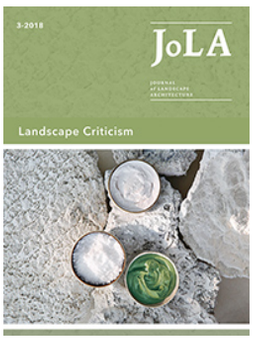

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Renewed landscapes: Obsolete airfields as landscape reserves for adaptive reuse

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Abstract

Over the past century, the world has built thousands of airports and airfields, which has had a significant impact on the landscape. Given the history of the rapid growth of air travel, but also due to the expansion of cities, many airports have become obsolete. Many have been abandoned, either because they are too small, in the wrong place, or because of the functional obsolescence of the structures. Landscape architects have engaged in the transformation of airports, mitigating and remediating the adverse environmental impacts as well as designing new landscapes. This article explores relevant projects that conceive airfields as renewed landscapes through four strategies: transform, recycle, regenerate, and on-hold. These operative strategies could help to reimagine and redesign the redevelopment of airport sites with a diverse range of scenarios.

Airports on-hold / airport landscape / infrastructure lifecycle / adaptive reuse

Airfields have fascinated and influenced landscape architects and urban designers alike since the beginning of aviation. They have had significant effects on the transformation of urban and natural landscapes, generally considered hubs, gateways, frontiers, squares, infrastructure, and social and cultural places. Rarely have they been considered landscapes. Even more rarely has the phase of obsolescence and decommissioning been considered an opportunity to create new productive landscapes. However, airfields are not just engineering projects and architectural objects, but more complex urban ecologies with significant environmental implications. These fields have already given designers, city governments, and developers new and, until now, unforeseen opportunities, providing grounds for new landscapes.[1]

At the global level, more than half of national airports are at risk of closure or have an uncertain future. In the United States alone, there are nearly 20,000 airports in public, private, and military use (Fig. 1). Over 1,000 of these are currently abandoned, and there are at least 281 unclassified airports with no clearly defined function.[2] In Europe, there are around 2,000 airports. Among these, almost 750 are abandoned, on-hold, or underutilized. This is a significant issue, however not yet widely reported except in specific projects in North America and Europe (Fig. 2). The selection of cases proposed by this contribution furthers the general understanding of how to reuse and convert airports after, or even before, their closure. Obsolete airports become problematic in terms of wasted land, urban contamination, and economic loss for many mayors and owners who, generally, do not find a real benefit in optimizing scheduled flights or improving the technical and physical characteristics of underused airports. Within this framework, landscape architects have reasserted their historical interest in the airfield as a site of design through a range of practices that most often involve biological and ecological strategies for dealing with the management of the airport.[3] The economic centrality, environmental impact, and cultural relevance of airports, as well as their abandonment, have provided landscape architecture with new territories and opportunities to be explored.

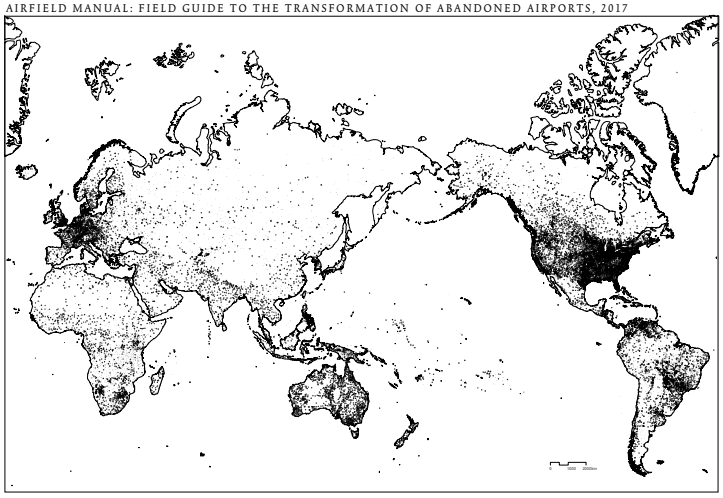

Figure 1 Airfields
Map of the 48,556 total airfields in the world.

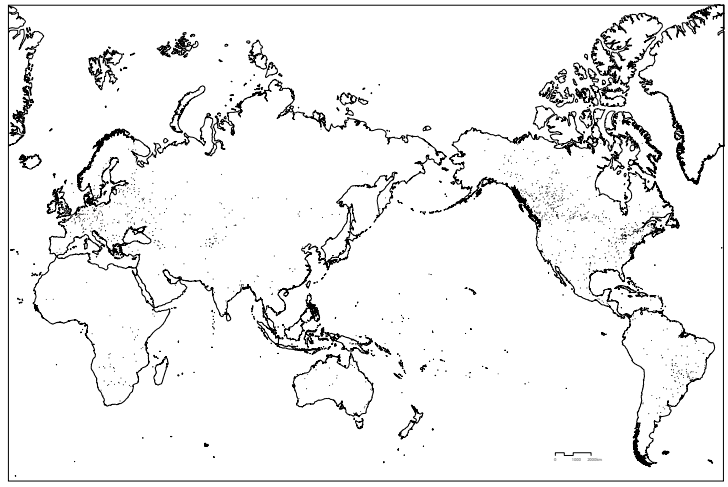

Figure 2 Decommissioned Airports
Map of the 1,786 decommissioned airfields in the world.

