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MONOGRAPHIC ISSUE:
WASTE ARCHITECTURE / WASTE MANAGEMENT
IN LANDSCAPE AND URBAN AREAS

Guest Editors:
Anna Artuso
Elena Cossu

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RAFFAELLO COSSU

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Detritus - Multidisciplinary Journal for Waste Resources and Residues - is aimed at extending the "waste" concept by opening up the field to other waste-related disciplines (e.g. earth science, applied microbiology, environmental science, architecture, art, law, etc.) welcoming strategic, review and opinion papers. **Detritus is indexed in Emerging Sources Citation Index (ESCI) Web of Science, Scopus, Elsevier, DOAJ Directory of Open Access Journals and Google Scholar.** Detritus is an official journal of IWWG (International Waste Working Group), a non-profit organisation established in 2002 to serve as a forum for the scientific and professional community and to respond to a need for the international promotion and dissemination of new developments in the waste management industry.

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Editorial

WHY ARE WASTE MANAGEMENT FACILITIES SO UNATTRACTIVE?

Waste Architecture is a branch of the design field relating to the Architecture and Land Planning of waste management and disposal facilities based on projects ranging from a vast (landfills, incinerators, treatment plants) to a municipal and peri-municipal scale (waste collection systems, recovery and recycling plants, etc ...).

This branch therefore deals with works and products featuring a marked environmental, territorial, economic and social impact, a topic towards which Society is known to be highly sensitive. The issue therefore dictates a need for targeted political and planning strategies aimed at increasing awareness of the importance of these structures in ensuring quality of the environment and the territory, which may also produce major repercussions on our health. Health intended, according to the WHO definition, as “a state of complete physical, mental and social well-being” achieved through the actual and perceived quality of the space within which one lives.

Waste management is a topic that actively impinges on society, although frequently associated with clichés and misleading persuasions that result in the infrastructures present throughout the network being viewed as areas of neglect, environmental and territorial eyesores to be placed on the margins of shared community spaces.

The demographic increase and scarce availability of space have both resulted in landfills, incinerators, treatment plants and integrated waste disposal systems becoming an integral part of our daily routine. Whilst in the past similar issues were viewed as technical aspects of Engineering, the current need to include these works in a detailed land planning has highlighted a requirement in the fields of landscape and urban design to rely on a multidisciplinary team that extends to the area of Architecture.

In the specific context of wastes, with very few rare exceptions, architects are however inexplicably excluded from the conception, planning and development of these key infrastructures.

On the whole, the majority of nations worldwide fail to envisage an integration between the waste management system and the territory throughout which the system operates. This criticality is largely due to lack of recognition of the role of primary urban infrastructure, i.e. an essential service in the life of a Community. The waste system, in the same way as other infrastructures comprising hubs and networks, is linked to a need for works and interventions for which (with very few exceptions) no planning aimed at ensuring integration with the landscape (natural and urban)

is envisaged, nor architectural research to promote manufacturing quality of the goods.

In common practice, architectural techniques for the collection and treatment of wastes are designed as highly efficient industrial products. Technical and functional requirements that frequently dictate the form of these works thus evolve into overt limitations that hamper the potential configurations, with functional needs rarely being supported by architectural and manufacturing studies.

Indeed, many of the works undertaken are conceived based exclusively on technical aspects, with negative architectural and social implications. The majority of plants adopted by the “waste system” have tended to create feelings of threat, diffidence and hostility, thus frequently being considered an unnecessary “evil” to be eliminated or hidden from view (think of landfill constructed in the past, with the black fumes rising from the heaps of waste and of the incinerator chimneys).

Viewed to date by politics as a “problem” rather than a resource, by communities as a threat, by environmentalists as an endless source of pollution, by sanitary engineers as functioning machines and by architects as works in which design is limited merely to the packaging, the infrastructure hubs throughout the waste collection network have struggled to achieve any form of “dignity” as public works, although being of fundamental importance for modern-day society.

Accordingly, the inescapable role covered by the waste management network should be acknowledged in the same way as other public services (transport, water supply, lighting, etc.), and all associated works undertaken with the same attention to details of planning and design devoted to any other works of community concern in terms of planning, siting, study of the context, choice of shapes and material, legibility of spaces, levels of planning and design, economic analysis. And, in the same way as planning for all major works (ranging from bridges to skyscrapers, from museums to airports ...), the technical requirements will need to adapt to the architectural needs rather than the contrary.

Numerous works undertaken throughout the world, from the Ariel Sharon Park on the Hirya landfill in Israel, to the Val d'en Joan in Barcelona and the Amarger Bakke incinerator in Copenhagen, have demonstrated how this type of architecture constitutes a highly interesting sector that highlights, throughout the various stages of the project, a series of potentials: the recognisability of the structures may be exploited to characterise a landscape or a city; a

high-quality architectural project will contribute towards enhancing legibility with a view to raising environmental awareness and may provide an opportunity to create new functionalities; degraded areas may be restored to a new vocation.

Based on these considerations, and with a view to “enobling” this sector, in 2015, Arcoplan Associates devised the Waste Architecture Platform, a showcase for initiatives that has brought together environmental experts, architects, designers, urban and land planners to encourage networking on an international level on the topics of mutual interest in seminars, design workshops, publications, etc. Since then, Arcoplan has been consistently involved in the organisation of oral sessions at the prestigious Sardinia – International Waste Management and Landfill Symposium, a reference event over the last 30 years for the scientific community that rotates around waste, thus rendering Waste Architecture one of the main topics of the Symposium.

