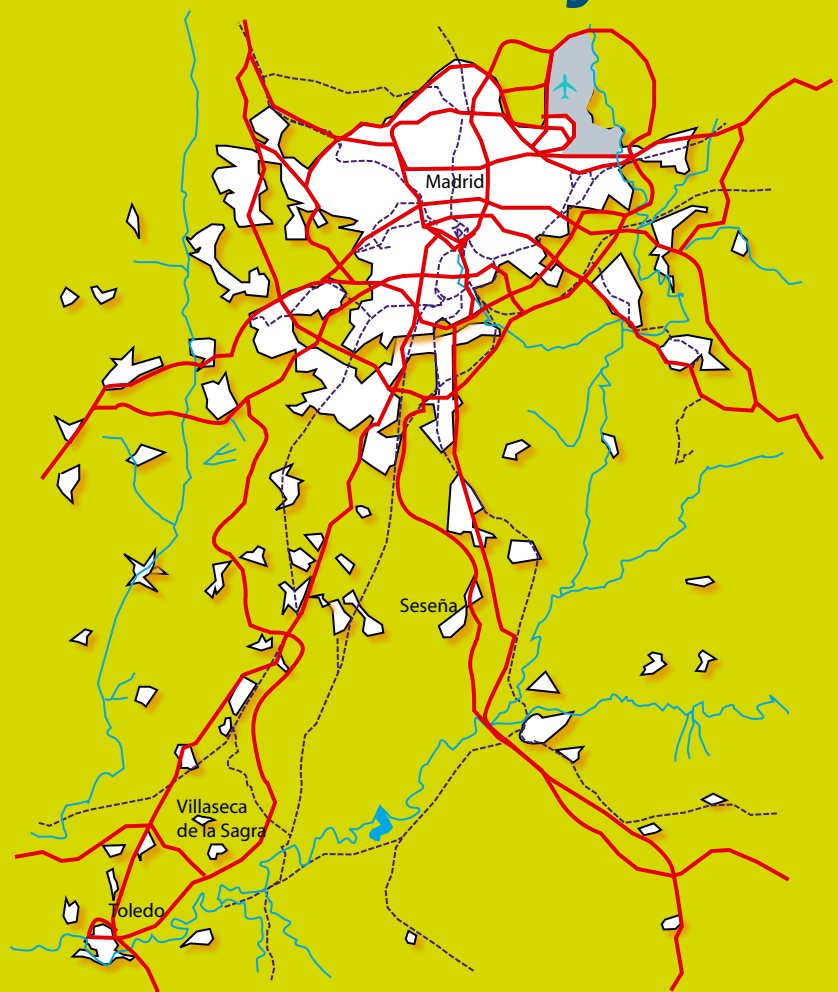


La Sagra – Territory and mobility in the 21st century

The La Sagra region in central Spain is set to grow due to increasing development pressure and rising house prices in the neighbouring Madrid region. La Sagra is ideally suited to become a showcase for a ‘city of cities’ form of polynuclear urban development based around existing and new road, rail and air transport infrastructures.



(illustration: Karin Dekker)

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The La Sagra region (1,100 km²) lies between the cities of Madrid and Toledo in the Autonomous Community of Castilla La Mancha. The Association of Municipalities of La Sagra Alta contains 13 historic centres. As a rural area located close to a metropolitan environment, La Sagra is experiencing growing pressure from the Madrid region and as a consequence is urbanising at a rapid pace. The question of how its infrastructure can keep up with the rate of urban development is becoming a key issue for municipalities in the area.

POPULATION GROWTH IN LA SAGRA

The population of La Sagra has increased significantly in recent years. This growth in residential and employment uses is largely the result of rising land prices in Madrid and the area directly to the south of the city, where prices have tripled in the last eight years. At present La Sagra still has a relatively small population, but its

generally flat landscape is highly suited to construction and growth is estimated to continue further in this zone. Local authorities are making plans to cope with this population growth. However, opinions differ on the amount of growth that is to be expected: in 2020 the population may be from two to four times its present size. This range covers the outcomes of three scenarios based on annual average growth rates of 6%, 8% and 9.4%.

