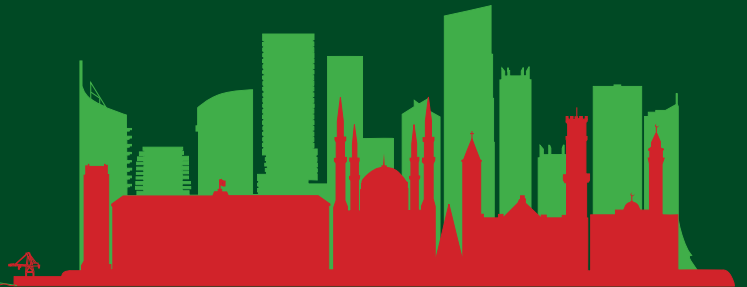


STUDY FOR A EUROPEAN REVIVAL OF THE BEIRUT PORT AND THE SURROUNDING AREA

Beirut, April 2021



PREAMBLE



Despite the various local and international challenges that Lebanon is going through, the country is showing once again its capacity to fulfil its destiny of rising from the ashes. This is possible today with the unequivocal support of friends of Lebanon who believe in the unique ability of each Lebanese citizen to drive the needed change. The success of this project cannot be achieved without the consent and the enthusiasm of the concerned community.

Berlin, April 2021

Dr. Mustapha Adib
Ambassador of Lebanon to the Federal Republic of Germany

What we have here is more than just a study, and it goes beyond the reconstruction of what was destroyed after the terrible explosion of the 4th of August 2020 in the Port of Beirut. What is in our hands today and within our reach, is the opportunity to see Beirut offering again a liveable space for each member of its society, the hope for the Lebanese and international companies to regain trust and invest in Lebanon, the prospect for the creation of thousands of jobs driving economic growth, and the new opening of the Port of Beirut to the World.

While the destruction (physical, mental, and financial) caused by the blast is most of the time irrevocable, this project was most importantly thought of with a unique aim: to be able to give back as much as possible to those who suffered the most.

This project does not only re-build the houses, schools, and infrastructure of the destroyed part of the city, it offers above all the hope in a better tomorrow to all Lebanon, and it sets high standards for professionalism and transparency, with social interest at heart. For it to become a reality, the initiation of serious reforms would be required.

Finally, I would like to thank the German Federal Ministry for Economic Cooperation and Development (BMZ), in addition to all different parties involved in this transnational project, for believing in our country and in its bright future.

PREAMBLE



Esteemed reader.

This is a study about a vision of hope for a society in despair. Under the patronage of UNODC, dedicated consultancy companies with long-standing ties to Lebanon and to the Port of Beirut engaged to draw options for a new harbour and for a more livable city. After the devastating explosion of August 4th there is an urgent need to rebuild for the society as a whole. Implemented transparently and with all institutional adaptations required, this could be a first step of reform.

Many elements are at stake. Many of them are tackled in this study. This study does not show options of clean-up and repair, neither is it only about a container hub. It is about options for a transparent and independently run port for Lebanon's trade. And it is about bringing back a form of social cohesion through options for urban planning. All options suggest

- affordable family living for a much-neglected educated middle-class,
- public spaces with green, lake, beaches, and promenade,
- public facilities of kindergartens, schools, health, sports grounds, and transport,
- coverage of the current damages of the city of Beirut following the explosion.

These options however do not end at the level of ideas. The study goes into possible avenues of implementation. From my understanding three elements prove to be key:

- Trust: Anyone involved will bring in his standing first, towards civil society as much as towards others to engage.
- Means: It will not be only about technical know-how but about the weight to sign off and secure the volume needed.
- Impact: The research institute involved calculated an impact in Lebanon of up to 50.000 newly created permanent jobs and an overall income of US\$ 30 bn. These are parameters of true development.

The Lebanese shore measures a mere 160 km to Cyprus. As Parliamentary State Secretary in the German Ministry for Economic Cooperation and Development, I see any endeavour as a European vision and nothing but. Any approach by a single country alone would eventually not materialize. And it would not be for the best for the country: As European countries, together we have the range of contributions and the strength needed.

May this study of options open the arena to European private actors to engage in implementing true reform and development.

April 2021

Norbert Barthle

Parliamentary State Secretary to the German Federal Minister for Economic Cooperation and Development

EXECUTIVE SUMMARY

This study has been part of connected research by four expert firms: Hamburg Port Consulting (HPC), Colliers International, Fraunhofer IMW (IMW) and Roland Berger (RB). It contains mostly content developed solely by HPC, Colliers and Fraunhofer, and in some clearly referenced areas, content jointly developed with RB, and builds on these to develop conceptual solutions to the challenges currently faced.

The study considers the current situation in the Beirut Port, and then builds on the RB related study findings, as well as reviewing regional competitors and competitive options.

