



TU1206-WG1-016

Valletta

TU1206 COST Sub-Urban WG1 Report

P.A. Zammit



COST is supported by the
EU Framework Programme
Horizon 2020



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Published December 2016

Author: Perit Adriana Zammit

Editor: Ola M. Sæther (NGU)

Editor and layout : Guri V. Ganerød (NGU)

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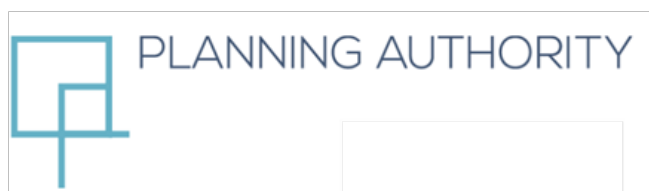


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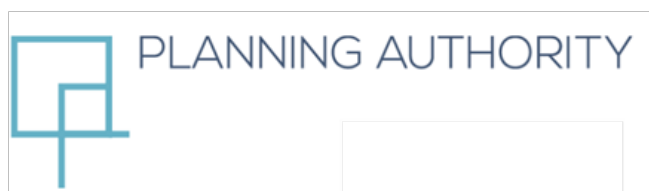


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1 Introduction

Valletta is the capital city of Malta and serves as a governmental, a business and an administrative hub of the Maltese Islands. This fortified city is located between the Grand Harbour and Marsamxett Harbour (Figure 2). It includes numerous monuments and buildings which date back to the 16th, 17th and 18th centuries and which make Valletta an UNESCO World Heritage Site. Amongst various monuments, the city has an extensive network of spaces situated below its surface. Most of these underground spaces were developed throughout the years for military and defensive purposes.

Valletta is full of human activity during the day with various commuters visiting the city for commercial, employment and cultural purposes. On the contrary, the historical city is less frequented by people at night. The main reason for this situation is attributed to the fact that the city core has been left in a derelict state for various years. During the last decade, much effort has been done to revitalise the city and the Grand Harbour area. Conducted works include the restoration of monuments that are situated both above and below the surface, the improvement of amenities for tourists and locals and the opening up of bars and restaurants for entertainment purposes at night. However, there is still much work that needs to be done, especially when considering that Valletta will be the European Capital of Culture of the year 2018.

2 Demography

2.1 Size

Valletta covers an area of 0.8 km² and this makes it the smallest capital city within the European Union. Valletta is a peninsula surrounded entirely by fortifications and, accordingly, cannot expand horizontally in terms of land area. In addition, as an UNESCO World Heritage Site, most buildings, including the subsurface, have important architectural features and are difficult to alter or adapt for modern use.

2.2 Population

The number of inhabitants is currently at 5,784. The population number had its peak during the British period (1800 - 1964) with more than 24,000 inhabitants until 1939. However, during the Second World War the city was bombarded with air attacks and consequently a large number of residents fled out of the capital in an effort to seek less targeted areas. This resulted in a significant increase in abandoned households, which continued during the

post-war years and is still being observed today. Currently, the number of vacant properties stands at over 30 percent of the Capital's properties (NSO, 2014). Table 1 shows the change in the number of inhabitants of Valletta during the time period from 1931 to 2011.

Year	1931	1948	1957	1967	1985	1995	2005	2011
Population	22,779	18,666	18,202	15,279	9,340	7,262	6,300	5,784

Table 1: Population in Valletta: 1931-2011 (NSO, 2014).

Nevertheless, from the latest statistics taken in 2011, the population density in Valletta is at 7,492 inhabitants per km², which is still on the high side when compared to the national average of 1,285 inhabitants per km² in entire Malta (NSO, 2014). Also, over the years, the number of daily commuters visiting the city has increased exponentially, since Valletta is an important business and financial centre of the island (The Planning Authority, 2016).

2.2.1 Age Distribution

Table 2 compares the percentage of the population by age group between Valletta and the national average in 2011. It is evident that Valletta has an ageing residential population, with only people over the age of 60 exceeding that of the national average.

Age	0-14	15-24	25-34	35-44	45-54	55-64	65+	Total
Malta	14.8	13.3	14.5	13.0	13.8	14.3	16.3	100
Valletta	12.4	11.1	12.0	10.9	13.0	15.3	25.2	100

Table 2: Age Distribution (%) in Valletta and entire Malta in 2011 (NSO, 2014).

2.3 Property

2.3.1 Occupied Dwellings

Valletta has a lot of dwellings that are in need of serious repairs or that are in dilapidated form. From Census 2011 it was noted that

"the proportion of dwellings in a good state of repair was the lowest one [ever] recorded (41.4 per cent), while the proportion of dwellings in need of serious repairs or in a dilapidated form was the second largest (14.7 per cent), following Mdina¹ (22.2 per cent)" (NSO, 2014).

The rapid depopulation combined with a decline in the overall richness of the capital's cityscape led to the creation of vacant abandoned properties (The Planning Authority, 2016). Furthermore, the residents are not the owners of their dwellings but are tenants with leases dating back several decades. Indeed, some of the dwellings are actually rented out for as little as 200 Euros per year. Making this situation even worse, is the tenants' financial standing, with most of them having a very low income to finance any improvements in their property. On the other hand, the owners receiving ostensible rents have no incentive whatsoever to undertake the necessary repairs and maintenance works. This has led to the situation that a number of buildings are being subdivided and turned into slums (The Planning Authority, 2016).

