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**Security and safety challenges of a palace-museum in  
nature environment. The case of Pena, Sintra.**

## **Abstract**

The National Palace of Pena, in Portugal, is managed by Parques de Sintra - Monte da Lua, S.A. (PSML) since 2007, a company with exclusively public capital created after the Cultural Landscape of Sintra was listed by UNESCO as a World Heritage Site.

This paper refers to two plans: the Territorial Security Plan and Conservation Plan for Built Heritage.

In articulation with the various bodies of Civil Protection, Territorial Management as well as Stakeholders, PSML has, throughout its Safety Department, the capability to assist in the development of an Integrated Strategic Territorial Planning, based on the establishment of sustained protocols. On the other hand, PSML has developed and implemented a Conservation Plan for Built Heritage with the aim of improving the condition of the monument, based on international principles and recommendations, codes of ethics, and terminology.

The plan establishes guidelines for maintenance actions and defines a set of rules for space usage and methodologies for inspection and monitorization of plan implementation, mainly focused on cost control and evaluation of key performance indicators.

## **Keywords**

Sintra; Cultural landscape; Parques de Sintra; Territorial safety plan; Conservation plan for built heritage.

## Introduction

Given the ever-evolving threat factors affecting the natural and built heritage, which have recently been broadened by socio-economic, political, industrial, and technological drivers, there has been a rising awareness regarding the need to safeguard cultural landscapes. As the first cultural landscape to be inscribed on the World Heritage List, Sintra reflects the secular actions of both nature and anthropic activities. Reflecting on the cultural landscape of Sintra, we realise that its longevity is never static, is always prone to changes, thus revealing itself as an added challenge for its preservation and protection, through the necessities of the human being and its future generations, but also that its natural heritage has its own biological rhythm.

In consideration of the existing international legal instruments, regarding the protection and safeguarding of cultural landscapes (highlighting: UNESCO, 1972; IUCN, 1974; Council of Europe, 2000), with particular emphasis on Sintra, the Portuguese State undertakes the responsibility of governance and the establishment of management structures that will ensure the requirements of UNESCO. In Portugal, the Law on Cultural Heritage, the Law 107/2001 of 8 September (Assembleia da República, 2001), is the legal instrument that regulates the protection and enhancement of the National Cultural Heritage, which is then complemented with territorial management and planning instruments, both in terms of regulations and strategies. Considering the existence of natural values of relevant interest for biotic preservation of the landscape, and considering the high pressures of urban expansion in the region, the Sintra-Cascais Protected Landscape Area was created in 1981, which was preceded by the creation of the Sintra Cascais Natural Park, in order to ensure the "rational management of the natural and landscape resources which characterise the region, and the development of actions to safeguard them; safeguarding the architectural, historical or traditional heritage of the region, as well as promoting architecture integrated into the landscape; and promoting the economic development and well-being of the populations, in

harmony with the fundamental laws of nature" (DR 8/1994 of 11 March. Ministério do Ambiente e Recursos Naturais, 1994) (T. Pereira, Trans.).

## 1. Creation of Parques de Sintra – Monte da Lua

Nevertheless, given the absence of an entity devoted towards the requirements of the Cultural Landscape of Sintra, in the year 2000, in response to criticism raised by UNESCO, the company Parques de Sintra - Monte da Lua, S.A.(PSML) was created, through Decree 215/2000 of 2 September (Ministério do Ambiente e do Ordenamento do Território, 2000).

Parques de Sintra - Monte da Lua, S.A. was thus created with the purpose of gathering the institutions with responsibility in safeguarding and enhancing the value of this landscape, whereby the Portuguese State entrusted this company with the management of its main properties in the area namely the Park and National Palace of Pena, the National Palace of Sintra, the Palace of Monserrate, the Convent of Capuchos, Peninha, as well as forest properties (around 1000 hectares), integrated in the Sintra Cascais Natural Park and in the Sintra Cultural Landscape. Considering its overriding mission of managing the natural and built values present in the Cultural Landscape of Sintra, Parques de Sintra, assumes the safeguarding of the cultural landscape as an absolute necessity and only possible through the involvement of the widest range of stakeholders. It incorporates the Technical Directorate of Built Heritage (Direção Técnica do Património Construído - DTPC), which is responsible for the conservation, maintenance and requalification of the built heritage, through a multidisciplinary approach that integrates teams from areas such as engineering, architecture, conservation and restoration, and archaeology. The Security Department ensures corporate involvement in security affairs and cooperates with institutional entities with responsibilities regarding the protection of the Cultural Landscape of Sintra.