Hence, the objectives of this study are to develop tangible options recommended for the successful redevelopment of the port precinct into the future. This study entails a brief assessment of the status quo and analysis of the consequences of the explosion on the port and the Lebanese economy, before focusing on a path forward. Looking ahead, the economic potential of the Port of Beirut is presented up to 2030, providing insights into the regional ambition that the country's main seaport could develop and achieve. This study develops strategic options for the port on several levels, answering immediate needs while presenting a future role of the port, potential expansion plans based on an integration of new governance model and integration into the city. This serves as the goal to make the Port of Beirut a transparent and efficient economic hub for Lebanon, offering long-term opportunities that can benefit the country on a national level.

THE CURRENT ROLE OF THE PORT OF BEIRUT

The Port of Beirut is the main gateway for the external trade of Lebanon and acts mainly as a seaport for local demand. The overall trade volumes consist of approximately 90% imports and 10% exports, indicating a significant trade imbalance. About 6 to 8 m tons of merchandise are handled at the port per year and mainly consist of container cargo, general cargo and dry bulk (excluding transit and transshipment volumes). In addition, about 0.5 m TEU of transshipments are handled at the port per year, showing a growing trend. The Port of Beirut, as a port catering for local demand, is a mirror of the Lebanese economy. It has a strong dependency on domestic circumstances and trade volumes are largely driven by imports based on domestic demand and consumption.

As such, the current economic crisis has had a large effect on the activities at the Port of Beirut. The economy faced a continued downturn with an up to 25% contraction in real GDP (Oxford Economics, 2020), the currency inflation sharpened and private consumption levels fell by 14% (World Bank, 2020). As a result, there was less demand for imports as demonstrated by the development of total volumes of traded goods from 2015 to 2019. This situation was further exacerbated by the consequences of the Covid-19 pandemic in 2020.

DAMAGE ASSESSMENT

The Port of Beirut was able to receive the first vessels again within 14 days of the explosion, and for this massive credit must be given to the resilience and fortitude of all involved in the functioning of the port. Indeed, despite the massive damage to the port and landside infrastructure, as well as the wrecks in the port, it has managed to maintain operations throughout, while a cleanup has moved ahead swiftly to staunch leaks of oil into the port waters, as well as consolidate various scraps into areas of similar scrap to minimize the impact.

Damage to the container terminal was fortunately minimized and the explosion focused mostly on the destruction of the workshops and surrounds, meaning that the terminal was able to be up and running almost immediately again, with the majority of gantry cranes functioning as before, safely and efficiently.

Containers on the western region of the container terminal were partially affected, with approximately 180 damaged to a point preventing delivery or at least further inspection.

Some 1,250 vehicles being stored in port were severely damaged and had to be written off, but have been piled together awaiting scrapping, while other scrap totals around 30,000 mts of steel scrap and 50,000 mts of concrete and asbestos scrap. The former will likely be exported to scrap merchants for recycling while the latter will be treated and should be used in construction to fill areas of damage specifically in basin 3.

Quay 9, the site of the explosion, has a large crater, with the entire quay wall as well as the entire bulk discharging infrastructure based on it, completely destroyed. The Silos on the quayside are also destroyed and still require tearing down and removal. The point quay itself needs to be further investigated including geotechnical and underwater surveys to ascertain the integrity of the structure, however the utilities should be assumed to require full replacement.

In addition, the Orient Queen passenger vessel remains rolled over alongside the quay 11, while 4 other floating wrecks remain at the bulk terminal, with one sunken wreck along the breakwater opposite the terminal.

The overall salvage still to be taken, including rubble removal, is estimated to be between USD 50-100 m – excluding any further surveys or rebuilding.

On the landside, apart from the quay damage, there has been significant damage, if not total destruction of all storage capabilities of the port. This represents both the most urgent challenge to the working of the port as well as the largest opportunity to replace antiquated and dangerous storage facilities with modern structures and practices. At present, all non-containerized cargo can be discharged and delivered on a direct delivery basis only, meaning that nothing is stored in the port, a loss of revenue as well as

EXECUTIVE SUMMARY

a slowing of the port's performance leading also to a reduction in volumes and thus further loss in revenue. Interim storage should be established as fast as possible, however not in such a way that the tendency then becomes for it to become long term. Storage policies of the port must also be considered.

BLUEPRINT FOR RECONSTRUCTION

Basic Requirements - Transparency and accountability

Any reconstruction efforts at the Port of Beirut must, as a prerequisite include a revised and transparent governance structure in line with international norms, in order to regain the trust and support of not only the people of Lebanon, but of the international community as well.

The current port management is carried out by a „Temporary Committee for Management and Investment of the Port of Beirut“ which has been in place since 1990, without clear reporting lines or accountability. Because of this it does

not undergo the supervision of a public institution and is not linked to a specific legal framework, nor is it subject to either the Audit Bureau or the supervision of the Central Inspection Unit.