On a positive note, most of these buildings can still be rehabilitated by reversing past structural alterations and reverting their footprint to an acceptable size.

2.3.2 Commercial Property

Commercial properties within Valletta yield a higher return of income than residential properties. Many international companies seek to acquire property in Valletta, since an address within the Capital is beneficial to their image and prestige. Obviously commercial property within Valletta's centre bears a greater monetary value than properties situated outside of the existing commercial hub. Pressure is often brought into play to convert cheaper property, located outside of the commercial hub, to commercial use rather than into residential development. In fact (reflecting this trend) prices of existing residential buildings have been inflated, making it difficult for individuals to purchase affordable residential property within Valletta (The Planning Authority, 2016).

3 Traffic Management and Infrastructure

Residential decline is not the only problem in Valletta. Excessive vehicular traffic is another major issue. Valletta's steep streets are a challenge to pedestrian accessibility, whilst their restricted width make vehicular mobility and parking very difficult. Currently, the central

¹ Mdina is a fortified city in the Northern region of Malta.

commercial areas around Republic Street are adequately pedestrianised and free of car traffic. This is important to cater for the high increase of commuters within the City during the daytime.

Considering that Valletta has an ageing population, the pedestrian network within residential areas may hamper the elderly people from relating and living the life of the City. Actually, the road network cannot be totally transformed solely for pedestrian use because a minimal use of vehicular mobility is required to serve the commercial areas (The Planning Authority, 2016).

A large number of employees works within the City and this led to a growth of the vehicular traffic being generated within the city boundaries. The main bus terminus is located just outside of the main entrance to Valletta and does not really access the inner fabric. Ironically, the restrictions in terms of vehicular mobility favour pedestrian circulation within the City particularly in the central core where most of the commercial outlets and offices are located.



Figure 1: Valletta Streets (Jess, 2012).

4 Geological and Physical Setting

4.1 Setting

Valletta is located between two harbours, namely Marsamxett Harbour and the Grand Harbour. The City is situated on a peninsula and is surrounded by the sea on three sides and by land on one side facing Marsa (Figure 2).



Figure 2: Map of Valletta and its surroundings (OpenStreetMap contributors, 2016).

The area on which Valletta was originally named Mount Sceberras was divided into five valleys along Mount Sceberras. The valleys which were once referred to as Manderaggio, Ghetto, Arsenal, St. Lazarus and St. Lucy, were oriented towards the coastline and ended there. The coast is characterised by a number of caves (Said, 2012).



Figure 3: Cave dell' Agliata below St. Christopher's Bastion (Vincentz, 2016).

However, the construction of Valletta and its fortifications modified the coastline and integrated it with the fortified walls (Said, 2012). The highest point of the hill rises to approximately 140 metres above sea level, where today stands Auberge de Castille². Figure 3 gives an idea of the topography of Valletta.

The Order's original plans for Valletta aimed at flattening the terrain of Mount Sceberras. However, the estimated costs for realizing this were too high, and instead the City was planned around the existing topography with the middle part of Valletta, mainly the area around Republic Street, being constructed on the flat part of the terrain with steps and undulating streets emerging from either side and leading towards the harbours.

² Auberge de Castille was built by the Knights and currently houses the office of the Prime Minister.

4.2 Geology

The principle rock type of Malta is limestone which is a sedimentary rock that is relatively soft and easily excavated. This type of rock enables the construction of large stable underground chambers and tunnels (Armstrong, 1991). In relatively simple terms, local rock contains five horizontal layers, starting from the bottommost and oldest layer being Lower Coralline limestone, followed by Globigerina Limestone, Blue Clay, Greensands and Upper Coralline limestone. The latter resides at the topmost

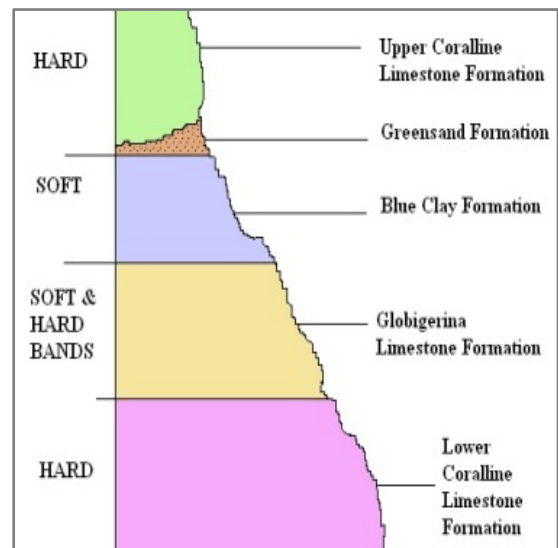


Figure 4: Section of Malta's rock formation (Seismic Monitoring & Research Unit, 2012).

layer. The section of the local rock strata is depicted in Figure 4, whilst Figure 5 shows the geological map of the Maltese Archipelago.