Sources: ESRI, http://ourairports.com, www.airfields-freeman.com, www.forgottenairfields.com. Projection: WGS 1984 PDC Mercator.

Airfield genetics

The combination of centrality, emptiness, environmental contamination, and economic capability makes airfields exceptional case studies from a landscape perspective. Generally, a growing population, a high demand for new dwellings and the sites' physical centrality in the city simplify their reconversion into new urban developments and urban parks. The conversion of an abandoned airfield is not just a matter of simple engineering or solely an architectural project, but rather a complex design process within a more coherent and interdisciplinary framework. Most often it is a mechanism that also makes it possible to plan for the ecological function of the site over time, by thinking about what is outside the airfield and what is at the airport, in relation to each other. The landscape approach then allows for the definition and planning of a new type of airfield, in which its entire lifespan, including its decommissioning, is seen as one long lifecycle (Fig. 3).

Looking at the examples of former airport-site conversions, it is possible to define four intervention typologies. In the first type the airport is completely renovated and replaced with some combination of public park and housing and a new urban form, as in Denver (Stapleton Redevelopment). The second type comprises all those places that are redesigned through natural processes, as in Frankfurt am Main (Maurice Rose Airfield). The third is where the airport is partially converted, while other parts are simply left intact, as in Berlin (Tempelhofer Feld). However, the process for the closure and the consequential transformation of an underutilized airfield is not obvious, and it might take several years before choosing to definitely deactivate an airport. In these cases, the fourth type of intervention is to take time and hold ground, as in Catalonia (Lleida-Alguaire Airport). Very often, in fact, airport owners do not see the option of demolishing the infrastructure as the most convenient alternative. Other potential alternatives may be introduced that can generate unexpected uses and, in the meantime, airports can be kept as reserves with gradual transformations into new places and productive landscapes through adaptive reuse. On the one hand, these selected projects clearly demonstrate that the conversion of obsolete and decommissioned airfields can be an effective lever for urban, social, economic, and environmental redevelopment programmes. On the other, such experiences also highlight the resulting deleterious political, social, and environmental impacts if they are kept, abandoned, and underutilized over time. Airfields can therefore be considered as landscape reserves, owing to their capability to be turned back into landscape and to generate a new productive landscape.

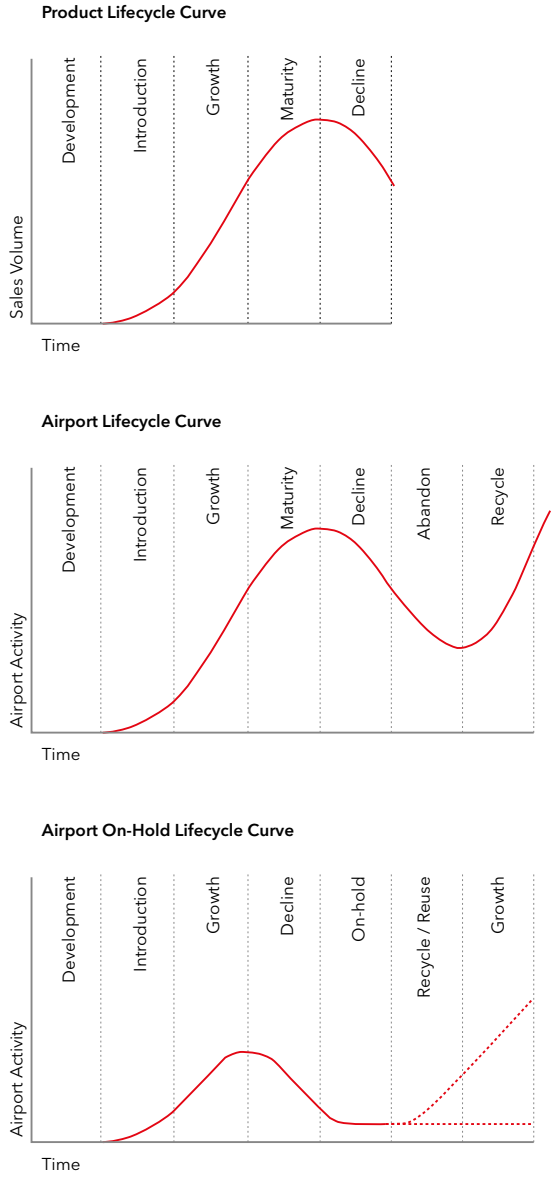

Figure 3 a,b,c Airport Life Cycle Diagrams. Comparisons between product lifecycle, airport lifecycle, and on-hold airport lifecycle.