This monographic issue represents one of the outputs of the Waste Architecture Platform, providing a selection of papers presented during the third edition of the International

Workshop on Waste Architecture / Landscape and urban areas, held in October 2019, listing in the final columns the results of the design workshop focused on the redevelopment of landfill scheduled on the second day of the event. The Workshop was organised by Arcoplan Associates with the scientific support of ReLOAD Lab / ICEA - Department of Civil Environmental and Architectural Engineering, University of Padova (IT).

The issue moreover includes a series of external contributions from designers working in the specific field on both an academic and professional level.

It is to be hoped that the planning and design of key infrastructures in the waste sector such as those described in the papers present in this monographic issue, with their ability to conjugate environmental requirements with care for the territory, high quality architecture and wellbeing of the community, will gradually start to be provided for as a matter of routine.

Anna Artuso, Elena Cossu
Arcoplan Associates, Italy
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Detritus and Architecture 2/2

REHABILITATION OF LANDFILLS: DESIGN LAB AT THE INTERNATIONAL WORKSHOP ON WASTE ARCHITECTURE 2019

Anna Artuso ¹, Elena Cossu ¹ and Stefanos Antoniadis ²

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In 2019 Arcoplan Associates organised the third edition of the International Workshop on Waste Architecture / Waste Management in Landscape and Urban Areas conceived as a parallel event of Sardinia 2019, 17th International Waste Management and landfill Symposium.

The first day of the event was devoted entirely to oral presentations, whilst the second was taken up by a practical design and planning workshop. The design lab was coordinated by Studio Arcoplan with the collaboration of Stefanos Antoniadis, research fellow at the University of Padova.

During the lab participants had the opportunity to apply theoretical notions learnt during the oral sessions to an actual case study promoted by a company, and to exchange views and opinions with colleagues and experts as part of a working team.

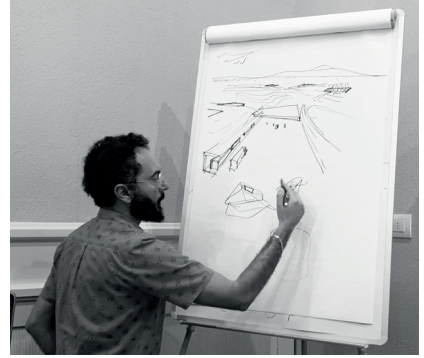
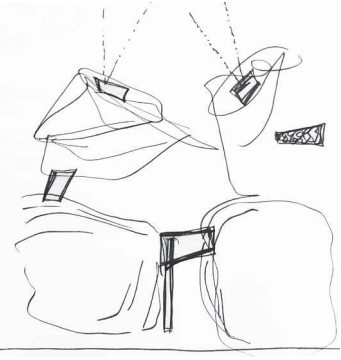
The most important concept that emerged during the workshop focused on how landfill redevelopment is much more likely to be successful if the project is undertaken by a multidisciplinary team (architects, environmental engineers, planners, etc.) developed during the active phase of the landfill. Indeed, the possibility of using new wastes

as a plastic material to mould the shape of the mass will extend the range of potential functions to be assigned to the project and provide greater freedom in reorganising the final configuration of the area. With a view to designing the area not as a landfill, but rather in line with the final use envisaged by the project, wastes may be used immediately to forge the final morphology of the landscape. By implementing a strategic land planning, landfills may thus be transformed from environmental eyesores into an integral part of the urban landscape, instruments intended to provide a new intended use.

During the workshop a series of redevelopment projects focussed not on the mere conversion of areas into urban parks or playing fields, but which devised a series of innovative intended uses, were elaborated. The first case envisaged an extensive archaeological-industrial park featuring terraced lakes, whilst the second a system of themed itineraries that crossed the area and intersected throughout the landfill.

The results of the workshop are presented below.





CASE STUDY 1: LANDFILL FOR HAZARDOUS AND NON-HAZARDOUS SPECIAL WASTES / ECOFER AMBIENTE SRL

Proposer: Ecofer Ambiente Srl

Location: Rome, Italy

Area: approx. 25 hectares

Type of plant: landfill for hazardous and non-hazardous special wastes

Tutors: Anna Artuso (Arcoplan Associates), Stefanos Antoniadis (University of Padova, Italy)

Working group: Giulia Bassi, Giacomo Bellussi, Emilia Rutkowski, Stefano Sardu, Giovanni Sommariva

Ecofer Ambiente Srl manages a sanitary landfill authorised for conferment of hazardous and non-hazardous special wastes. The landfill was designed at the start of the year 2003 in accordance with criteria established by Legislative Decree 36/2003 relating to hazardous waste

landfills, subsequently enhanced by the regulations contained in the authorization permits. The landfill accepts solely non-hazardous wastes originating from the metal recovery sector (end-of-life vehicles and other metallic wastes).