Which of these scenarios will eventually take place depends predominantly on two factors: the trend in population growth in the central zone of Spain is expected to increase and the area's ability to link into the transport infrastructure to be developed in the zone south of the economic powerhouse of Madrid.

Table 1 shows the estimated population growth in La Sagra under each of the three scenarios, compared with the neighbouring regions of Toledo, Madrid and the southern region of the Autonomous



	2007	2010	2015	2020	%
Madrid city	3,100,000	3,200,000	3,250,000	3,300,000	0.50%
Southern Madrid region	190,000	220,000	240,000	250,000	2.20%
La Sagra – low growth	–	180,000	240,000	300,000	6.00%
medium growth	140,000	200,000	280,000	380,000	8.00%
high growth model	–	220,000	320,000	450,000	9.50%
Toledo	75,000	110,000	125,000	140,000	5.00%

Community of Madrid (municipalities of Getafe, Navalcarnero and Aranjuez). Despite the differences between the three growth models, in all projected cases the area of La Sagra experiences the strongest growth. Compared to Toledo and especially to the saturated Madrid region, the annual percentage growth rate in La Sagra will be remarkably high.

With the fast population growth in La Sagra, and the fact that most economic activities are at present situated in the Madrid region, a large impact on the transportation system is to be expected, such as increased commuter traffic. In order to understand these implications and investigate possible solutions, we first focus on the present road, rail and air transport networks. The challenges that these networks face are then interpreted as an opportunity for integrated transportation planning.

PRIMARY TRANSPORT NETWORKS

Conditioned by the demands of the Madrid region, the transport infrastructure in Spain’s central zone is generally good. Historically, the former capital of Toledo and the (then) provincial town of Madrid, were well connected. At present their roles are reversed: the bipolar Toledo-Madrid system has been transformed into a system with one primary centre, Madrid, leaving Toledo as just one of the historic municipalities in the surrounding region. Administratively,

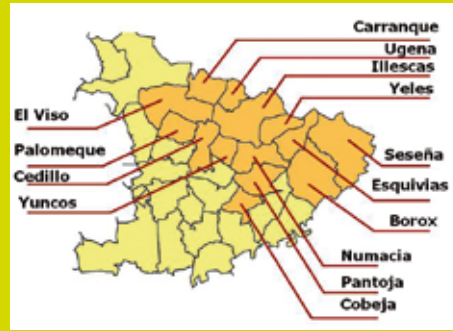
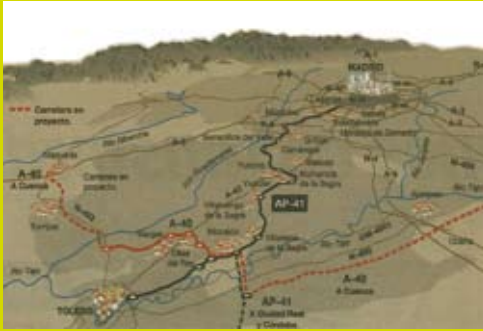
the municipalities of La Sagra have at different times fallen under either the Toledo or Madrid regional authorities.

ROAD NETWORK

As a whole, when the region is viewed at the national scale, the motorway network is well developed. The primary roads that cross La Sagra are the Madrid-Toledo motorway (A41) and the corresponding Madrid-Toledo toll motorway (AP41), the road to Andalucía (R4) and its corresponding toll motorway. Further, two new high capacity roads have been planned and approved: one will cross La Sagra from east to west and a national motorway will connect Maqueda with Tarancón. However, the present secondary network of regional roads provides insufficient capacity for the current population and increasing traffic flows, and different sections of the network are severely congested during certain hours of the day.