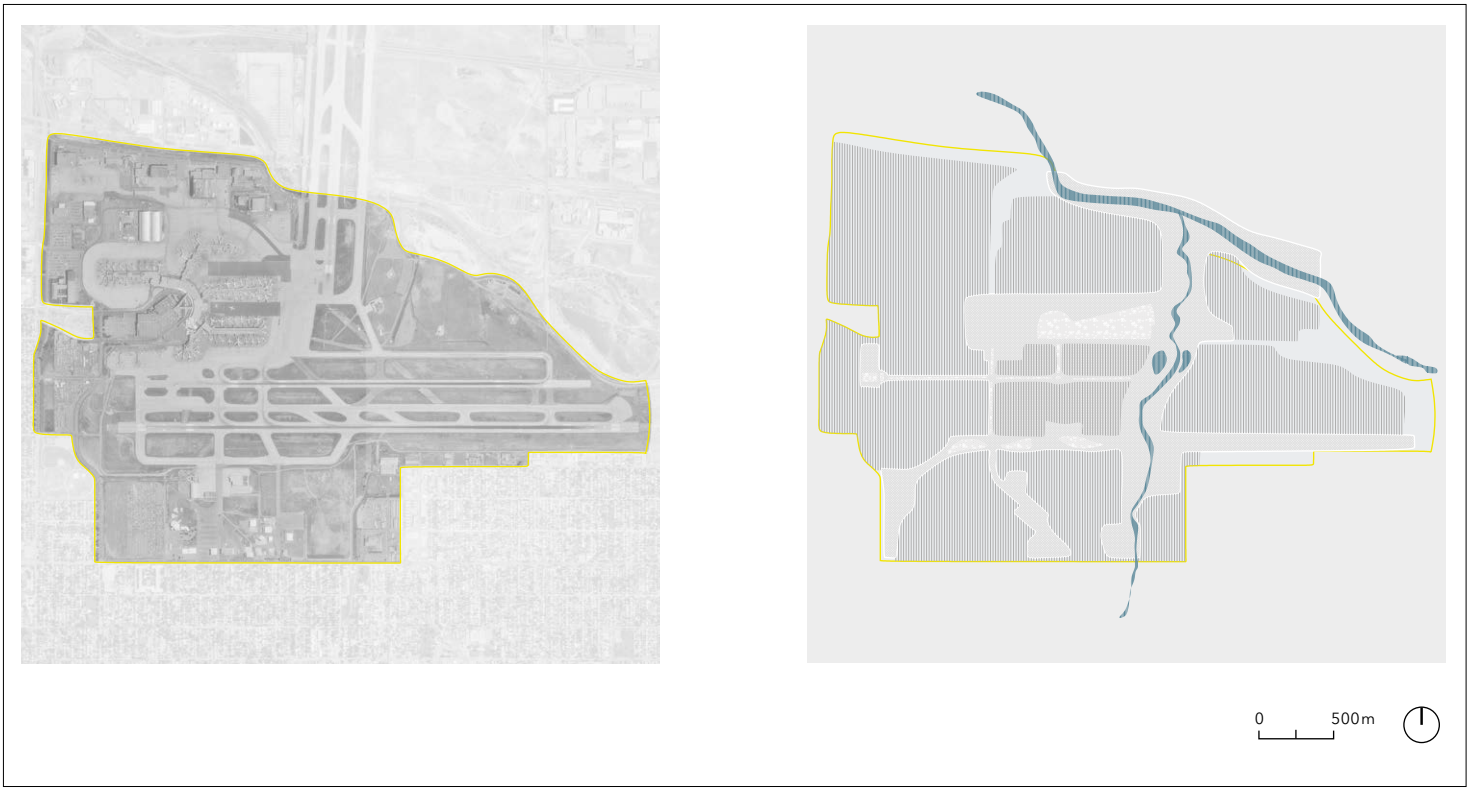

Figure 4 Comparison between Stapleton International Airport and Stapleton Redevelopment, AECOM, et al., 1997. The original airport has an area of 596 ha; pervious surface: 221 ha; impervious surface: 375 ha; runway length: 5.8 km; perimeter: 12 km. Stapleton Redevelopment has an area of 619 ha; open area: 247 ha; built area: 372 ha; water area: 20 ha; perimeter: 12 km.