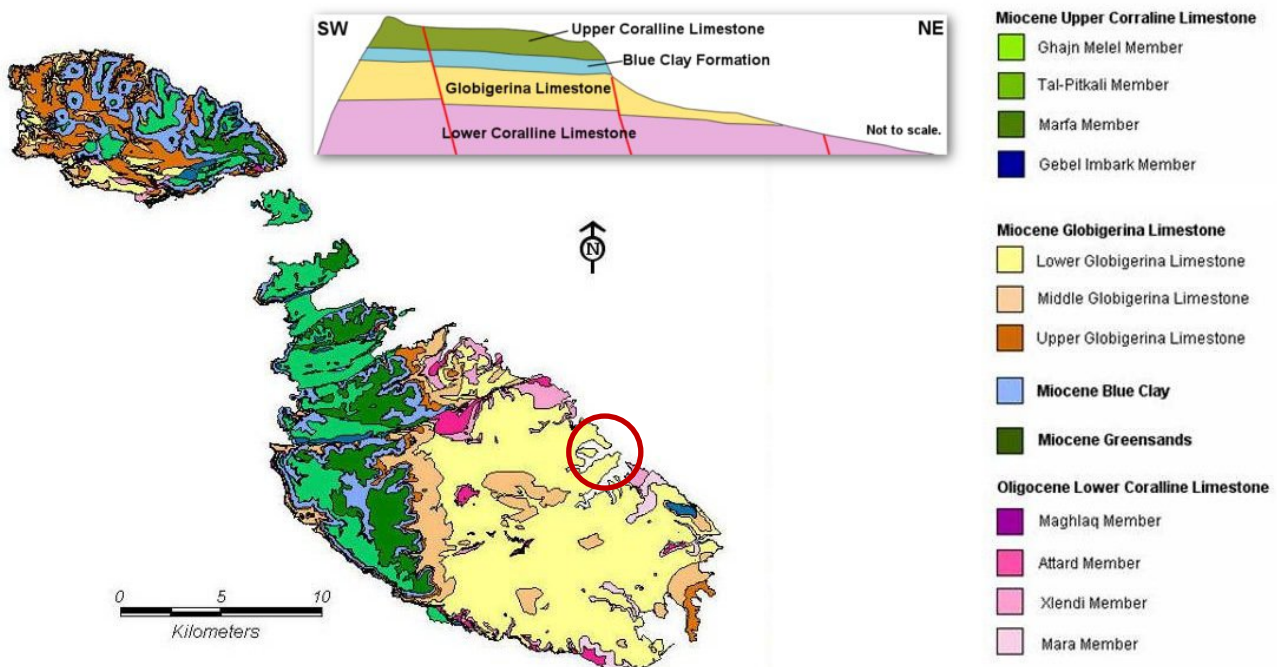


Figure 5: Geology of Malta (Karsten Eig, 2015).

Valletta (the location of the city is indicated by the red circle in Figure 5) is formed out of Globigerina Limestone, which is a very soft rock composed nearly completely of planktonic carbonate, and that gets its name from the Globigerina foraminifera, a very tiny crustacean. Being pure and fine-grained, this limestone has a distinctive yellow-greyish colour (Karsten Eig, 2015).

Globigerina limestone is divided into three members: the Lower bed (“Franka” or “Soll”), the Middle Globigerina layer (“Turbazz”) identified by its pure white and fine grained composition, and the upper main member (“Gebli tal-kwiener”). The vast majority of the buildings on the Maltese Islands are constructed with the Lower Globigerina Limestone (“Franka”), especially with the Lower bed of the Lower Globigerina.

4.3 Hydrogeology

Malta has no surface water and freshwater resources are scarce. This is mainly attributed to the local geological and climatic conditions (Spiteri, Scerri, & Valdramidis, 2015). In fact, the groundwater resources in Malta are restricted to a number of aquifers. The largest groundwater storage is provided by the sea level aquifer and this serves for eighty percent of the groundwater extraction. This body of freshwater has the form of a lens that floats on saltwater with higher density. There are also a number of perched aquifers that sit on impervious strata above the sea level (see Figure 6). These aquifers are replenished when rainwater infiltrates into the ground and slowly percolates into them, making them a finite resource (Spiteri, Scerri, & Valdramidis, 2015).

Water scarcity has always been a problem and Valletta was supplied solely through stored rainwater until 1610. In that year, works began by the Knights on an aqueduct to carry water from the springs in the Rabat Plateau to Valletta. Other various major infrastructural works were undertaken by the British and these included the digging of a deep well close to Valletta and the installation of a motorized pump in 1851. In 1887, a pipeline water system was installed to supply Valletta, Floriana, Sliema, Birkirkara, Zebbug, Siggiewi, Rabat and Mdina (FAO, 2006).