The container terminal is managed by a separate entity, the Beirut Container Terminal Consortium (BCTC). Since the official contract ran out in January 2020, the BCTC is also now active in a temporary role, with lack of clarity of when the new tender will be run, or who is eligible to take part.

The World Bank and Roland Berger reports, both indicate a recommendation for a clear Landlord model of structure with tiered structure of National governance, ports management and port operational levels, to ensure national and regional competitiveness and operations efficiency. In addition, it also allows for private sector participation in rebuilding the port to secure international funding.

URBAN DEVELOPMENT

The reconstruction of the port outlines an extension of the port to the east. This opens the opportunity for an urban development reuse by converting and removing open spaces using at least the first two basins of the port.

Three options in determination of plot size have been examined where Option 2 with a total site area of around 1.2 km², providing a building area of rd. 3.5 Mio. sqm GFA including rd. 0.5 Mio. sqm GFA of public facilities buildings, represented the best potential layout. This option balances port expansion with income that could be attained from the development of a waterfront, while still allowing for further development in the very long-term future, into an amended option. It optimizes the layout of the current port, focusing on improving storage abilities in proximity to the container terminal, and opens the way for further growth into the bay at a later stage if required.

Accordingly, a master layout plan has been detailed for Option 2. The architectural concept reflects a balanced synthesis of the best of three cultures:

- An International Real Estate Expertise for robust revenues from the privately funded Development.
- European Urbanistic Fundamentals for Diverse and Lively Neighbourhoods.
- Local Architecture Principles for Acceptance and a consistent City Structure.

It aims for a fair mix of High-Level Architecture and Social Housing for local families, provides public Buildings for Education, Culture, Health and Sports, accessible Parks and City Beaches. Public Transport and Green Energy can be a starting point for a sustainable Beirut.

The area can provide homes for rd. 35,000 inhabitants and a rd. 40,000 workplaces. Total Building Investment will be rd. 7 bn USD generating a profit up to 2.5 bn USD over an estimated development and marketing time of around 15 years. Associated with the urban development of a new harbor city and the direct profits by marketing the developed areas is the great opportunity to generate the funds necessary for the reconstruction of the port facilities and, in addition, to be able to provide significant impetus for the reconstruction of the city and the political stabilization of Lebanon.

Indirect Benefits of the urban development

Large-scale investment projects produce considerable direct, indirect, and secondary economic effects that are reflected in increased added value, higher employment rates and income as well as in the generation of additional earnings for public authorities through taxes and social security contributions. For the Beirut Waterfront, this indirect profitability including earnings from development and based on the assumptions made, could sum up to approx. USD 30 bn in the base case over a period of 25 years. Hence, the project has significant positive effects that by far exceed the initial costs for the public as well as the results from a project-specific feasibility study.

In addition, qualitative effects play a major role and provide further significant benefits for the civil society of Beirut and Lebanon. Its impacts can enhance political and socio-economic stability by reducing unemployment and discontent in society and by offering long-term perspectives to the people. Further integrating effects can result from social measures that shall be financed through the indirect profitability gains, like strengthening low-income families, and combining working and living areas.

The Beirut Waterfront project can play an important role for the attractiveness of Beirut and Lebanon in becoming a gate to the Middle East for international companies as well as attracting tourists, business travelers and investors from all around the world. By becoming a lighthouse project, the image of the country might fundamentally change from a region of instability to one of economic prosperity.

Environmental and ecological sustainability criteria can be met through e.g. building structure and materials, nature of the utility infrastructure and share of green recreational areas which have positive effects on microclimate and biodiversity. The new district might even become an initial point for a public transport system.

A PATH FORWARD

Crises present opportunities, while this study began as a high level overview to understand and present options to redevelop the port precinct of Beirut, right size it and provide a viable blueprint for the port moving forward, it quickly became apparent that there is a unique opportunity here for a port facility to pivot its own development into a national cornerstone, with the potential to refocus and develop the precinct for the benefit not only of business, but of the people of a Lebanon as a whole. What has come out is a clear proposed concept for a self-funding development able to create transparency, employment and boost the city and national economy while providing more integration of the Lebanese people and linking the city into the developing Mediterranean tourist industry.

Moving forward the concept, if accepted by all, requires further studies and detailing, however underlying all of this is the need for a clear new governance structure aligned with international norms, with the mandate to undertake the long-term wholesale developments the concept requires.

The concept, as any, requires support and further development from all levels of the Lebanese society, however initial feedback has across the board been very positive and we look forward to developing this further in the interests of all stakeholders.



