe mountain conditions. It is a well designed construction that has been realised with a high degree of quality.

- It has remarkable stylistic and architectural homogeneity. The railway infrastructure moreover blends in particularly harmoniously with the Alpine landscapes through which it passes.

Criterion (ii): The Rhaetian Railway of Albula/Bernina constitutes an outstanding technical, architectural and environmental ensemble. The two lines, today unified in a single transalpine line, embody a very comprehensive and diversified set of innovative solutions that bear witness to substantial interchanges of human and cultural values in the development of mountain railway technologies, in terms of its architectural and civil engineering achievements, and its aesthetic harmony with the landscapes through which they pass.

Criterion (iv): The Rhaetian Railway of Albula/Bernina is a very significant illustration of the development of mountain railways at high altitudes in the first decade of the 20th century. It represents a consummate example of great quality, which was instrumental in the long-term development of human activities in the mountains. It offers diversified landscapes in conjunction with the railway that are significant of this period of the flourishing of a relationship between man and nature.

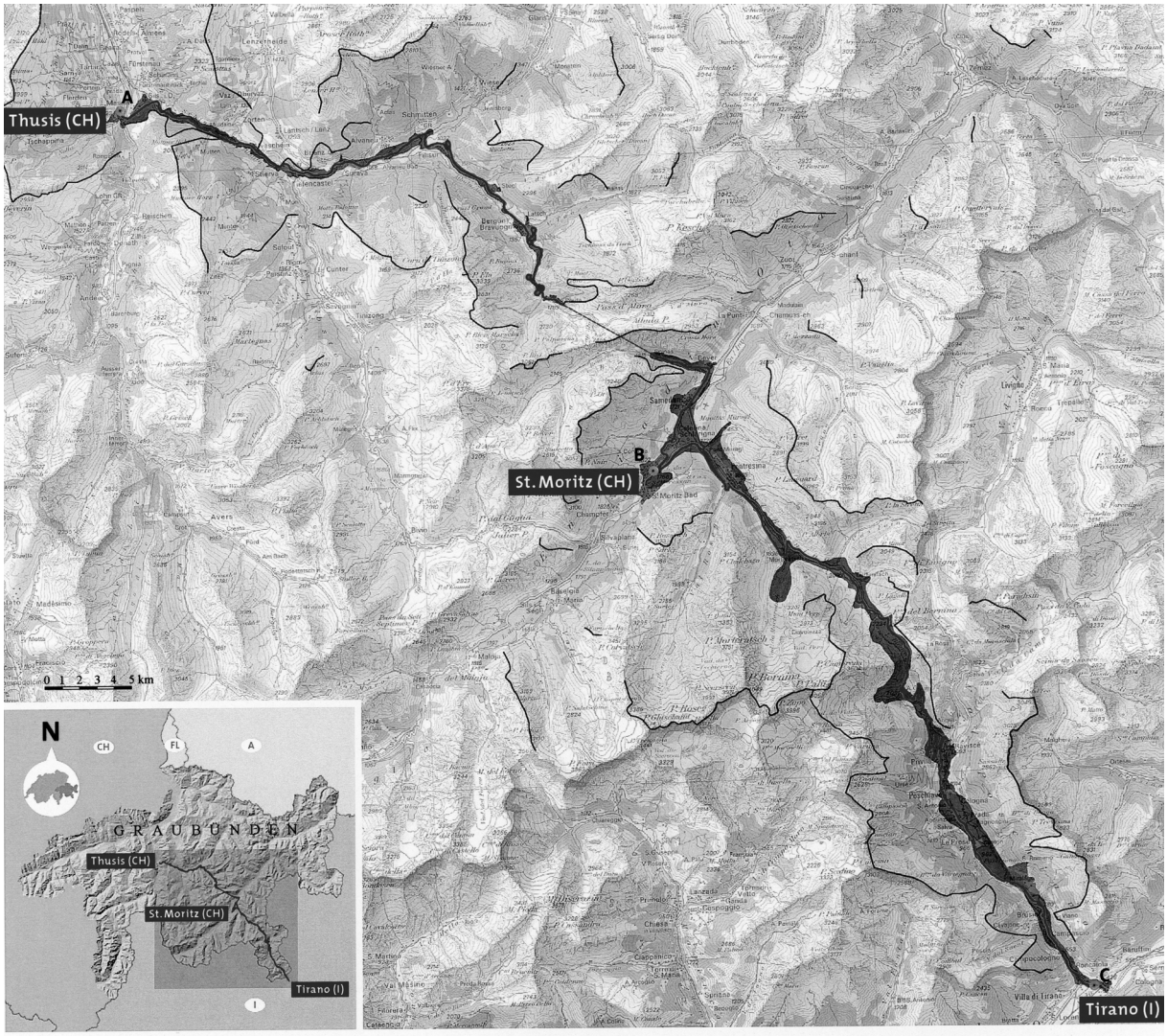
The railway infrastructures of the Albula and Bernina lines form an authentic ensemble of great integrity. Their technical operation and their maintenance ensure long-term conservation of high quality. The Rhaetian railway company that has unified them and carries out their technical management has introduced technical changes and innovations that are compatible with the concept of authenticity of technological properties that are still in use.

The legal protection in place is adequate. The management system of the property is satisfactory, though a reinforcement of the presentation to the public of the founding heritage aspects of the property is desirable.

ICOMOS recommends that the States Parties should give consideration to the following points:

- It would be desirable to change the name of the nominated property, in view of the choice finally made by the States Parties to remove the cultural landscapes from the nominated property itself and instead include them in the buffer zone. A more appropriate name would be *Rhaetian Railway in the Albula/Bernina Landscapes*. This name refers to the remarkable natural landscapes through which the railway passes, and which are included in the Distant Buffer Zone.

- It would be desirable to consider a significant reinforcement in the presentation to the public of the heritage, historical, social and environmental values of the Rhaetian Railway in the Albula/Bernina Landscapes. To this end, it would for example be appropriate to consider the creation of an Interpretation & Documentation Centre of a quality commensurate with the outstanding universal value of the property.



Sources:
Basic map: PK 200'000 swisstopo, Wabern
Geo-data: Amt für Raumentwicklung Graubünden
Design: Süsskind, SGD, Chur
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Core zone

Core zone

Buffer zone

Primary buffer zone

Buffer zone in the 'near' area

Buffer zone in the 'distant' area ("backdrop")

Horizon line

Georeferenced points

- **A** Thusis Exit Signal: N 46° 41' 50'' E 9° 26' 28''
- **B** St. Moritz Station: N 46° 29' 54'' E 9° 50' 47''
- **C** Tirano Station: N 46° 12' 57'' E 10° 10' 00'

Map showing the revised boundaries of the nominated property

Albula valley

Landwasser viaduct

The « White lake » (Lago bianco)

Stugl/Stuls station