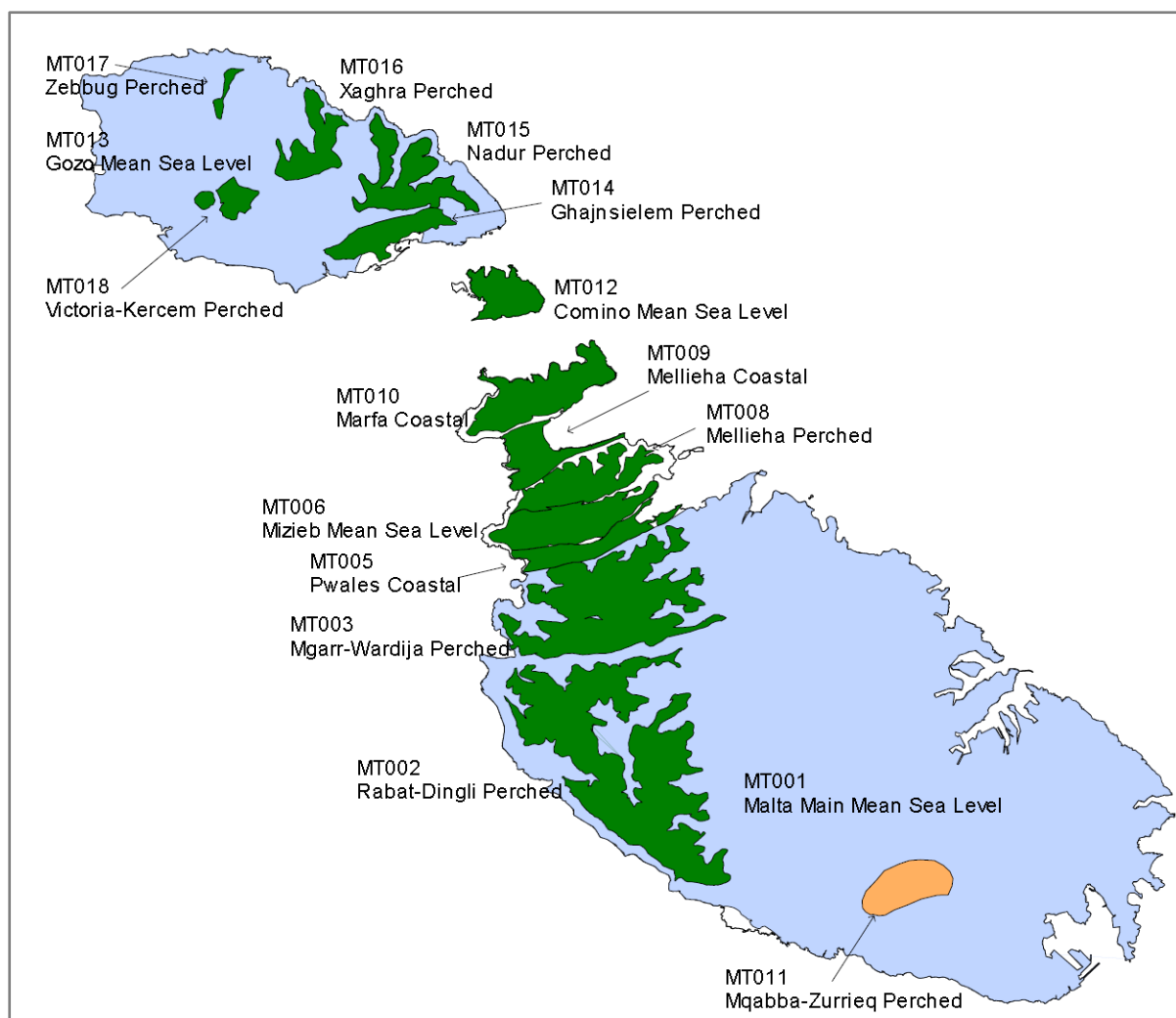


Figure 6: Groundwater bodies (MRA, 2012).



Figure 7: Aqueduct to Valletta (Wikipedia, 2016).

5 Urban Planning and Management

5.1 Policies and Legislation

The Development Planning Act is the piece of legislation that regularises the Planning System processes. It provides for:

- i. the spatial strategy for the Environment and Development (SPED). This was approved in July 2015;
- ii. subsidiary plans and policies including subject plans, local plans, action plan or other plans; and
- iii. development order (GoM, 2016).

The SPED considers a strategic vision to regulate the sustainable management of land and sea resources. It aims at providing a framework for an integrated planning system. Reference to underground development in the SPED is made solely in Thematic Objective 4

that specifies that “existing strategic infrastructure is safeguarded and that provision is made for infrastructure (water, electricity, sewers, fuel storage and telecommunications) to sustain socio-economic development needs whilst encouraging the Best Available Technology and protecting the environment” (GoM, 2015, p. 20).

The Local Plans consist of seven map-based plans for the entire Maltese Islands and cover approximately 33 km². They have been published in 2006, except for the Marsaxlokk Bay and the Grand Harbour Local Plan which were published earlier. The Local Plans designate the land use, building heights, conservation areas and development boundaries. They provide guidance as to where development can take place and set the criteria against which development proposals are decided by the Planning Authority. The Grand Harbour Local Plan (2002) (Figure 8) makes the only reference to the underground, and indicates an underground rapid transit route as part of a long-term transport strategy. To date, this long-term strategy has not been implemented, although there have been developments on the subject recently as described in section 7.7.2. The other local plans make no specific reference to the development of the underground. Hence, the zoning of the underground is usually being dictated by the surface use. In addition, the maximum depth for underground development is not yet regularised by any plan.