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DISCLAIMER

This study was conducted jointly between Hamburg Port Consulting, Colliers International and the Fraunhofer Center for International Management and Knowledge Economy IMW, including some content from Roland Berger's parallel study. It was completed over a 6-week time frame and presents, from an outside-in perspective, options for redevelopment strategy of the Port of Beirut, including options for a revised governance and operating model concept following the August 4 explosion. The analysis is built on data extracted from expert and stakeholder interviews, news sources and the Lebanese Customs and the Port of Beirut websites and is subject to limitations of available statistics. Although this paper presents our best estimates, the data might not accurately reflect the port's actual conditions. The eventual outcome of the future years will be highly dependent on the political and economic developments of the country and the broader region.

Moreover, the options that are presented for the spatial layout of the port are indicative and serve as a concept phase input to more detailed feasibility studies on the discussed concept that should be conducted.

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GLOSSARY OF TERMS AND ABBREVIATIONS

TERM	DEFINITION
Agreements	
FTA	Free Trade Agreement
GAFTA	Greater Arab Free Trade Area
Associations & Organizations	
APIC	Association of Petroleum Importing Companies
EFTA	European Free Trade Association
IDAL	Investment Development Authority of Lebanon
IFI	International Financial Institution
IMF	International Monetary Fund
IMO	International Maritime Organization
OECD	Organization for Economic Cooperation and Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development
UNODC	United Nations Office on Drugs and Crime
Companies	
AIIB	Asian Infrastructure Investment Bank
CAS	Central Administration of Statistics
CMA CGM	Compagnie Maritime d' Affrètement and Compagnie Générale Maritime
COGICO	Consolidated Group for Industry and Commerce
COSCO	China Ocean Shipping Company
GEPB	Compagnie de Gestion et d'Exploitation Port de Beyrouth
HIF (Hodico)	Heavy Industrial Fuels Fuels (Heavy Oil Distribution Company)
HPC	Hamburg Port Consulting
HYPKO	Hydrocarbon Products Company
IBM	International Business Machines

GLOSSARY OF TERMS AND ABBREVIATIONS

TERM	DEFINITION
INDEVCO	Industrial Development Company
IPC	Iraq Petroleum Company
IPT	Issa Petrol Trade
MSC	Mediterranean Shipping Company
Abbreviations & contractions	
B.C.	Before Christ
BLT	Build-Lease-Transfer
BOO	Build-Own-Operate
BOOT	Build-Own-Operate-Transfer
BPA	Beirut Port Authority
BPMU	Beirut Port Monitoring Unit
BTO	Build-Transfer-Operate
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
COVID-19	Coronavirus Disease
DBFO	Design-Build-Finance-Operate
DBOT	Design-Build-Operate-Transfer
DCMF	Design-Construct-Manage-Finance
DCP	Dynamic Cone Penetration
EOOT	Equip-Own-Operate-Transfer
EPC	Engineering, Procurement and Construction
F&B	Food and Beverage
GDP	Gross Domestic Product
GPR	Ground-penetrating Radar
GVA	Gross Value Added
LCA	Logistics Capacity Assessment
MRO	Maintenance, Repair and Operations
O&M	Operations and Maintenance
OPEX	Operational Expenditure
SEIA	Strategic Environmental Impact Assessments

GLOSSARY OF TERMS AND ABBREVIATIONS

TERM	DEFINITION
SPV	Special Purpose Vehicle
LFZ	Logistic Free Zone
PoB	Port of Beirut
PoT	Port of Tripoli
PPP	Private Public Partnerships
RoRo	Roll-on/Roll-off
RTG cranes	Rubber tyred gantry cranes
STS cranes	Ship-to-shore cranes
Countries & Unions	
GCC	Gulf Cooperation Council
KSA	Kingdom of Saudi Arabia
UAE	United Arab Emirates
USA	United States of America
Currencies	
USD	United States Dollar
News Outlets	
BBC	British Broadcasting Corporation
CNN	Cable News Network
NY Times	New York Times
Notations	
c.	Circa
e.g.	Exempli gratia
etc.	Et cetera
i.e.	Id est
N/A	Not Applicable
Units	
bn	Billion
km	Kilometers
km ²	Kilometers squared
m	Meters
m ²	Meters squared
m ton	Million ton
TEU	Twenty-foot Equivalent Unit

1. INTRODUCTION

1.1 Brief summary of recent events

A devastating blast shook the capital city Beirut, on August 4, 2020, killing over 200 people, wounding over 6,500, and leaving over 300,000 people displaced (UNICEF, 2020). Large sections of the port and its infrastructure were destroyed, including most of the country's grain reserves and damages estimated to be in the billions of dollars were inflicted across the city. According to the World Bank's „Beirut Rapid Damage and Needs Assessment“ report published towards the end of August 2020, physical damages were estimated to be between USD 3.8-4.6 bn, with housing and the cultural sector most severely affected. Economic losses were estimated to be USD 2.9-3.5 bn, with housing being the most hit, followed by transport (including the port) and culture. In addition, the immediate priority „recovery and reconstruction needs“ until the end of 2020 and 2021 were estimated to be USD 1.8-2.2 bn, with transport sector needs being the highest followed by culture and housing (World Bank, 2020).