RAILWAY NETWORK

The current rail network is composed of two types of lines: the older system with a rail gauge of 1,688 mm (used for goods trains and passenger services at lower speeds) and new lines for higher speed passenger trains with the European rail gauge of 1,435 mm. Some of the stations in La Sagra are on the first network, but many of them have fallen into disuse over the last twenty years. Recently, proposals have been made for reopening these for commuter trains. →



The La Sagra area between Madrid and Toledo.

Several train maintenance workshops for the high speed network are located in La Sagra and form an important element for the further development of the region, providing as they do access to existing and future lines. In addition, a new station is being planned for use in emergency situations in the Madrid railway system, such as critical technical or engineering failures due to accidents, natural disasters or terrorist attacks.

INFRASTRUCTURE NETWORKS POORLY CONNECTED

The motorway network is becoming congested and the regional network of secondary roads is both congested and lacks density – especially when faced with the large population growth expected. The railway system largely bypasses the region, with the older stations having fallen into disuse. The regional railway system is still not developed and its development may encounter a variety of obstacles due to La Sagra's location between two administrative regions. However, plans to adapt older lines are currently being discussed. In this respect, a relation with the subway system of Madrid should be mentioned. This system is confined to the city of Madrid, but a network of commuter trains (comparable with the RER of Paris) has been introduced since 1996. However, these trains are not connected to the La Sagra region, while connections into the air transport network are also poor at present. The La Sagra region contains no commercial airports. Aero clubs exist in Casarrubios, Ontígola and Ocaña, but these do not have any relevance for regional mobility.

MOBILITY PROPOSALS FOR REGIONAL ECONOMICAL DEVELOPMENT

To create a better economic and territorial balance between Madrid and Toledo, our study proposes integrating different existing initiatives with a new regional airport situated between the two cities. An airport in La Sagra would function as the second airport of the central area of the Iberian peninsula, facilitating access to Castilla La Mancha and the city of Toledo. This new airport would justify high speed train (AVE) connections to La Sagra and additional larger scale infrastructure. Finally, we propose improving the regional infrastructure by introducing Phileas bus rapid transit systems, much like Metro Sur in Madrid.

FUTURE MOBILITY IN LA SAGRA

Departing from the emerging urbanist paradigm of the distributed city (or city of cities), our study proposes different additions to the existing infrastructure. These alternatives would have a major influence on economic development, quality of life and sustainability in the region of La Sagra. Community services can be further developed in such a 'city of cities' by building connections between the different municipalities. In this article we do not evaluate the organisational and participation aspects, but concentrate on infrastructure proposals in relation to the general system of mobility for a fast growing population.

The mobility system proposed follows a series of actions to connect local mobility with the larger national network by integrating the La Sagra region into the bipolar network of the Madrid region, as principal 'centre of gravity', and the city of Toledo, which functions as an administrative centre.

As many of the inhabitants of La Sagra work in Madrid, a mature network of connections is of great importance – also for the economic development of the La Sagra region itself. The possible new airport will also create major development opportunities. The AVE line to Toledo branches from the main Madrid-Seville line at Villaseca de La Sagra and it is precisely in this location where the new La Sagra-Toledo airport is proposed. As high speed train users coincide with the group of air travellers, it will be easy to integrate both transport services from a user perspective. We propose combining the AVE station with the airport in an 'Airport City' to create a first rate transport, communication, employment and leisure infrastructure.

A NEW AIRPORT AND AVE STATION

Madrid has four airports, of which Barajas is the international airport. Mobility systems for the 21st century should also include a strategically positioned network of regional airports – especially in Spain, where distances are relatively large. Nowadays, even commuting between Madrid and Barcelona is not rare as several carriers provide 'air bridges' between such cities. La Sagra is one of the search zones for a possible new regional airport. Due to its location in Castilla de la Mancha, it will be important to demonstrate the benefits for the region of Madrid and the Central Region as a whole.