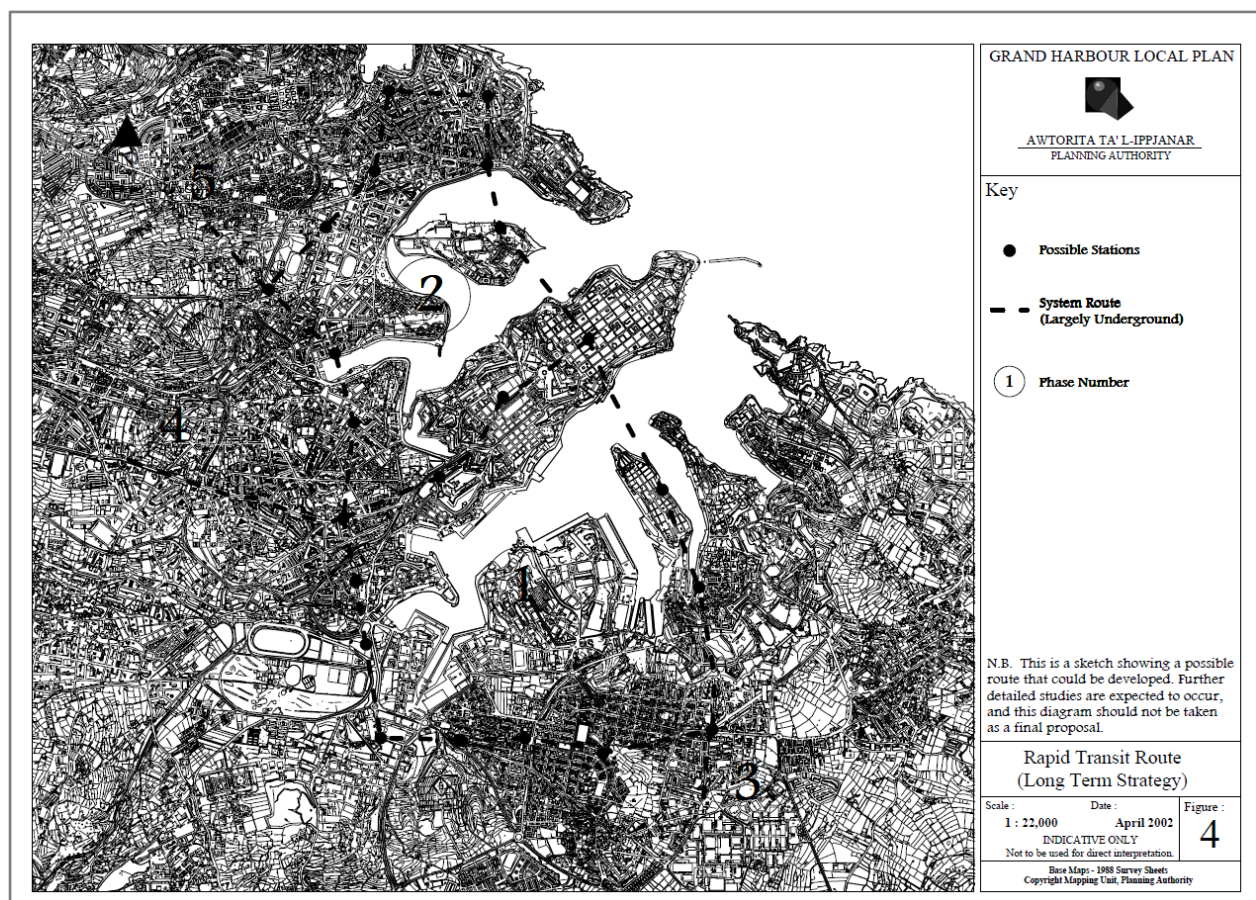


Figure 8: Map 4 of the Grand Harbour Local Plan, 2002.

5.2 Ownership law

The law affecting the possession of underground development includes Article 323 in Civil Code (Cap 16). This law dates back to centuries ago and regulates property ownership in Malta and states that the owner of the surface owns 'from heavens above to the centre of the earth below' (GoM, 1874).

Article 29 from Chapter 88 of the Laws of Malta: *Land Acquisition (Public Purposes) Ordinance* states:“(2) When for any public purpose any land is declared to be subject to subsoil rights, no owner shall make any new or extend any existing underground work or excavation without the prior permission, in writing, of the Board” (GoM, 1935). Sub-soil refers to just below street level. No depth is quoted in the Law.

5.3 History and origins of the urban form

5.3.1 Origins of Valletta

The fortified city was founded by the Grand Master Jean de la Valette (1557-1568) following the end of the 1565 Siege. At the time, Malta was administered by the Order of St. John. The aim of building a city on Mount Sceberras was a means to repel attacks and contain the population behind defensive walls in case of another Siege.