On November 21, 2013, the MV „Rhosus“ docked in the Port of Beirut carrying 2,750 tons of ammonium nitrate. The ship was arrested in the port for outstanding debts and barred from leaving the country and subsequently abandoned to the custody of the Lebanese authorities. In October 2014, 2,750 tons of ammonium nitrate were unloaded to warehouse 12 within the port.

In the six years since the unloading of the 2,750 tons of ammonium nitrate, several inspections took place and repeated warnings had resonated throughout the government, port and customs authority, and Lebanese army. However, no action was taken to secure the chemicals.

On August 4, 2020 – it is suspected that the sparks stemming from welding work ignited this cargo, resulting in a catastrophic explosion that was also heard in Cyprus, 2,000 km across the Mediterranean. Seismologists at the United States Geological Survey estimated the blast to be the equivalent of a 3.3 magnitude earthquake (BBC, 2020). The explosion destroyed the general cargo area, free zone area, and the grain Silos, leaving a crater roughly 124 m in diameter and 43 m in depth at the shoreline, a bit over the length of a football field (CNN, 2020).

The explosion took place amidst the country's worst economic crisis following widescale protests in October 2019, and the global Corona Pandemic further hitting the extremely stressed economy hard. The sum total meaning that the Lebanese Pound has severely depreciated by more than 75percent with thousands of small businesses going bankrupt and more than half of the population is now living below the poverty line (Relief Web, 2020).

1.2 Objectives of the study

The study is an independent analysis done by the private sector to provide comprehensive stocktaking and an assessment of the current state of play. It has been conducted to provide a potential solution to not only re-establish a transparent port facility, but assist in the further redevelopment and re-awakening of the Lebanese economy. This entails a thorough damage assessment and analysis of the consequences of the explosion on the port and its business as well as the relevant interlinkages with the Lebanese economy. A potential plan for the development of the port precinct to unlock the economic potential of not just the Port of Beirut, but the city with its historical relevance as well, is presented moving beyond the current with a vision for the future in line with the regional ambition of Beirut.

Moreover, this study develops a potential strategic concept and pathway for the development of the port precinct that allows the port to remain operational at current and ever improving efficiencies while becoming a world class facility for the benefit of the Lebanese population as a whole, creating employment and transparent governance into the future.

Working in combination with, and building on the Roland Berger study, this study looks at the current port situation and then develops options for the port itself. This is worked into a feasible concept for further development, then combines this with integration options into the city and contemplates the overall effect this will have on the Beirut and Lebanese employment and economy as a whole. It is, as the title implies, about joining forces for a new era for the Port of Beirut and the long-term potential for the whole country that can be leveraged through collective efforts to rebuild it better than before.

2. STATUS QUO ASSESSMENT AND MARKET OUTLOOK

2.1 Port of Beirut damage stocktaking

2.1.1 Vessel and equipment salvage

Because of the explosion, there are still five shipwrecks in the area of Quays 8 to 11 to be removed from their current positions:

- A sunken wreck inside the main breakwater (opposite Quay 8)
- The "Orient Queen" rolled over at Quay 11.
- Three floating wrecks

The salvage of the five wrecks is not contracted yet but considered urgent. The German based Harren & Partner Group of companies with its subsidiaries Combi Lift Projekt GmbH & Co. KG and CL Salvage GmbH & Co.KG, who are already in contact with Port of Beirut and the ship owners, would be prepared to salvage the wrecks including the removal of oil pollutants.

Furthermore, Combi Lift is currently preparing the removal of 52 containers already identified with hazardous goods, which were abandoned by their owners at the Beirut container terminal over the past years. As most of these containers cannot be moved anymore due to damages and advanced corrosion, this includes a rather high effort for re-packaging and removal as hazardous waste.

Another 185 containers spread all over the port are still to be scanned and removed as well. Combi Lift further reported a total of 30,000 tonnes of metal scrap and 50,000 tonnes of asbestos concentrated rubble to be removed from the port area. Lastly, also to be removed are a significant number of destroyed vehicles as well as the silo scrap, grain and concrete structures.