Transform: Stapleton Redevelopment, Denver

Growing populations and a high demand for new housing cause many obsolete airports to be redeveloped as a new part of the city. This is a trend that characterized the 1990s, when the process generally started with the transformation of the air connection infrastructure (runway and technical streets) into roads and streets and continued the new urban development with housing, public services, and commercial and business areas. The addition of public urban parks has added value to the gradual renovation of existing structures and to new urban development areas. This kind of development is extremely well connected to nearby cities, but very often the memory of the airport is almost completely removed. This happened in Denver (Fig. 4), where the site of the old airport was transformed into a shiny, new neighbourhood with loads of open space and trails (Fig. 5). Stapleton Airfield was opened on 17 October 1929 as Denver Municipal Airport, changing its name after a 1944 expansion. By the 1980s, plans were underway to replace Stapleton Airfield with a new airport, owing to a number of problems concerning inadequate physical and technical structures for flights, noise, and pollution. Meanwhile, the new Denver International Airport (DIA) officially opened in north-eastern Denver. The runways at Stapleton were marked with large yellow 'Xs', indicating that it was no longer legal or safe for any aircraft to land there. While Denver International was being built, planners began to consider how the Stapleton site could be redeveloped. The former airport site (4,700 acres/1,900 ha) was redeveloped by Forest City Enterprises. In 2001, the construction of single-family houses, row houses, and condominiums began. Despite the fifteen-minute driving distance from Denver, the master plan, designed in 1995, emphasized a pedestrian-oriented design rather than an automobile-oriented design, most common in suburban development in the late 1900s. In Stapleton, housing, shops, and restaurants are conveniently located so residents do not need to leave the area. The new community is zoned for residential and commercial development, including lofts, townhouses, single-family houses, and mini-mansions in a variety of architectural styles. Even though nearly a third of the airport's site has been redeveloped as public park space (Fig. 6), the project reveals itself as a big real estate operation, with the removal of all traces of the former airport. Here the airfield has been treated like any other abandoned place, erasing its physical characteristics and creating a new urban development.

DEEPAQUA@FLICKR, 2017

Figure 5 In the Stapleton Redevelopment, the airfield has been reimagined as a series of streetscapes and greenways. The urban expansion aimed to be economically, socially, and environmentally sustainable and maintain close connections to the existing infrastructure and urban fabric of the city centre. The control tower is preserved as a landmark in the midst of the new urban neighbourhood.

RERUNCO@FLICKR, 2013

Figure 6 In Denver, the contamination clean-up efforts have made the site a landmark of brownfield redevelopment. On the other hand, the stormwater treatment system formed a fundamental aspect of the community's spatial organization. The system collects water from individual parcels of land and extends over a network connecting parks and open spaces.

Figure 7 Comparison between Maurice Rose Airfield before and after its transformation. The original airport has an area of 12 ha; pervious surface: 8 ha; impervious surface: 4 ha; runway length: 1 km; perimeter: 2 km. The new park has an area of 28 ha; open area: 22 ha; built area: 3 ha; water area: 7 ha; perimeter: 2.7 km.

Recycle: Maurice Rose Airfield, Frankfurt am Main

The renewal process of an airfield very often takes into account the original characteristics of the airport, highlighting particularities of the former airfield, whether technical or geographical, and transforming it into a landmark for a new landscape. This process is not exhausted with the total assimilation of the infrastructure into the city. After the transformation and reactivation, the airport presents physical traces of its former self and of the presence of its previous life and former activity, as in Frankfurt am Main (Fig. 7). This project shows an extraordinary conversion of a field, formerly used by the US Armed Forces. The project retains the signs of the airport's activities through the re-elaboration and reinterpretation of the concrete and asphalt into urban parks and an ecological environment. After the end of the Second World War, the US Army opened an aerodrome, which was provisionally named after General Maurice Rose. In 1994, the US Army ceased to use the airfield. After closing down, the Maurice Rose Airfield seemed to remain as a relic of the Cold War, like a foreign substance in the near-natural floodplains of the Nidda River. The buildings were occupied by Werkstatt Frankfurt e.V., an association working to find jobs for the long-term unemployed. The surrounding land was unused and neglected until, slowly and spontaneously, new users from the city discovered that the runway had considerable appeal. In 2003, after acquiring the old aerodrome property, the Frankfurt City Council opted for a subtle intervention. The literal restitution of the old riverside fields seemed, however, to be an anachronistic operation and, paradoxically, one that was not very sustainable. Demolishing and totally dismantling the installations would have meant a costly operation, so a less unwieldy project was chosen, with the aim of facilitating the transition towards a more natural state while also making the most of popular support and, to some extent, conserving the historical connotations of the place. The 4.5 ha of asphalted surface, set in an ideal environment and, in particular, well away from traffic, offered the perfect setting for bicycle riding, roller-skating, and skateboarding. The auxiliary pavilions were also conserved, and they still function as Werkstatt Frankfurt e.V. workshops. A café was opened in the control tower, offering spectacular views over the Nidda River and surrounding fields. The new park grounds were incorporated into Frankfurt's green belt. The design of the airport offers a new approach to creating a public park in which the history of military use can still be experienced. The concrete and asphalt relics have generated an interesting plant mosaic.[4] In fact, the design's basic idea was to modify the original airfield and its materiality gently enough to enable the military character of the area to build a new sense of unity with the surrounding nature. The project is considered an exercise with respect for and enhancement of the past activity of the area: with minimal economic investment, the recycle project consolidated the natural character of the space. Simultaneously, the former airfield was opened to the public for recreational outdoor use. The intervention preserved intact one third of the runway, thus keeping 1.5 ha of hard, flat surface that can be used for biking, skating, etc. (Fig. 8). The