The military engineer in charge was Francesco Laparelli who designed the city with the intention of creating a fortress city following a Renaissance urban form. Indeed, the zone allocated for fortifications and bastions amounts to ca. 20% of the overall area of Valletta along the perimeter. The core of the city followed a grid pattern layout spread over hills and valleys and fortified walls around the perimeter of the peninsula. The main road, Republic Street, runs from the entrance gate to the tip of one of St. Elmo's bastions. The city was built accordingly to the practices of the time and Valletta is now considered as a typical example of the town planning of the sixteenth century.



Figure 9: Aerial Photo of Valletta (Valletta, n.d.).

The building of Valletta's fortifications, palaces and houses was regulated by a code administered by a section of the Order titled *Officio delle Case*. The regulations ensured that the central core is reserved for public buildings, having wider streets, squares and residences for the more privileged people and prohibited gardens or open spaces along street fronts. The design of the buildings' façades adjoining street intersections had to include decorated corner features and each building had to contain a water cistern and a cesspit connected to public sewers. Stones required for the construction of these buildings were to be quarried from the Manderaggio area, located northwest from the peninsula, and from the excavation of the above-mentioned cisterns/cesspits (The Planning Authority, 2016).

The Mandraggio was originally intended to form a sheltered basin within the fortifications to berth the navy (Figure 10). Unfortunately, during excavation stone of inferior quality and possibly harder to excavate was found. In addition, the space was too small to accommodate the entire fleet and the location was subject to the strong winds and currents (Darmanin, 2015). Thus, the plan of berthing the navy within the fortifications was abandoned and the area was instead developed and occupied by poor citizens with dwellings of low standards and poor hygiene. Here, the urban pattern did not follow the grid pattern but was more like a serpentine, medieval pattern of narrow and serpentine streets.



Figure 10: Plan of Marsamxett showing the Mandraggio (Darmanin, 2015).

5.3.2 Baroque

The 17th and 18th centuries saw the emergence of Baroque and from a planned fortified Renaissance town, Valletta started experiencing gradual changes in its urban texture with Mannerist and Baroque architecture. Baroque was reflected in new churches, palaces, and administrative and recreational buildings. Façades and interiors of sixteenth century buildings were remodelled. The city was thus

transformed into a vibrant hub of political, cultural and commercial activity, which was often positively commented upon by various travellers who from time to time visited the now 'Baroque Malta' (The Planning Authority, 2016). During the British colonial administration between 1801 and 1964, Valletta also benefited from Neo-classical buildings and gardens.

5.3.3 Valletta after World War II

Since its foundation, little has changed in the urban pattern of Valletta. The most radical changes happened as a result of damage during the Second World War. During the reconstruction of damaged parts of the city, much has been done to rehabilitate and remove the slum areas from the city. Manderaggio was totally cleared after World War II and new housing blocks respecting the grid-iron pattern of the city were built. The entrance of the city was also changed during the 1960s and 1970s and again in recent years. Currently, the city boasts a recently completed architectural project by Renzo Piano. Other changes include minor alterations to the original buildings to accommodate new uses for commercial and public purposes.

5.4 Underground Development in Valletta

5.4.1 Defensive System

The subterranean of Valletta is often described as a mirror image of what has been built on top (Puntan-Galea, 2006). The Knights took the underground into consideration to serve the above-ground as a form of defensive concept when they constructed the city. From the initial stages, Laparelli considered the formation of subterranean vaulted chambers to reach the required levels, on which streets were laid out (Said, 2012). The tunnels were a means to connect the city with the coast which would have served the inhabitants to move through the city in the case the city was besieged.

5.4.2 Water

Valletta has no groundwater and water has always been a major concern. Underground water cisterns were constructed strategically within the city to sustain the population with water. Each household had to use the stones excavated from their basements to build their houses on top. Consequently, the basements were used for water cisterns providing water for drinking and washing (Said, 2012). Similarly, the stone dug from the ditch was of good quality and thus, it was used to build the bastions that would embrace the city (Figure 11).