Partially following the division of the former quarry, the area on which the landfill is sited is divided into three operative lots: Lot 1 has been in the aftercare phase since 2013, Lot 2 is currently operational and Lot 3 will be opened in September. Post-operational management envisages, to complete the authorized volume, reconstruction of the hilly landscape of the zone to the profile featured prior to extraction, compatibly with the existing structures and management of rain water. The areas located to the north and north-west of the storage tanks, are used as a temporary deposit for fertile soil and clay and a green area with vineyards. To the west lie via Ardeatina and the regional railway. The service area is situated approximately 15 metres below road level; the slope decreases on moving north, reaching a flat plain close to the border of the area.

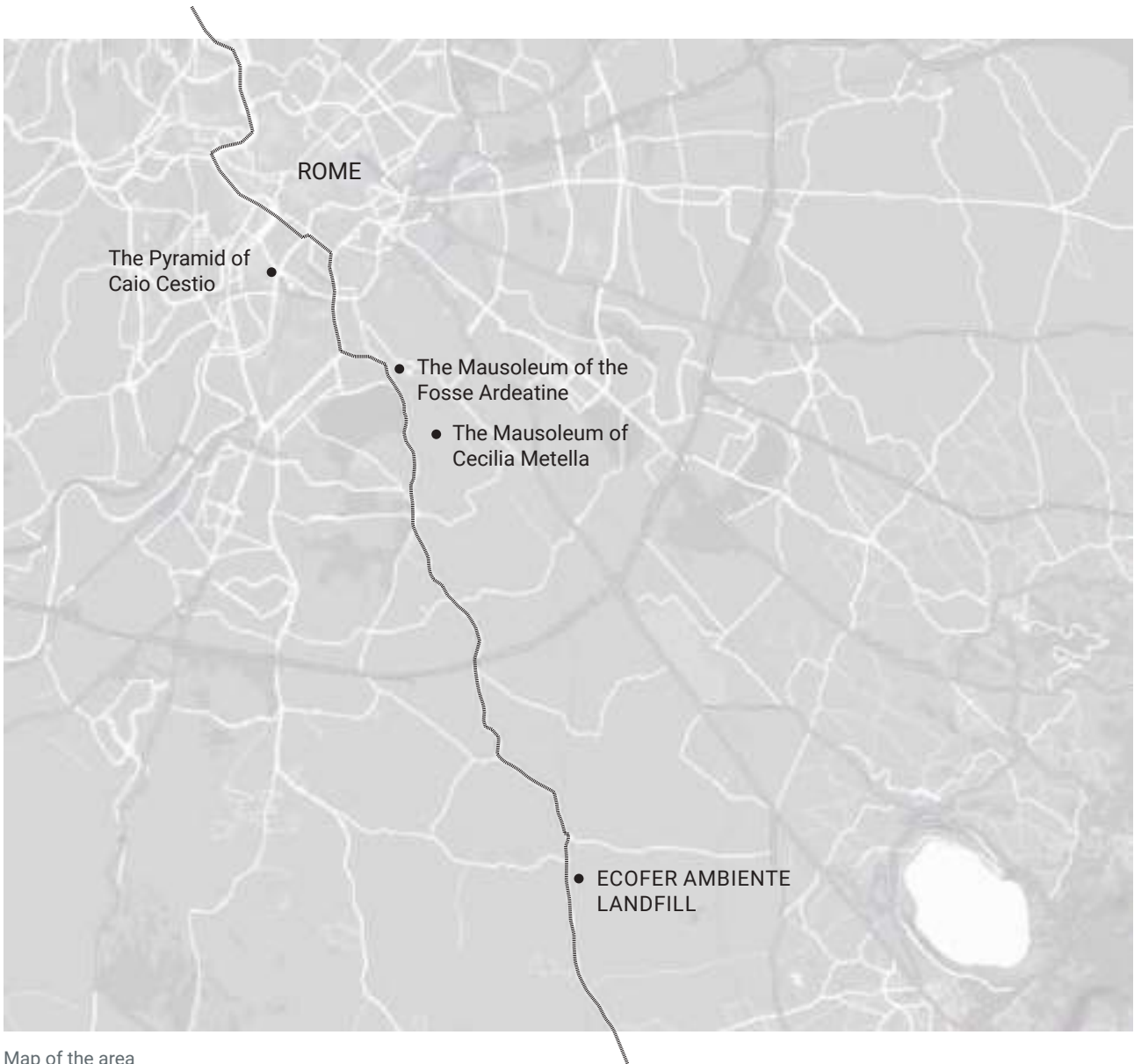


View of the existing landfill

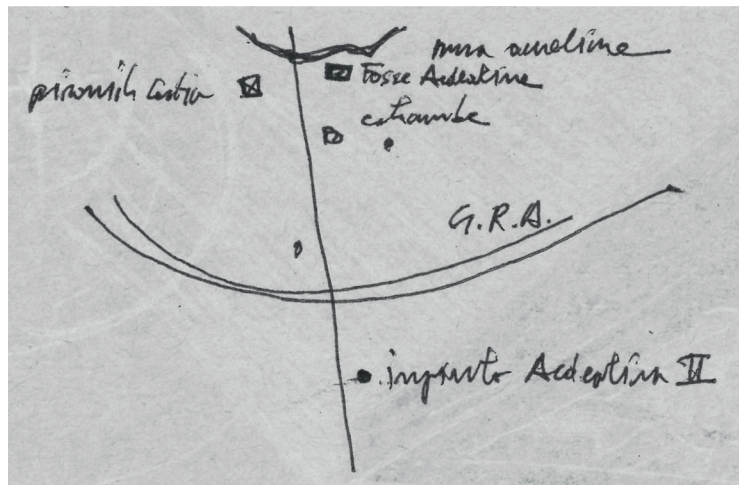
1 / THE PROPOSED CONCEPT

Le Corbusier, with his famous drawing called *La leçon de Rome* (1925), showed how the ancient Roman architectures, through the abstraction skill, can be read as a series of main geometric solids. Rome is dotted with large cylinders, pyramids, cubes, parallelepipeds and spheres. But even in less urbanized contexts, such as the countryside, the strong presence of classical and medieval ruins, pieces of bridges and infrastructures of the past scattered everywhere has for centuries influenced the representation of the Roman countryside studded with large recognizable artificial forms. The architectural