## 2. Development of management and territorial protection plans

A prominent concern within Parques de Sintra is its participation within the development of territorial protection plans for the Cultural Landscape of Sintra. Considering this responsibility, Parques de Sintra- Monte da Lua, under its own organic structure, created a Security Department which has specific responsibilities within the organization, in particular:

- Inter-sectoral articulation with the remaining institutions responsible for the management and safeguarding of Sintra's Cultural Landscape;
- To contribute towards the preservation of the natural and built values present in Sintra's Cultural Landscape;
- The implementation of security and protection mechanisms in the properties under Parques de Sintra's management;
- Ensuring the safety of both visitors and employees in the territorial context of the properties under management;
- Ensuring interdepartmental articulation for projects and requirements for the promotion of safety.

Together with the articulation with the various bodies of Civil Protection, territorial management as well as stakeholders, Parques de Sintra, in consideration of its importance in safeguarding Sintra's Cultural Landscape, has, throughout its Safety Department, the capability to assist in the development of an Integrated Strategic Planning, based on the establishment of sustained protocols through Technological and Social Innovation allied to Intersectoral Collaboration Structures. Considering the importance of Sintra's Cultural Landscape, the management and protection of the Territory is the result of the articulation of several entities, namely the Municipality of Sintra, Municipality of Cascais, Technical-Forestry Offices of Sintra and Cascais, Firefighting Brigades, Civil Protection Units of Sintra and Cascais, the Portuguese Armed Forces, National Republican Guard, Public Security Police, Municipal Police, Cascais Ambiente, CulturSintra Foundation and Parques de Sintra- Monte da Lua.

Therefore, Parques de Sintra, in close collaboration with the Municipality of Sintra, has been included in several collaboration protocols with the objective of promoting the environmental and social sustainability of the region, with emphasis on the management and protection of the territory. Hence, the following territorial management initiatives stand out:

- Collaboration Protocol between the Municipality of Sintra, Parques de Sintra, the CulturSintra foundation and the Humanitarian Associations of Voluntary Firefighters of the Municipality of Sintra for the functioning of permanent intervention groups at municipal level;
- Assistance in the management and economic operation of watchtowers for the early detection of fires, which are strategically located in the vicinity of the Municipality's Cultural Landscape of Sintra, namely in Nafarros, Pedra Amarela, Belas and Alcoitão;
- Economic support for the management and acquisition of individual protection and fire-fighting equipment for the municipal Forest Fire Brigade teams;
- Articulation between the Municipality of Sintra, the Portuguese Army and Sintra Civil Protection through surveillance by the Portuguese Military during the summer season, with the objective of improving the awareness of the population and dissuading the spread of illegal acts of vandalism and criminality in the Cultural Landscape of Sintra. In this sense, Parques de Sintra ensures the lodging of military patrols in the Park of Pena and expenses concerning the provision of meals;
- Considering the heterogeneity of the properties under the management of Parques de Sintra, each one with its own particularities, Parques de Sintra welcomes Emergency and Civil Protection entities to perform evacuation drills in a real environment;
- Allied to the articulation between all stakeholders, Parques de Sintra, through its Safety Department, also aims to improve safety conditions and prevention of accidents at the properties under management. This goal is also achieved

through the installation of safety equipment, improved communications and through human resources, which are in close coordination with all entities with responsibilities for safeguarding the Cultural Landscape of Sintra.

Concerning inter-sectoral collaboration, Parques de Sintra, alongside all stakeholders, strongly believe that technology performs a fundamental aspect in the management and prevention of incidents and that its contributions are essential towards the shared mission. Considering this premise, Parques de Sintra proceeded with the implementation of the following projects:

- The installation of an early fire detection camera, atop the Clock Tower, in the National Palace of Pena. This equipment allows, through its privileged position, a 360° coverage of the area classified as World Heritage, enabling a possible early detection of fire outbreaks and, by sending geographic coordinates, creates an alert to the Civil Protection entities;
- Considering the heterogeneity of the properties under management, Parques de Sintra, proceeded, whenever possible, with the installation of Closed Circuit Television, in order to promote more adequate safety conditions for both the Built and Natural Heritage;
- Additionally, in order to ensure adequate coverage of communication networks, Parques de Sintra, together with several stakeholders, proceeded with the installation of a fiber optic ring in the Cultural Landscape of Sintra, ensuring communication between all emergency communication equipment.