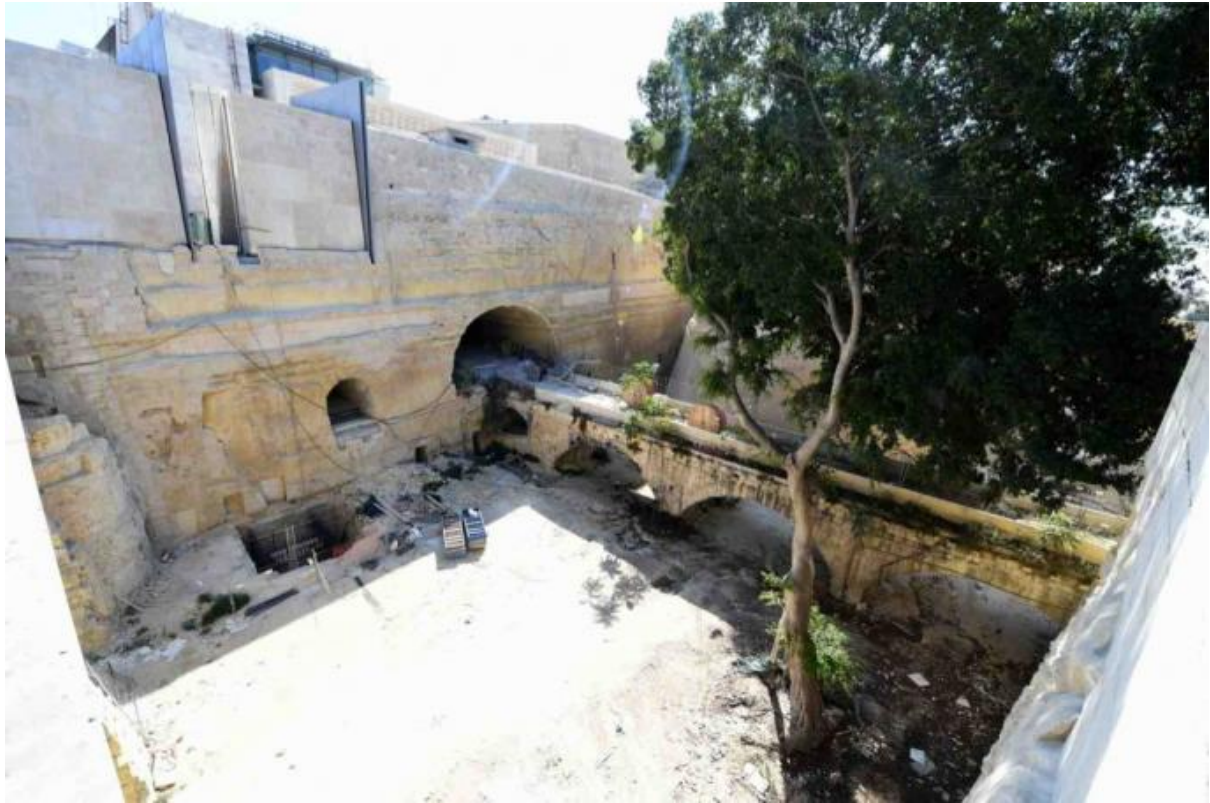


Figure 11: Valletta Ditch (Debono, 2014).

5.4.3 Sewers

The subterranean of Valletta features also sewers, concealed tunnels, passages, cellars, shelters, crypts and other spaces. The sewers were built in the 16th century and were later upgraded when the British took control over Malta. It must be noted that the sewer organizational system, as installed by the British, is still in use today, although it is in need of extensive repair (Puntan-Galea, 2006). At underground level, orientation is easy as each building and street is numbered.

5.4.4 Crypts

Most churches and chapels in the city excavated their own crypts, where now buried Knights, high ranking individuals, beneficiaries and members of the clergy are placed.

5.4.5 Shelters

Air raid shelters connecting with each other were also constructed for housing people during wartime. A case in point is the de Piro's located under Casa Rocca Piccola (Figure 12), which was a private shelter (Puntan-Galea, 2006).



Figure 12: Family Shelter under Casa Rocca Piccola (dePiro, 2016).

5.4.6 Railway

The British extended the potential use of underground space also through the development of a railway as a public transport system being partially located at underground levels (Bonnici & Cassar, 1992). The train system connected the spine of Malta from Valletta to Mdina and a number of settlements in between. Parts of the railway line were located within an underground tunnel from Valletta to Portes des Bombes in Floriana³ and within another tunnel under Mdina reaching to the final station (Bonnici & Cassar, 1992).

The various underground spaces are still being investigated and there is still much more to discover. The Valletta Restoration Committee has collected documentation and information. The intention is to open these areas under the Capital and to utilize them, restoring them and making them more accessible to the public. Numerous bars, restaurants and clubs are being opened up in these unique and unusual spaces which are attracting a lot of people to the Capital (Figure 13).

³ Floriana is the city located adjacent to Valletta.



Figure 13: Underground Restaurant (Rampila, 2016).

6 Recent Trials of Underground Projects in Valletta

6.1 Underground Car Park in St. George's Square

St. George's square (or Palace Square) is one of the main open spaces in Valletta. It is served as a *Plaza* to the Grand Master's Palace which is located just in front of it. Other buildings that are surrounding the square include the Bank of Valletta, the Main Guard and the Italian Cultural.

As a means to attenuate the parking problem in the capital, it was proposed to excavate an underground car park for accommodating 93 parking spaces beneath St. George's Square. However, following studies in the area detected a system of underground tunnels running under the square. These tunnels date back to the Knights period and include vaulted chambers. Closer inspections of these tunnels found that the tunnels are of cultural heritage value and are protected by the Cultural Heritage Act (Government of Malta, 2009).

Thus, the proposal for an underground car park was withdrawn. The initial project was instead replaced by a non-intrusive project for the pedestrianisation, surfacing improvements and restoration of the square. The entire project was completed in

December 2009 and the square has since then become a popular meeting place for Valletta residents and visitors (Ministry of Education, Culture, Youth and Sport Malta, 2010).