design for the transformation of the Ecofer Ambiente case study, located in this same territory, not so far from a series of evident landscape-scale signs (the Aurelian Walls, the GRA ring road, the important signs of the ancient Roman roads) and large forms of the landscape (the Pyramid of Caio Cestio, the cylinder of the Mausoleum of Cecilia Metella, the plate of the Mausoleum of the Fosse Ardeatine). Therefore, beyond

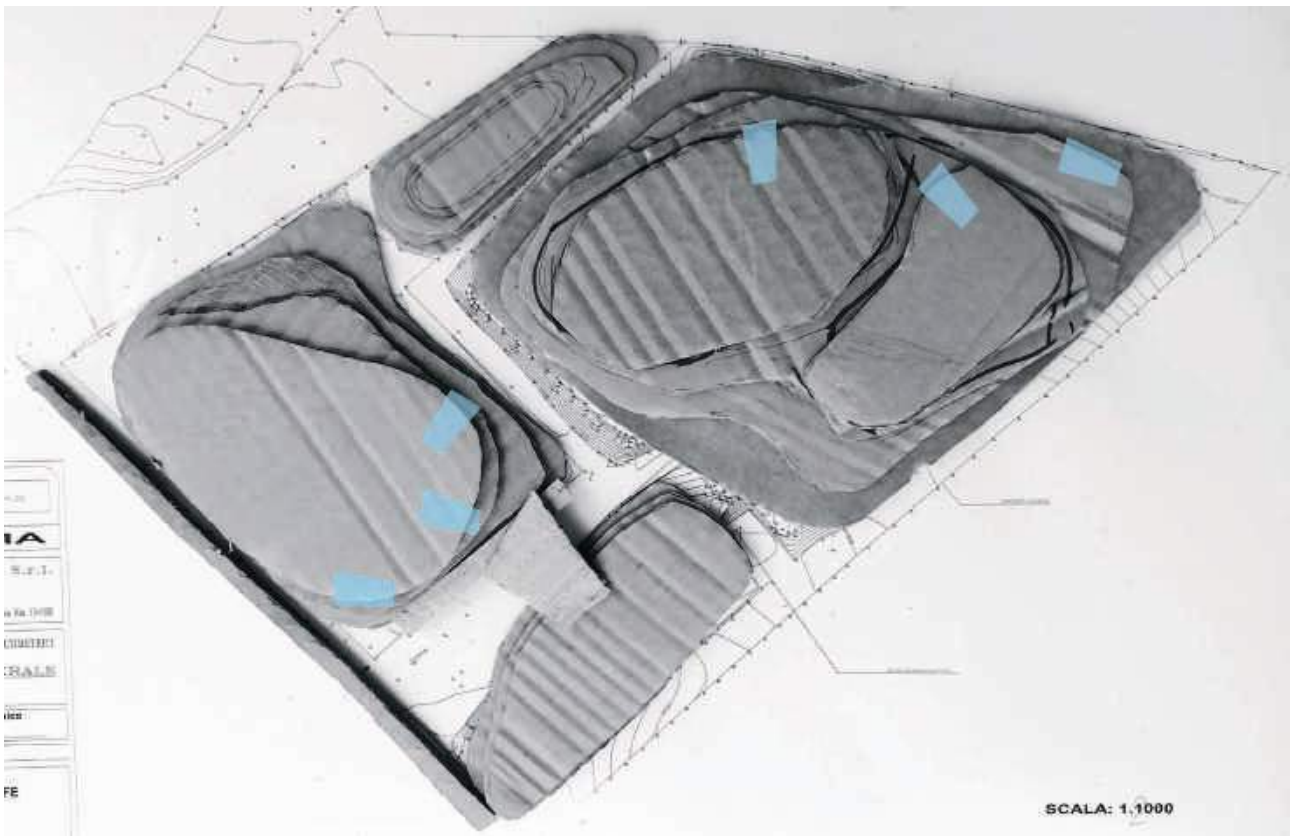
a functional program that will evaluate the strategic location for palatability activities in order guarantee a desirable and continuous post-management use as a place open to the community, the regenerative hypothesis draws strength from this big scale objects' poetics. The new Ecofer Ambiente site must not be continually remembered merely as a former landfill, but it can become a new element that contributes to the construction of a landscape vocabulary as much as the other forms of the territory. A large ribbed concrete slab identifies the access to the area, shades a vast open space, and suspends wrecks of cars – the type of waste stored there – to keep the memory of the place alive but also archaeological fragments and Roman finds – which could be displaced there under concession by the cultural institutions – to underline once again the need for contemporary urban stuff. Other slab are inserted and suspend among the embankments of the landfill – especially for those still to be designed and filled, therefore authorizing some structural predispositions – to house swimming pools, sports courts, and hanging gardens.