Figure 8 The playground. The transformation of the Maurice Rose Airfield into a natural park and playground areas. The hardscape of the former runway is used for a variety of outdoor activities like roller-skating, cycling, and picnicking.

former airport has been designated as an archaeological site to be renewed and reinterpreted. This design approach was established based on the specificities of the airfield, showing in new ways the fusion of landscape and the urban with the help of an ecological approach (Fig. 9). The site was engineered to reduce biological and hydrological processes. The designers interpreted the open spaces of the airfield as blank slates for topographic and hydrological invention and intervention. Cut and fill, insertions and landforms were prominent on this airport site and were used in connection with the recovery of streams and ponds, the restoration of wildlife habitat and the implementation of extensive water systems that generate a new topography. The positive effects of this renewal process on the territory offer an increased availability of landscape and places for recreational activities, the implementation of alternative mobility with its integration into the regional bicycle network, and, consequentially, the activation of socioeconomic growth in the surrounding area.

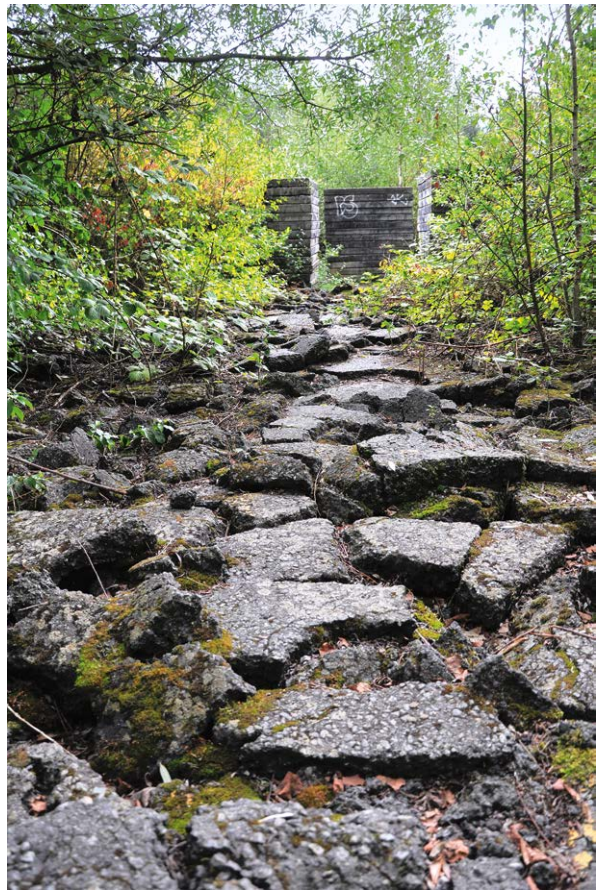

Figure 9 Asphalt and nature. At Maurice Rose Airfield, nature and man-made structures have entered into a reciprocal relationship. Half of the existing concrete was demolished, fractionated and rebuilt into elements of different sizes (from 10-m² concrete blocks to fine gravel), thus creating a wide range of habitat conditions, from wet to nutrient-friendly.