In addition to the strategies mentioned above, the cooperation between the Municipality of Sintra, Parques de Sintra and other stakeholders also stands out, in the creation of several plans dedicated exclusively towards the protection of Sintra's Cultural Landscape. Thus, the following plans and initiatives stand out:

- Regarding the Territorial Management and Protection Plans, we highlight the Municipal Plan for Emergency and Civil Protection of the Municipality of Sintra, which has the participation of Parques de Sintra - Monte da Lua, S.A, both in

emergency and disaster management strategies and in the rehabilitation phase;

- The Strategic Safety Plan of the Cultural Landscape of Sintra assumes the greatest prominence, being the main instrument of operational management in the event of the occurrence of accidents, particularly with stratified interventions and responsibilities that must be ensured by various stakeholders;
- On the initiative of the Municipality of Sintra, the Municipal Committee for the Defence of Forestry against Fires was created, which has weekly strategic meetings for the management of occurrences.

To conclude, throughout the actions of Parques de Sintra and its various stakeholders, the management of risk constitutes a daily task for all organisations. Hence, it is necessary to ensure the patrimonial value of the landscape, through an integrated and collaborative management, based on strategic planning and an equitable attempt to monitor uncertainties and threats.

### **3. The plan for heritage management and enhancement of monuments**

In response to the European Cultural Heritage Green Paper and implementing the Europa Green Deal, Parques de Sintra developed measures to increase the resilience of the heritage under its management, both natural and built, in the face of Climate Change.

The Plan for Heritage Management and Enhancement of Monuments contribute to the valuation and conservation of the entire built heritage, promoting the reduction of energy consumption, and sustainable actions to safeguard the heritage preparing them



to resist the spread of an eventual natural disaster and making them more resilient to the effects of climate change.

With the aim of improving the heritage condition of the monument, PSML has developed and implemented a Conservation Plan for Built Heritage, based on the principles and recommendations enshrined in international conventions and charters, and codes of ethics (such as those approved by International Council on Monuments and Sites - ICOMOS), and taking into account the terminology established in European standards.

The Multi-Year Building Management Plan establishes the conservation and maintenance strategy for the five-year period, anticipating all maintenance and investment costs necessary to safeguard these spaces. Through periodic maintenance actions and routine inspections, it promotes the anticipation of anomalies and the significant reduction of investment costs and the need for deep interventions, promoting the sustainable conservation of the building.

This way, the plan proposes specific approaches for preventive and corrective maintenance, functioning as a strategic management tool that identifies conservation and maintenance goals for the built heritage and the actions that need to be implemented to pursue them.

The plan was developed according to the following goals:

- Implementation of methodologies that reduce future interventions and mitigate built heritage loss;
- Coordination of preventive and corrective maintenance actions between different specialties;
- Compliance of safety standards and regulations;
- Hierarchical approach of corrective maintenance actions to reduce the risk of built heritage loss.

This document compiles supporting information such as the characterization of the overall condition of the monument, the history of interventions, the conservation principles for interventions and the pluriannual plan of main interventions.

Based on this information, the plan establishes practical guidelines for preventive and corrective maintenance actions that need to be undertaken. Additionally, the plan also defines a set of rules for space usage and methodologies for inspection and monitorization of plan implementation, mainly focused on cost control and evaluation of key performance indicators.

Documenting the work and interventions carried out is an essential part of any maintenance plan. Details of all inspections, the work carried out as a result of the inspection, information about the entity that carried out the work and the costs associated with these tasks; all this information is relevant in the short, medium and long term, guaranteeing the current and future stakeholders on the heritage the knowledge about the work done, when it was done and when it should be carried out again.

Thus, in order to expedite the reading and implementation of preventive maintenance of built elements and equipment, the actions to be carried out are systematised in sheets by specialty, according to the following parameters:

- Description of the maintenance tasks;
- Estimated execution times for each task;
- Identification of necessary resources;
- Definition of its periodicity;
- Quantification, location and identification of elements;
- Safety Precautions.

As far as sustainability measures in construction and heritage rehabilitation actions are concerned, they include waste management plans that promote the reduction of waste production and its reuse whenever possible.