The proposed site of the new La Sagra AVE station is located at the junction of the three important railway lines in central and southern Spain, leading to the provinces of Andalucía, Levante and Extremadura. For a connecting station, this location presents almost ideal conditions. At present this area contains the AVE maintenance workshops, which are 70 km away from the Madrid AVE station of Atocha. As the AVE train needs approximately 30 km to get up to speed and many more to decelerate, this location may be too close to Atocha. Nevertheless, for reasons of security and the desirability of linking different transport infrastructures, La Sagra holds potential. A well-developed and safe railway network should have several access points and be linked into an airport. This makes La Sagra the most cost-effective location and a choice for this integrated infrastructure will have a far-reaching impact on the entire region of Castilla La Mancha as well as the southern region of the Autonomous Community of Madrid. This proposed new AVE station would be an interchange between the main southern lines, providing access to the network for 1,500,000 inhabitants from Toledo to Getafe, allowing them to avoid the congested routes into the capital.

AIRPORT CITY

Several suggestions for planning and programming such an Airport City resulting from our study are described briefly below. Integrating the AVE station with the regional airport would considerably reduce construction costs. For such a combination of functions, a well-established scheme is to locate the system of train platforms underneath the airport terminal, with shared access to the parking system.

The location in La Sagra is cost-effective because the railway network already exists. In the proposed combination with an airport and the established and planned motorways, this AVE station could be one of the best connected in Europe. However, financing for the project has not yet been concluded. One of the possibilities is to connect this proposal with the current discussion on railway security in the Madrid region. A security station in La Sagra could avoid severe problems should Atocha station (south of Madrid) have to be temporarily closed. As plans for such a security station exist, we suggest that La Sagra participates in the development of the project brief. As the area is still relatively thinly populated it can still quite easily accommodate major new development, making it possibly the most effective location for the new AVE station.

We suggest three different levels for the combined railway station and airport terminal building: the lower level (-1) for railway accesses, the middle level (0) for airport arrivals and the upper level (+1) for airport departures. The terminal should also contain services and amenities such as hotels and restaurants, a business zone, congress centre, shopping area and leisure centres, and an integrated parking system. The surroundings offer possibilities for extensive industrial, logistic and leisure zones. With such a large development programme,

at this stage it is difficult to estimate the area of land required. However, assuming two 3,800-metre runways are needed and projecting the development programme to 2050, we estimate that an area of at least 25 km² should be reserved, of which about half would be dedicated to airport city services.

REGIONAL AND LOCAL MOBILITY

An important step is to connect the above projects into an upgraded regional transport network and improve commuter services to Madrid. The main aim is to connect the new airport city to the commuter network in the Madrid region by extending the line to Illescas on to the airport. The La Sagra region should also be linked to the city of Toledo, its administrative capital, by a high capacity railway from Seseña to Toledo. La Sagra would then become a rail hub linking the Madrid commuter network with the regional rail network serving the Toledo region. Concerning the road infrastructure, on the level of the secondary network we propose creating a new 'ring road' through La Sagra to provide a spine for the development of the territory into a distributed polynuclear city.

CONCLUSIONS

Our study proposes a transport system of nodal centres combined with larger-scale transport infrastructures. These will not only permit regional communication, but also contribute decisively to the development of the La Sagra region in a sustainable manner. The infrastructure projects could contribute to subsequent town planning, as they enable the construction of new centres along these lines, with parks, community services, and commercial and leisure zones.

The proposed infrastructure projects connect the present historic centres. It is important to realise that public transport systems must provide the advantages and qualities demanded by travellers, reflecting user demands rather than ideological models.

Along with the proposed new infrastructure, a less centralised form of territory management could be introduced in the La Sagra region by creating a network of municipalities and pursuing a strategy of coordinated growth. The transport systems, as the main pillars of this project, will support this polynuclear method of urban planning. This should be economically feasible as the region is ideally suited to the development of such a 'city of cities'. Pursuit of this option should be based on participation, quality of life and sustainability.

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