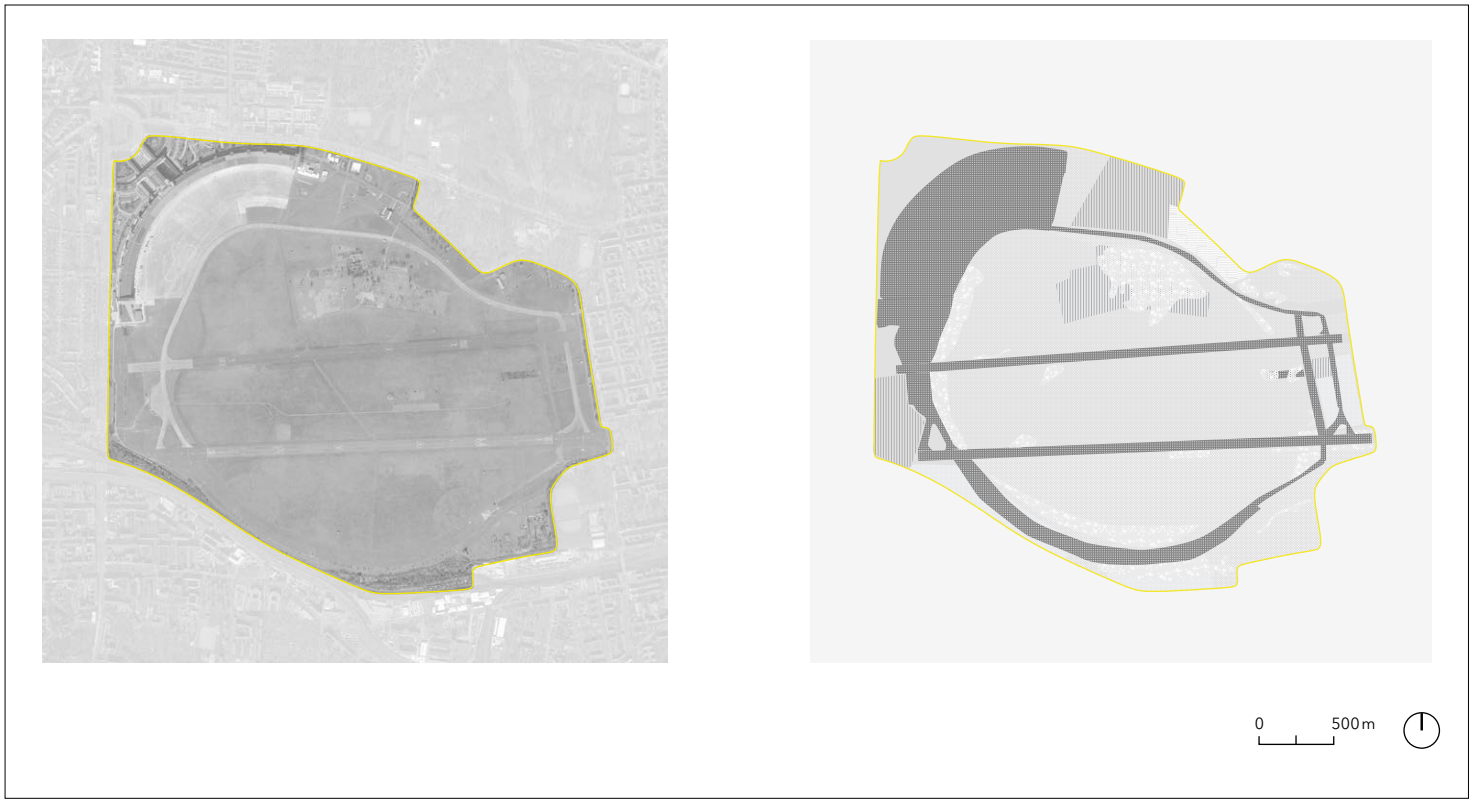

Figure 10 Comparison between Berlin Tempelhof Airport and Tempelhofer Feld, 2010. The original airport had an area of 368 ha; pervious surface: 248 ha; impervious surface: 120 ha; runway length: 4.25 km; perimeter: 7.7 km. Tempelhofer Feld has an area of 303 ha and the approximately 260 ha of open areas are devoted to outdoor living rooms, event areas, community gardens, sport areas, garden exhibitions.

Regenerate: Tempelhof Airport, Berlin

The conversion of former airports into parks and land for city expansion has provided designers with the opportunity to experiment with new models of urban development and, in the public realm, to engage citizens in the shaping of the urban landscape. In Berlin (Fig. 10), a form of temporary urbanism is being practised wherein citizens are invited to propose provisional uses for determined plots. The airport has been engulfed by the city and naturally transformed into Tempelhofer Feld: today it is a new productive field, a contemporary urban square, and the largest open public space in the city. Berlin's Tempelhof Airport, often called the City Airport, ceased operations in 2008 during the process of establishing Schönefeld as the main commercial airport in Berlin. During its post-airport usage, it has hosted numerous fairs and events. It is not often that a European metropolis that is hundreds of years old has the opportunity to create a massive new public park in its central area. But that is exactly what the German capital of Berlin intended to do with the former Tempelhof Airport. In the two years after the runway went silent and the enormous terminal was shut down, the stream of proposals for transforming the airfield into a public space illustrated the riches of the city's creativity. Most of the plans that made the final round of the competition utilized the existing layout of the airport: one of the preconditions for the landscape designers was that they retain the runways and other historical features, including the terminal. The site was officially reopened in May 2010 as a city park, and today more than 2,000,000 Berliners a year are visiting the park to enjoy its wide-open spaces for recreation, ranging from biking and skating to baseball and kiting. Despite city officials wanting to use about a third of the land for housing because of Berlin's growing population, citizens claimed the former airport as a public space and urban park. On 25 May 2014, more than half of the voters backed a referendum to preserve the airport as a leisure space. In this way, Berliners blocked plans to develop a big part of the former Tempelhof Airport. The minimal intervention of the park highlights the basic idea to modify the original airfield and its materiality gently, so that the landscape heritage and the memories of past activities could be consolidated in the natural character of the space (Fig. 11). The regeneration of the former airfield started by opening the space to the public for recreational outdoor use and preserving the runway as a flat surface that can still be used as a biking, skating, kiting, etc. surface, maintaining the biological dynamics that have emerged in recent decades as a natural and spontaneous process (Fig. 12).