6.2 Underground Ferry Tunnel

During the governance of Sir William Raid (1851-1858), the construction of a subterranean/subaqueous canal was proposed in order to connect the Grand Harbour with Marsamxett Harbour. This canal would have served as a means to upgrade the harbour facilities for the merchant shipping and royal navy. The tunnel was estimated to be 16 feet wide and 14 feet high and would have been costing somewhat less than £10,000, whilst two of them would have amounted to the total costs of £20,000. This high level of estimated costs was the reason why the plan for this tunnel never left the drawing board (Said, 2012, p. 83).

However, lately a similar project has been proposed by AX Holdings to improve the connections between and within the harbours. This new project includes the excavation of a ferry tunnel below St. Lucy Street, having a length of 800 meters, a width of 8.3 meters and a height of 5 meters. The North inlet is close to the lift leading from the waterfront to the Barrakka Gardens for enabling passengers to easily access the city.

The proposal is intended to reduce land traffic flows, to promote public transport and to ease the parking problems within the city. Given that the canal will pass at sea level, the probability of excavating through important historical heritage is low. However, extensive consultation with different entities including but not limited to the Superintendence of Cultural Heritage, UNESCO and Utilities' agencies together with many consultants in different fields, has been carried out to ensure that the works can run as smooth as possible.

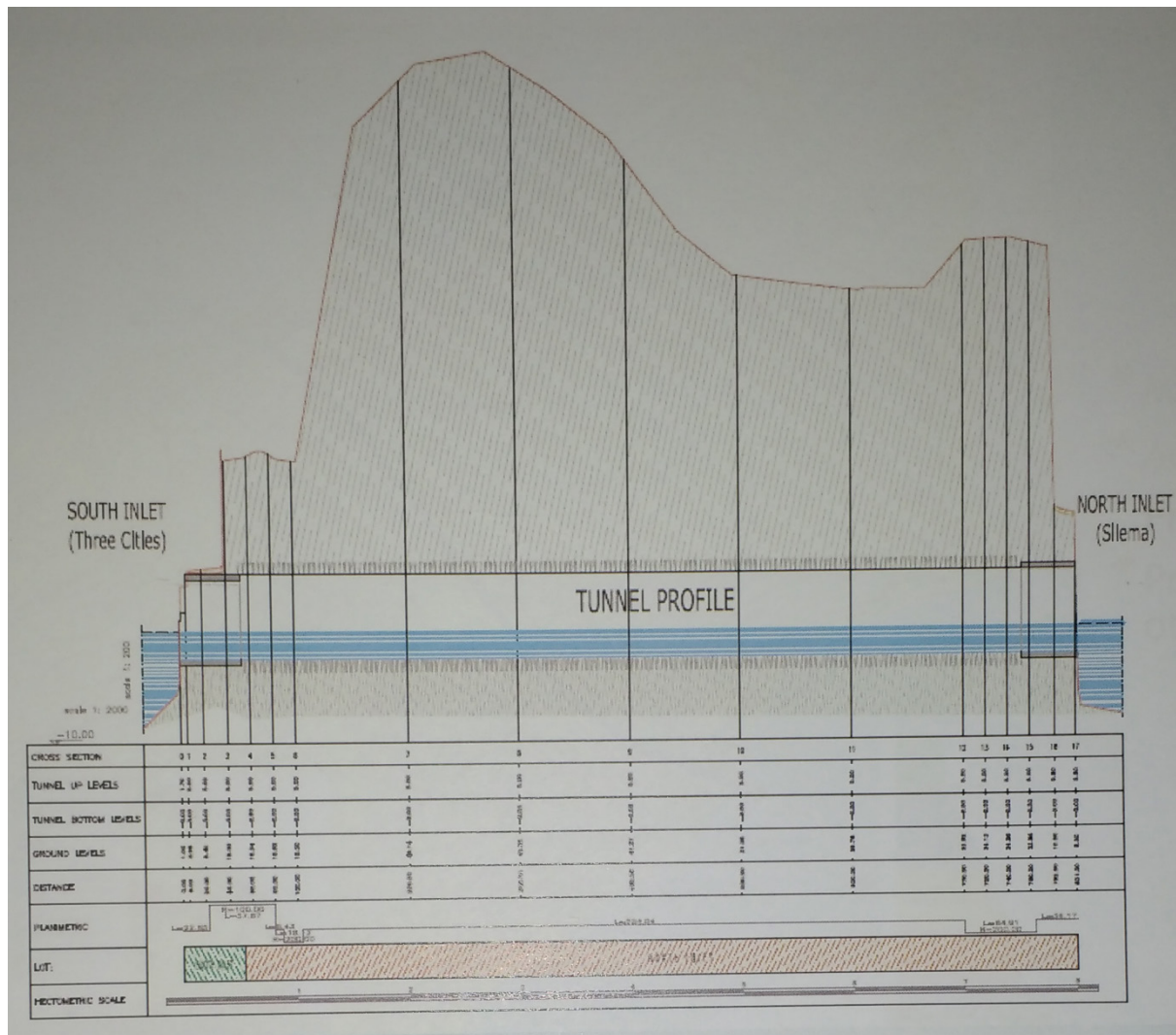


Figure 14: Longitudinal Section of Ferry Tunnel (AX Holdings, 2015).



Figure 15: Plan of ferry tunnel and other underground shelters (AX Holdings, 2015).

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