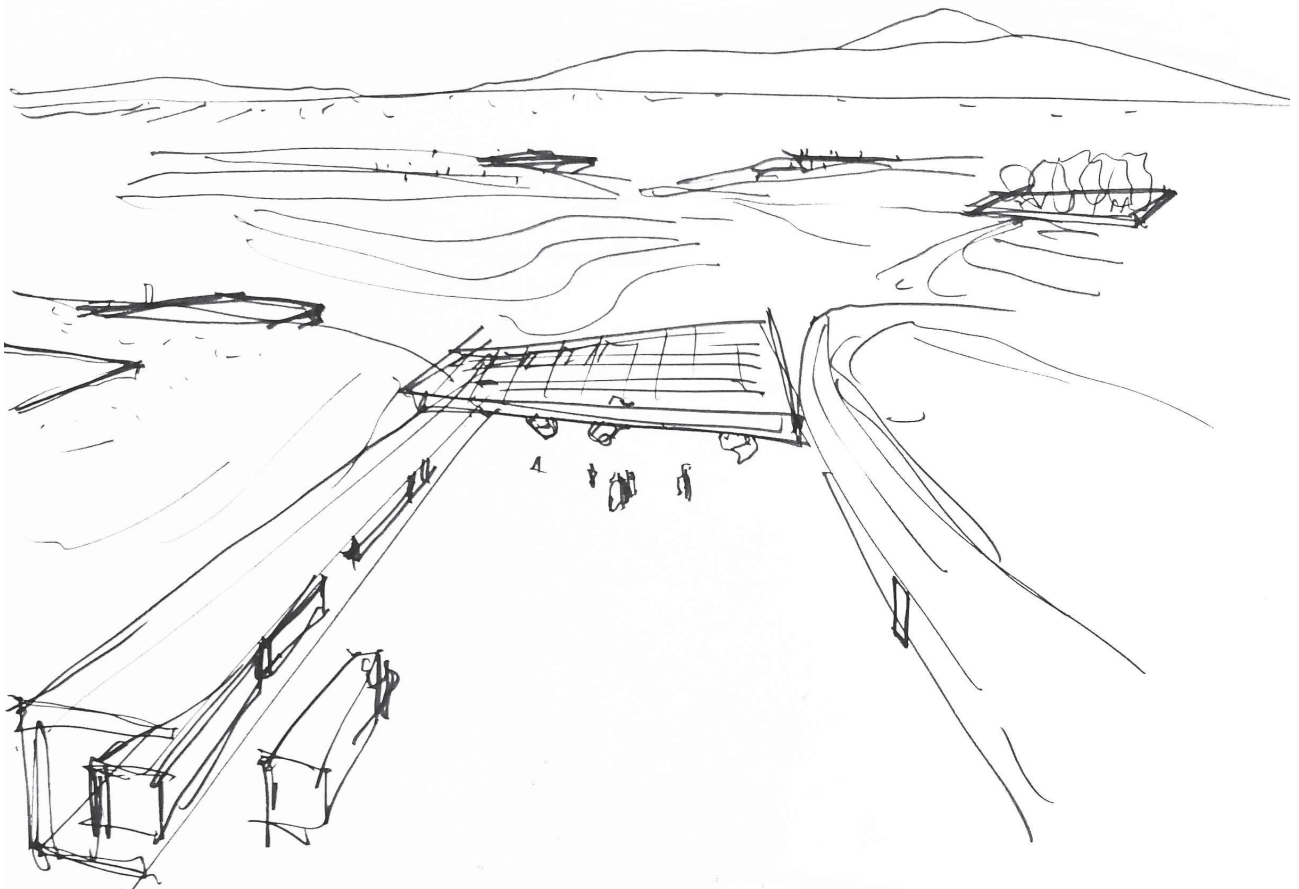
Map of the area



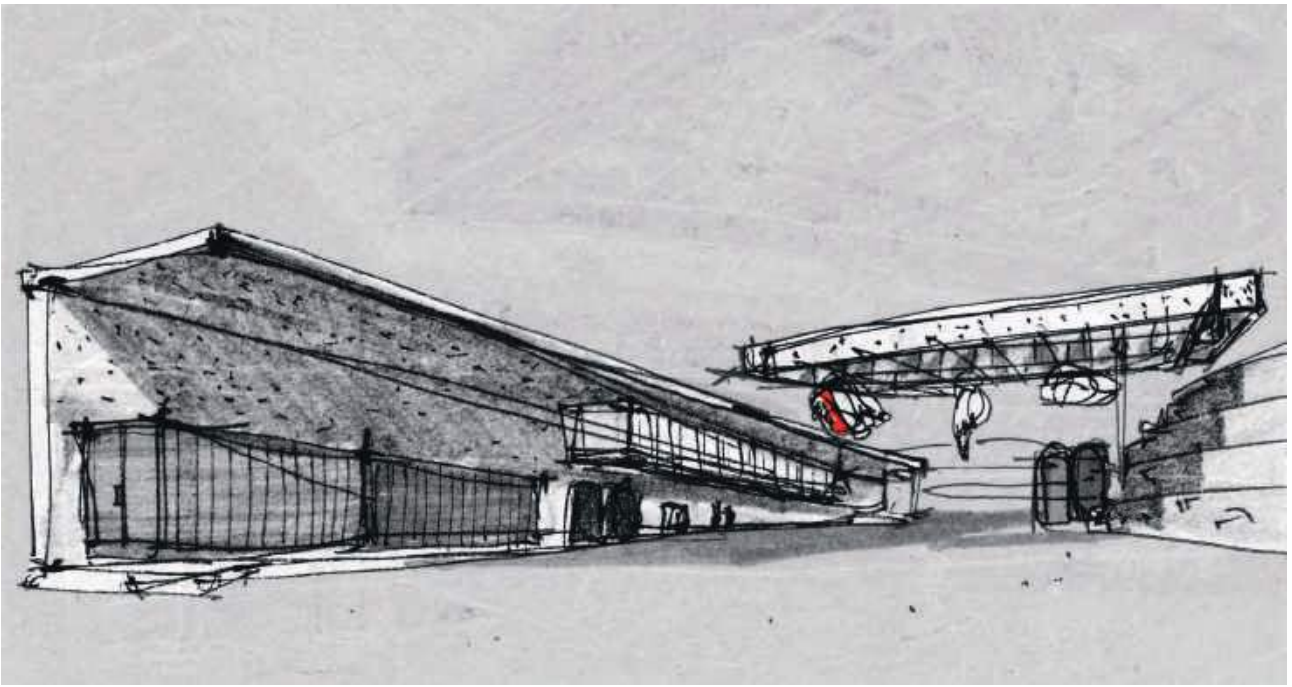
On the left: The Mausoleum of the Fosse Ardeatine (1945-1949), by N. Aprile, C. Calcaprina, A. Cardelli, M. Fiorentino, F. Coccia, G. Perugini and M. Basaldella. On the right: Constellation of big scale objects in the south part of Rome (sketch by S. Antoniadis, 2019)



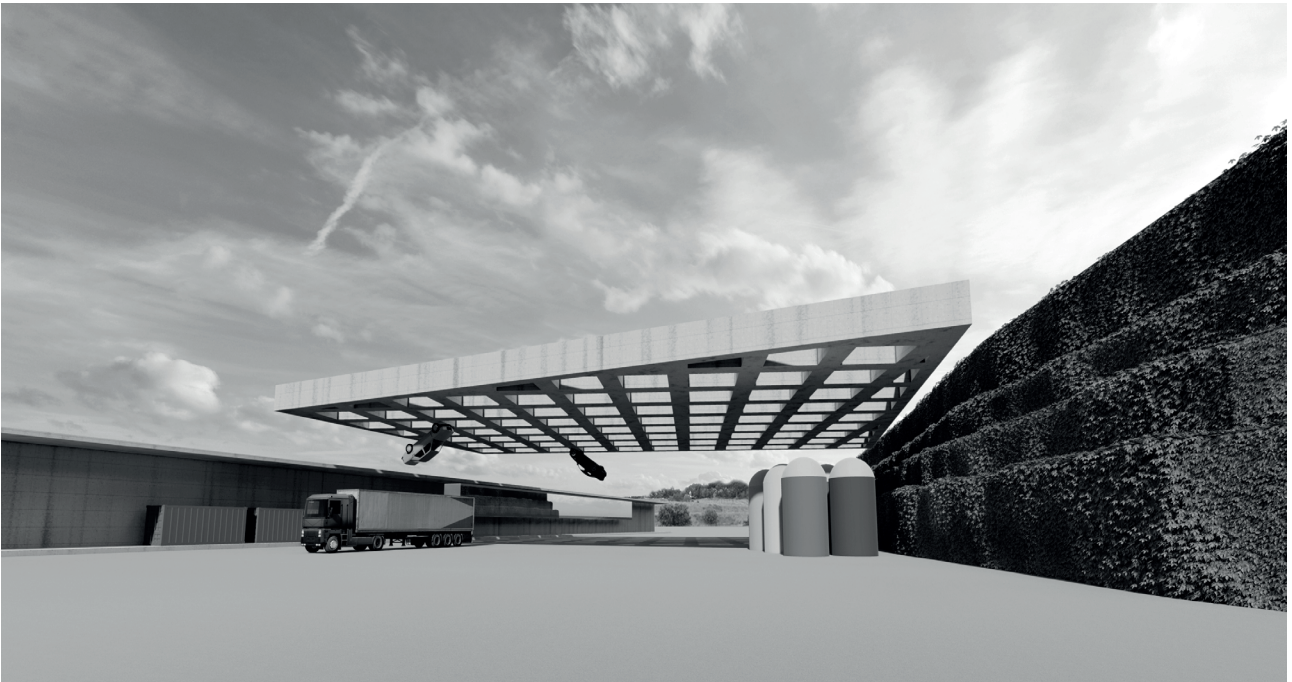
Architectural model



View of the landscape (sketch by S. Antoniadis, 2019)



View of the access area and the ribbed concrete slab (sketch by S. Antoniadis, 2019)



Architectural rendering (figure by G. Bellussi, 2019)

CASE STUDY 2: THE SERDIANA LANDFILL / ECOSERDIANA SPA

Proposer: Ecoserdiana Spa

Location: Serdiana, Cagliari, Italy

Area: approx. 10 hectares

Type of plant: Non-hazardous special waste landfill

Tutor: Elena Cossu (Arcoplan Associates)

Working group: Salvatore Colombo, Alessandro Forte, Andrea Giacomini, Danai Ilyadu, Antonio B. Montero, Luca Pia

The Serdiana landfill, managed by Ecoserdiana Spa, is a non-hazardous special waste landfill located in the Municipality of Cagliari, Italy. The area features an undulating morphology due to the alternating presence of flat areas

and hills. The physical location of the landfill was identified by the Municipal Authorities in Serdiana due to the presence on site of a sandstone quarry.