Figure 11 Tempelhofer Feld is now the largest open public space in Berlin. It offers a variety of activities such as productive fields, urban gardening, and outdoor pastimes ranging from biking and skating to baseball and kiting.

OLIVER KLEINSCHMIDT

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Figure 12 In Berlin, no remediation was proposed. It was determined that, despite the presence of contaminated soils, air quality was not affected by the ground contaminants and the site posed no danger to visitors.

Figure 13 Lleida-Alguaire Airport site plan. The airport has an area of 245 ha; pervious surface: 210 ha; impervious surface: 35 ha; runway length: 2.5 km; perimeter: 8 km.

On-hold: Lleida-Alguaire Airport, Catalonia

The transition from one cycle to another may allow for several possibilities that prepare an airfield for future transformations. Often, informal activities have reactivated a site by refocusing attention on it. In other cases, the aviation activities can be temporarily interrupted and substituted with alternative uses that are more beneficial to the surrounding area. This is the approach adopted for the revitalization of the regional airport in Catalonia (Fig. 13), where the airfield has been considered a latent public space—a generator of social relations and ecological devices—able to offer temporary and multifunctional services. The aviation activities at Lleida-Alguaire Airport began on 5 February 2010. One year later, none of the carrier companies had managed to maintain their flight activities at the airport. The village of Alguaire—with a small population of 3,000 inhabitants, located 15 km from Lleida—had been chosen, out of twenty other candidates, by the government to host the airfield. After twenty-three years of debate about its location, the airport was constructed. The new facility was supposed to attract Barcelona airport's surplus traffic and was configured as a key piece of infrastructure with which to promote and stimulate the economy and the development of the province of Lleida, the region of the Pyrenees, and Andorra. It was predicted that the presence of the airfield would increase tourism and the economic growth of the region. This never happened, and it is now clear that the entire endeavour had been miscalculated. In this situation a high-quality team, headed by Fermín Vázquez (b720 Architects), was chosen to provide a unique design and a recognizable building, responding to the programme of requirements with a sophisticated exercise of integration. The airport finds a balance in the environment by avoiding looking like a strange structure that has landed in the countryside, while at the same time not losing its character as a landmark reference (Fig. 14). The unquestionable architectural quality of the building, its integration in the physical context and the smart ecological and sustainable systems allow it to become an outstanding pole of operations in the territory. The renewal process makes use of the on-hold phase of the airfield by embedding a temporary service for local communities in it that can also be carried on simultaneously with aviation activities. The site has shifted into a productive and natural ecosystem in which local farmers take advantage of the immense grasslands and fields. In return, a flock of sheep has become an ecological device for the management of the buffer areas by controlling the growth of the grass (Fig. 15). This case shows how the combination of aviation use and local productive functions is a viable option. The potentiality of on-hold airports is that they generate the opportunity to activate a new lifecycle by anticipating the decline phase. This condition also introduces the possibility of a return of aviation activities in the future. Even if the commingling of transport and urban functions is rare, because the strength of one is usually the weakness of the other, the on-hold state makes this combination possible by converting weak aspects of the transition into strengths for the site.

Figure 14 The main envelope is conceived as a continuous blanket covering the most visible faces of the building to give formal unity to the whole and consolidate its presence into the context. The cover has vegetal layers combined with strips of wood and veneer that emulate the vegetable-farming plot environment, and also act as a thermal barrier.

ENRIC SERES, LLEIDA-ALGUAIRE, 2012

Figure 15 During the nightly cessation of flight activities at Lleida-Alguaire Airport, the airfield is used by local farmers to graze flocks of sheep.

Airfields as landscape reserves

The recognition that many airport facilities will become obsolete in the foreseeable future has brought our attention to the significant dimension of the issue and to successful strategies and compelling cases of airfield reconversion around the world. Airfields have been recognized as landscape reserves due to their capacity to return to the landscape and in fact generate a new productive landscapes. Many of them have served other functions, and many have begun new lifecycles that generate new trade within the cities, landscapes, and territories they serve. The main challenge for landscape architects—at first—is to recover these sites that impede biological and hydrological processes by the way they have been built. Among the characteristics of airfields are their large size, openness, and horizontality, which offer landscape architects the convergence of unique site characteristics. The four strategies offer different options as well as operative actions with which to drive the reuse of airport sites, representing the four phases of the lifetime of the airport. A number of case studies attest to the possibility of *transforming* decommissioned airfields into sites of expanded urban districts. After being decommissioned, many former airport sites went through remediation and conversion processes, opening up the possibility to develop new urban neighbourhoods. This type of development involves the building-up of a district as a place of long-term occupation and value, whereby the physical presence of the previous infrastructure is almost completely deleted. This approach allows the transformation of abandoned airports to trigger urban and landscape-based processes. Airport transformation becomes an operative catalyst for other urban transformations by stimulating and intensifying an area's development.