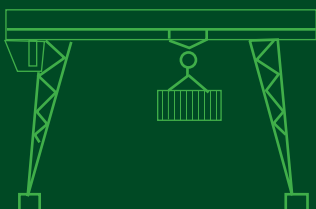
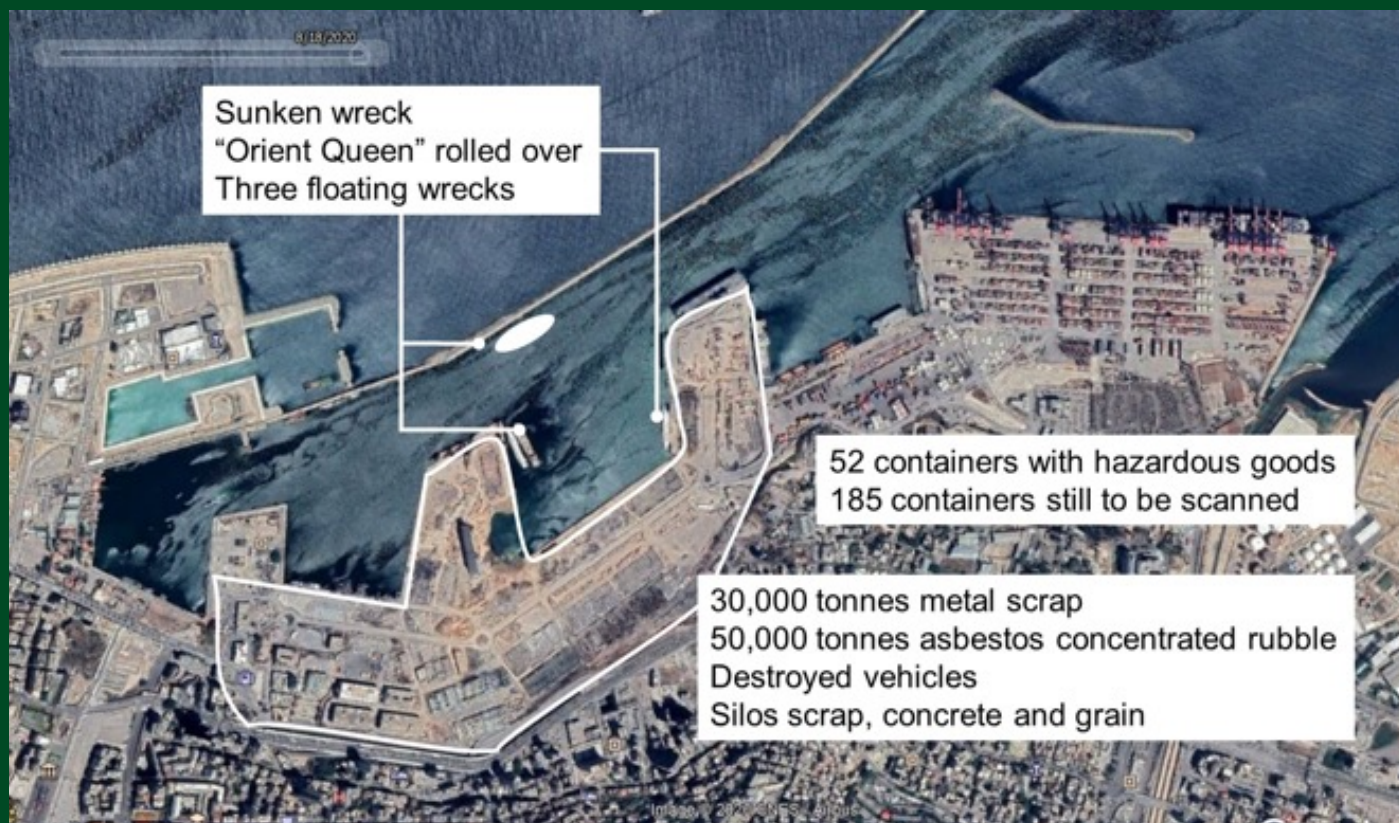


Figure 1: Port of Beirut salvage and removal



Source: HPC | Image: Google Earth

The grain import facility with equipment for unloading vessels as well as the Silos for storage of the imported grain were located in immediate proximity of the explosion, hence considered a total loss. The unloading equipment consisted of two suction units at Quay 8 and a third unit at Quay 9, a conveyor belt system at the quayside (length approx. 250 m), a conveyor belt between the quay and the

silos (length approx. 170 m) and two transfer towers at the quayside. The silos had a capacity of 120,000 MT, divided in 48 cells 2,500 MT each, plus 50 smaller cells 500 MT each for emptying the large cells leaving room for a full vessel load. Loading onto trucks took place directly from the silos, in total four truck weigh bridges were also part of the facility.

Figure 2: Port of Beirut grain import facility



Source: HPC | Image: Google Earth

Given the fact that the facility, which was almost 40 years old, is completely destroyed and the vacuum and conveyor setup with a relatively low suction speed of 600 MT/hour caused the bulk discharge to be much slower and thus more expensive than it should be, it is recommended to

develop a new state-of-the-art facility for future bulk operations. This new facility would be built at the most suited location within the port and will be dimensioned according to the forecasted volumes for grain import.