The landfill is comprised of 6 modules that have developed over time, only one of which is currently operational, and occupies a total surface area of approx. 10 hectares. The operative module has a raised banking and leans against two decommissioned landfill modules for non-hazardous special wastes and Municipal solid wastes. Some modules are currently in the post-operational phase.

The proposing body has shown interest in undertaking environmental requalification and landscaping of the area not limited to greening of the site, but also providing for re-use of the same.



View of the existing landfill

2 / THE PROPOSED CONCEPT

The proposal originated from a preliminary analysis of elements relating to a territorial, social and landscape context, as well as to the cultural vocations of the territory, whilst taking into account valorisation of the site with regard to its potential scientific value as a landfill and to the possibility of positively exploiting several of its features.

The proposal, consisting in a network of thematic itineraries that intersect both within and external to the site, was conceived for the purpose of rendering the site the barycentre of an extensive multifunctional system. The landfill therefore is seen as an opportunity to experience and benefit from an apparently scarcely characterised area.

A series of potential thematic itineraries have been identified based on the pinpointing of singular features present throughout the territory indicated for a potential interconnection with the landfill system (see map).

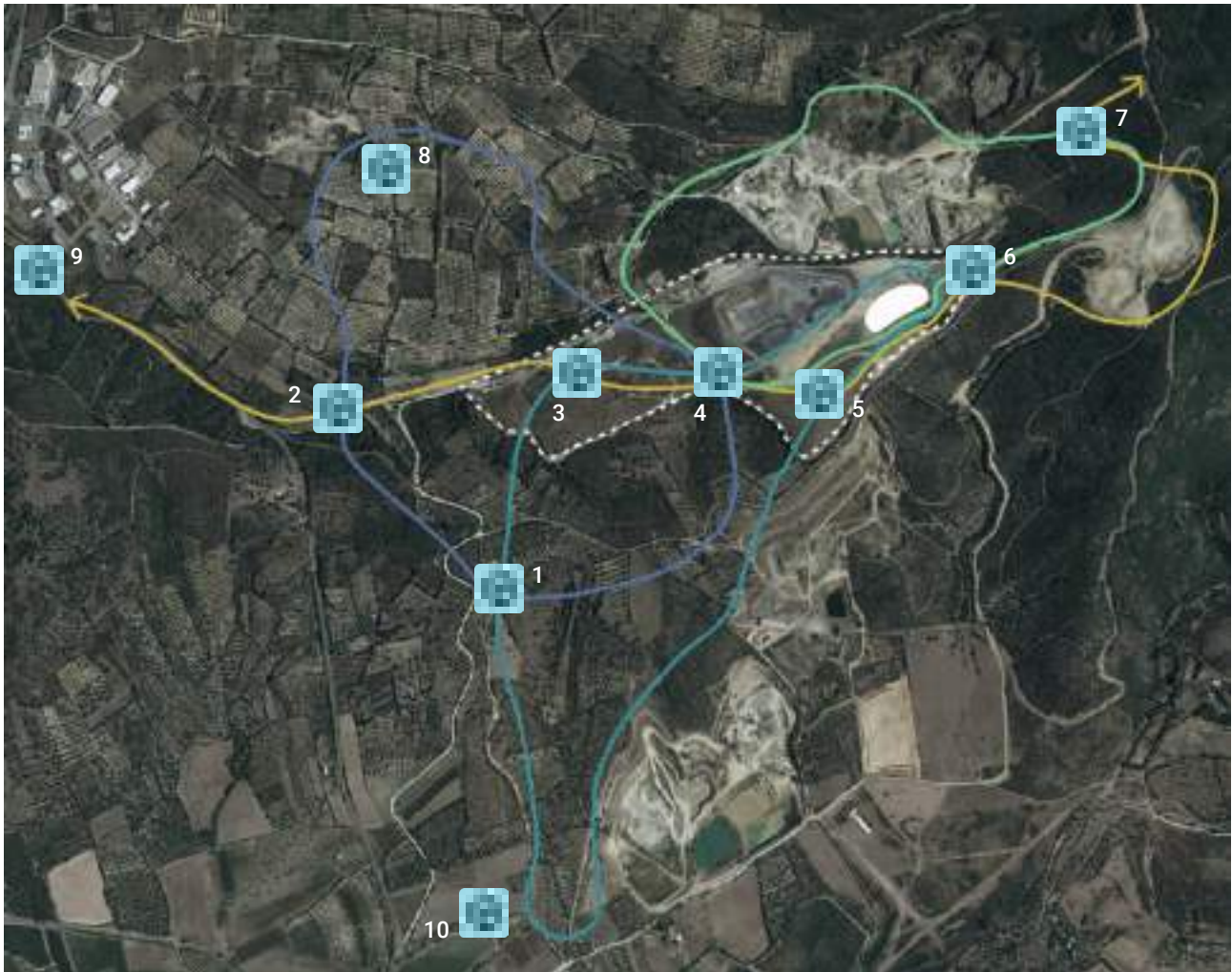
Each itinerary has been defined as a series of milestones to be reached focused on recreational, socio-cultural and educational aims and on fostering environmental awareness. The intersecting points will act as a link for the multi-itinerary system, i.e. strategic stages along the itinerary to be marked with an architectural feature. The presence of these links has been physically marked by means of a very sim-