To view the airfield as land that can be revived or renewed means to take under consideration its rhythms, lifecycles, and transformations. The *recycle* strategy stresses the idea of seeing the airport as an infrastructural archaeology, where the memories of the previous elements work as design opportunities and tools. These projects build on the natural and cultural heritage of the former airfield site to create a legacy. To activate this recycling process, airports must initiate new kinds of rhythms and life-cycles, assume alternative functions, and generate new trade and exchange with cities, landscapes, and territories. The layers of history are unearthed and used as tools to design and restore the sites. Gradually, these terrains can adapt into territorial nodes of ecological, touristic, and recreational activity. Many problematic airports cannot be utilized for urban expansion. These airports, which were once peripheral, have now been engulfed in the urban context, becoming physically central in the city. The subsequent availability of space constitutes a rare opportunity to *regenerate* a portion of the city. By taking under consideration changes in land use, improvements to mobility and connectivity, strengthening of infrastructures, the allocation of green public spaces, and environmental restoration, designers, developers, and officials can tap the potential of abandoned airport sites to recuperate urban landscapes and elevate the quality of life of current and future residents of the city.

The *on-hold* phase represents a transitional condition in which airports reveal latent patterns for new lifecycles where closure is not yet foreseen as the most suitable option. The process of the airport's transformation may require an extended period of gestation, preparation, and construction before it is achieved. During the periods of time between the airport's peak use, disuse, decommissioning, and transformation, owners must decide how to utilize their infrastructure in the meantime. This period of diversifying operations prepares the airfield for future transformation.

Landscape architects have engaged in the transformation of airfields, mitigating and remediating the adverse environmental impacts of aviation. Landscape is indeed an opportunity to address an airport's critical environmental issues and public health hazards. It is therefore necessary to foster interdisciplinary collaboration across local agencies and professional experts in a convergence of ecology, engineering, social policy, political processes, and urban design. All the strategies described above highlight different paths for renewed obsolete airfields to become 'places to live instead of places to leave' and to establish a stronger relationship between the new infrastructure and the surrounding territories. The sites accommodate multiple functions and users, adapting themselves and their efficiency in relation to the surrounding context and businesses, and fluxes (physical and immaterial) with the surrounding territory. The reconversion of these spaces often becomes an operative strategy for other urban transformations by activating processes of regeneration and growth, as well as increasing the availability of productive and renewed landscapes as places in which to live.

NOTES

1 See Sonja Dümpelmann and Charles Waldheim (eds.), *Airport Landscape: Urban Ecologies in the Aerial Age* (Cambridge, MA: Harvard Design Studies, 2016), 157.

2 Data obtained by national agencies, combined and implemented with Internet research. Information about the US gathered from the US Department of Transportation, Federal Aviation Administration, and Bureau of Transportation Statistics.

3 See the electronic publication *Airport Landscape Catalog* that accompanied the exhibition 'Airport Landscape' (Cambridge, MA: Harvard Graduate School of Design, 2014), 12, available at https://issuu.com/sienascarff/docs/airportlandscapecatalogfinal.

4 See GTL Gnüchtel Triebswetter Landschaftsarchitekten (2011), 'Old Airfield: Frankfurt am Main—Bonames, Germany', *Paisea: Revista de Paisajismo/Landscape Architecture Magazine*, 016/ March (2011), 28–31.

Figures 1, 2, 4 have been elaborated together with the "Airport Landscape" project research team of the Harvard Graduate School of Design's Office for Urbanization. Source: *Airfield Manual: Field Guide to the Transformation of Abandoned Airports*, 2017.

BIOGRAPHICAL NOTE

Sara Favargiotti, is an architect and an assistant professor of Landscape Architecture at the University of Trento / DICAM as well as a research affiliate at the Office for Urbanization, Harvard University GSD. She is specialized in landscape architecture and ecological design with a specific focus on emerging infrastructure and its influence on cities, landscapes, and territories. Her research and teaching focus on contemporary landscapes with a design approach based on transformation, adaptation, and anticipation. She graduated with distinction from the University of Genoa in 2009 and completed her PhD dissertation in Architectural and Urban Design at the IUAV Venice in 2014. She is the author of the book *Airports On-Hold: Towards Resilient Infrastructures* (LISt Lab, 2016), and co-author with Charles Waldheim of the book *Airfield Manual: A Field Guide to the Transformation of Abandoned Airports* (Harvard University GSD, 2017).

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