The following measures stand out:

- Reuse of waste resulting from construction or other works - for example natural materials resulting from demolition, such as stone, wood, ceramics - are reused in new construction (execution of traditional masonry structures, etc.);
- Use of natural materials in construction and rehabilitation - promoting the use of cork as an insulating material, or in traditional mortars where this material is incorporated resulting in passive actions to improve energy efficiency; use of natural oil paints for the treatment of wood and lime for building restoration, reduction of the use of solvent or chemical based paints in the building restoration actions contribute to the restoration of the building;
- Use of low-energy consuming materials - such as lime, a material with a reduced ecological footprint during the production phase and which promotes the consumption of carbon dioxide during the material's lifetime.

Energy, water and material efficiency was increased, reducing the consumption of primary energy, water and paper in the company's facilities by applying measures such as, among others:

- More efficient lighting equipment;
- Reduction of hours of outdoor lighting;
- Timed taps;
- Rehabilitation of the water supply mines network.

The set of measures developed will allow a reduction of 52,52 tonnes of oil equivalent (toe) per year (21.86%); of 13,368.10 m<sup>3</sup> of water (26.01%), as well as a reduction of 28.08% of greenhouse gases (GHG) (Tab. 1).

As important as the definition of the plans and respective projects is the effective follow-up of their implementation, through a monitoring and control process based on quantifiable indicators that transpose the information obtained into easily analysable and comparable data.

Tab. 1 - Determining the reduction of resource consumption.

CONSUMPTION IDENTIFICATION <sup>1</sup>	CONSUMPTION IN REFERENCE YEAR [value]	ANNUAL CONSUMPTION REDUCTION, ESTIMATED		GOALS [value]			UNITS
		Reduction value [value]	Reduction value [%]	Goals 2022	Goals 2023	Goals 2024	
On-site Energy (Non-Renewable)	333,45	42,39	12,71%	18,10	18,38	41,27	toe/year
On-site Energy (Renewable)	toe/year						toe/year
Energy in Fleets	111,37	10,19	9,15%	0,89	5,54	10,19	toe/year
Potable Water	51 401,65	13 368,10	26,01%	11384,67	12435,67	13382,59	m <sup>3</sup> / year
Non potable water	-						m <sup>3</sup> / year
Number of prints and copies	382 162,00	3 821,62	1,00%	3 821,62	3 821,62	3 821,62	[prints and copies /year]
Single-Use Plastics (Cups and Food Containers with or without Lids)	284 800,00	-	-	-	-	-	[units /year]
Single-use plastics (bottles)	1 307 978,00	-	-	-	-	-	[units /year]
Replaced Fluorinated Gases (quantities)	-	-	-	-	-	-	[kg/year]

## Final considerations

The set of monitoring indicators aims to respond to the necessary verification of the progress of the interventions and the results achieved, enabling a complete and thorough analysis of the level of progress of the various objectives of the plan. A monitoring system with consolidated procedures allows optimising the allocation of resources and the documentation/reporting of the work in progress, giving visibility to

<sup>1</sup> In the case of Energy at the Facilities, the total consumption, i.e. the energy needs of the facilities, corresponds to the total of: Energy in Facilities (Nonrenewable) + Energy in Installations (Renewable)

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the fulfilment of the defined strategies, promoting adjustments when pertinent and guiding the decision-making processes.

As described, the monitoring of this plan aims to control the implementation process, from a temporal and financial point of view, and to assess its impact, particularly on the evolution of the state of conservation of the monument.

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## Notes on the authors

Tomás Pereira, an employee of Parques de Sintra since 2012, holds the position of security technician since 2019. With training in tourism management, in the field of management of destinations and tourism products, he assists in the management of the company's security and compliance needs.

João Sousa Rego is the Director for built heritage at Parques de Sintra - Monte da Lua, S.A. since May 2019. He coordinates a multidisciplinary team, responsible for the maintenance, safeguarding and enhancement of the company's building, listed as a national monument. Before, he was the coordinator of the Blue-Green Corridor project at Parques de Sintra - Monte da Lua, which involved three municipalities - Sintra, Oeiras and Amadora.

Prior to Parques de Sintra - Monte da Lua, João Sousa Rego held Director roles in the Department of Rehabilitation and New Urban projects in the Public Urbanization Company of Lisbon and was a Deputy at Environment Ministry for the areas of land management and urban planning.