ple construction, which is however clearly recognisable on the landscape, even from a distance: a cube. Indeed, these constructions feature a regular, modular and interlocking (both vertically and horizontally) form that may be adapted for diverse uses according to the functional requirements. Subsequently, a specific use of the cube as a multifunctional container at all intersecting points was envisaged: managed as a system of facets, of filled and empty spaces, the cube is declined in all its possible configurations. As a greenhouse, a charging point for e-bikes, a birdwatching tower, and a wine-tasting area, the cube becomes the lynchpin of the system, heralding the presence on the landscape of a "diffuse project". The use of materials and colours will need to conform to a degree of homogeneity to allow the "cube stations" distributed throughout the territory to be interpreted as elements of the same system, both when located within the landfill site and when located externally. Use of transparent materials, wood surfaces, green surfaces and recovered materials may be envisaged. The possibility of turning a few of these "cube stations" into interactive totems all linked up by smart applications, and illuminating them during the hours of darkness, charging and heating them using diverse forms of energy (solar panels, wind power, waste heat recovery from biogas engines,

etc...) will add to the appeal of the potential applications of this concept.

A project of this nature will foster the development of important synergies on multiple levels, embarking the entrepreneurial entities present on the territory on a course

aimed at raising competition territorially from a point of view of the economy, society and the environment. Particular emphasis will be placed on the elaboration of a model that can be replicated and adapted to fit into any type of context.



cube stations

--- landfill site

— biodiversity itinerary

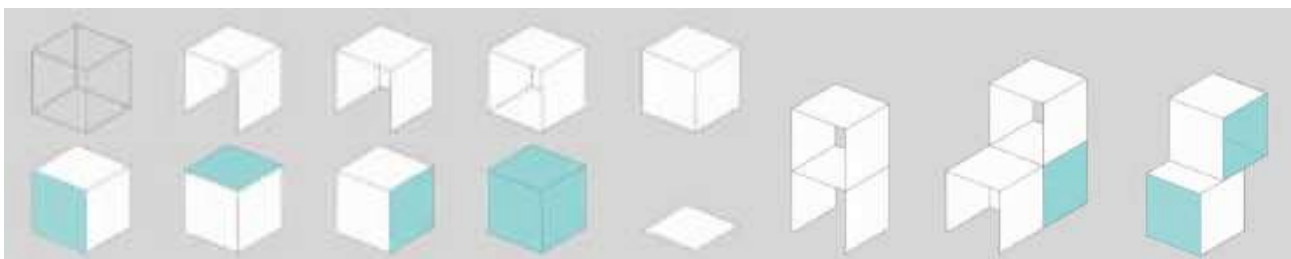
— green energies itinerary

— wine itinerary

— hiking / e bike / sport itinerary

- 1 greenhouse
- 2 food education
- 3 bike station
- 4 greenhouse
- 5 segway station
- 6 bird watching tower
- 7 refreshment area
- 8 taste area
- 9 sport station
- 10 gravel crushing

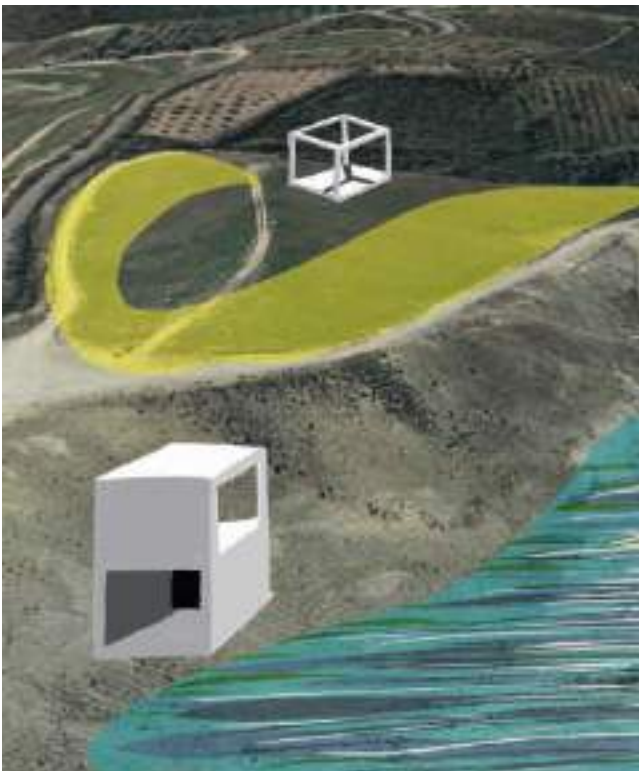
Map of the area: itineraries and cube stations (figure by E. Cossu)



Possible configurations of the cube stations (figure by A. Artuso).



View of the landscape (figure by A.B. Montero, 2019)



Details (figure by A.B. Montero, 2019)

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