2.1.2 Civil infrastructure review

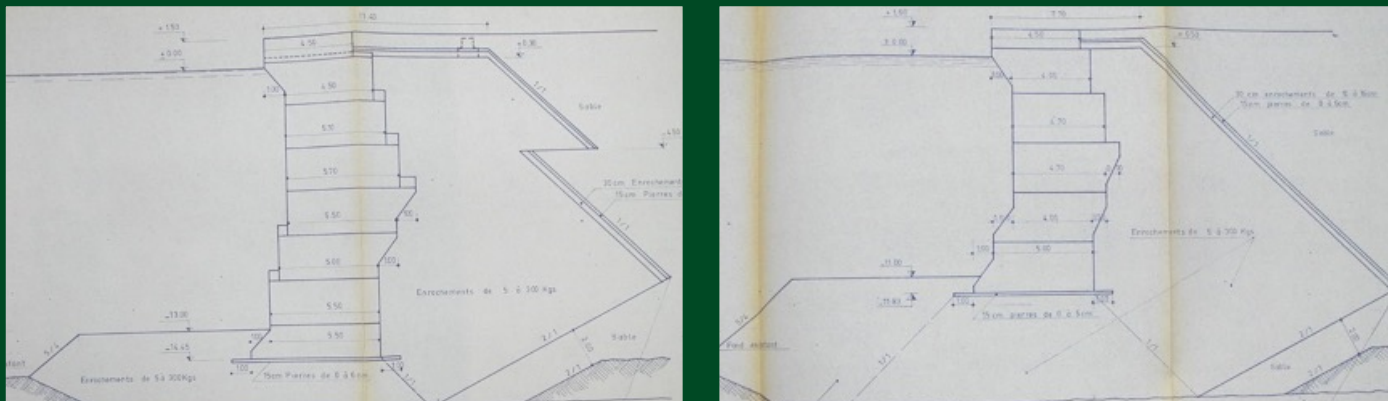
2.1.2.1 Introduction

The below chapters provide a general high-level description of the main civil infrastructure items within the Port of Beirut, particularly surrounding the explosion site, to understand the main facilities affected by the explosion and to provide initial ideas for consideration for further studies and investigations. The report prepared by the Management and Investment of the Port of Beirut, dated 24th of August 2020, was used as the basis for this stocktaking task, in particular for buildings and in addition to the use of Google Satellite imagery. It should be mentioned that the Consultant was unable to undertake a site visit to confirm the information provided within said report and therefore considers it as factual and accurate for the purposes of this high-level stocktaking task.

2.1.2.2 Quay walls

The Port of Beirut has 16 quays with varying lengths and depths. It is understood that the majority of the quays are constructed as concrete block walls type (see cross sections below) while the new extension at Quay 16 (approx. 500m) is constructed as a piled deck structure.

Figure 3: Cross sections at Quays 12 (left) and 13



Source: HPC

As apparent from the photography and satellite imagery, a large section of Quay 9 (approx. 160m of quay wall and adjacent apron/terminal area, approx. 1 ha) was completely destroyed. In order to correctly estimate the level of damage of this quay, extensive structural assessments are required to be undertaken both above and below the water level to determine the extent of damage and to accurately understand the options for the quays repair/rebuilding.

In addition to the obvious damage to Quay 9, it is strongly recommended that extensive structural assessments be undertaken on all quays in the direct vicinity of Quay 9 in order to determine if any damage has been caused by the catastrophic explosion and subsequent aftershock that occurred. It is not common practice that the structures would be designed to resist such a blast.

Therefore, the Consultant would strongly recommend that in-depth inspections are completed for these critical infrastructure items as soon as possible, in order to assess whether the explosion caused any changes in the structural integrity of the quays (shifting or damaging of blocks, foundations, etc.). Depending on the observed damages to the quays in the closest proximity to Quay 9, additional surveys may also be deemed necessary to the quays situated further from the blast radius.

In the case that major works is required for the repairs/rebuilding of quay walls, a general budget figure of quay wall construction between 50 - 90,000 USD per m of quay wall could be expected to provide an indication of possible cost implications. This figure serves only as an indication as the costs are dependant, amongst other things, on the type of construction, water depths, design loads, etc.

As previously stated, this item can have a major impact on the financial costs of rebuilding the port back to its previous state.

2.1.2.3 Pavement

Pavement structures are important to allow for safe and efficient travel of vehicles and equipment throughout a terminal. The Port of Beirut has various pavement structures varying from bitumen, concrete and block pavers throughout the terminal areas. The below figure shows an example of some pavement structures within the port taken from available as-built drawings.

Figure 4: Example of pavement structures



Source: HPC

No information was provided on the status of the pavements or its conditions, however due to the observed amount of debris in the provided photos, it can be assumed some pavement areas have been damaged to varying degrees. Visual surveys in conjunction with pavement testing should be undertaken to ensure the overall usability of the pavement.

2.1.2.4 Utilities

Utilities (potable water, firefighting, sewage, electricity/IT and storm water drainage systems) are critical facilities of any port and logistic area. It is understood that utilities are provided throughout the different port areas with the use of underground or semi-buried concrete channels, pipes and cables ducts.



Following the explosion and subsequent shock wave, such services may have been damaged due to excessive vibrations and/or shifting of foundations, which in turn may have damaged the concrete channels, pipes or ducts.

To understand potential costs, as a general guide for the construction of pavement in a new construction, pavement structures are generally considered to be in the range of 50-100 USD per m² depending on the type of use.

No information was provided on the status of the networks or their observed conditions. However, as an example as seen in the figure adjacent (potable water network, blue lines), a section of the potable water network ran directly through the location of the explosion, thereby rendering through least this section of the network unusable.

Due to the importance of such services, it is highly recommended that the full extent of utility networks surrounding the explosion are surveyed for damage. It also needs to be determined that their capacities are in line with their designs.

Facilities such as sewage treatment/pumping stations and electrical sub stations shall also be inspected as part of the utility systems. The following electrical and water facilities were recorded in the report prepared by the Management and Investment of the Port of Beirut (24th August 2020), with their associated damages:

Figure 5: Facilities condition

Facility	Condition	Facility	Condition
Electrical/Substations		Water/Water treatment	
Power Plant	Minor damage	SR1	Total loss
LT1	Unknown	SR2	Total loss
LT2	Minor damage	SR3	Total loss
LT3	Minor damage	SR4	Total loss
LT4	Partial damage	SR5	Total loss
LT5	Total loss	Main Water Tank	Various damages
LT6	Total loss		

Source: HPC

To understand potential costs, as a general guide for the construction of utilities (potable water, firefighting, sewage, electricity/IT network and storm water drainage systems), in a new construction, utilities are generally considered to be in the range of 30-60 USD per m².

2.1.2.5 Basins/water areas

Within the port there are 4 basins (basins 1-4), with depths ranging from -3 to -11 m. Following the explosion, much of the debris was scattered throughout the terminal. It is therefore recommended that hydrographic surveys are undertaken in each of the basins to ensure that major debris is not present, thereby ensuring that the basins, operational depths are guaranteed.

2.1.2.6 Buildings

Surrounding the explosion site, varying extents of damage are apparent to all the buildings within the port, with many buildings being considered a total loss/write off based on the available information provided within the report and examination of satellite imagery. The following tables provide a general summary of the major building structures based on the available data. The layout prepared by the Consultant aligns with the buildings listed below.

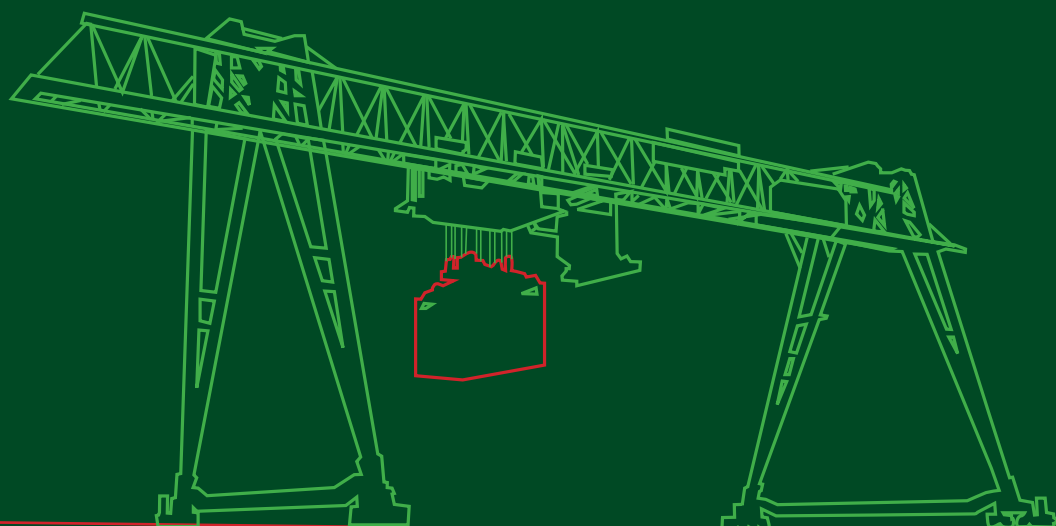


Figure 6: Buildings condition

General Warehouses			Administration (CATAC) Buildings	
Warehouse	Approx. Size m	Condition	Admin Buildings	Condition
5	4070	Total loss	CATAC A	Minor damages
6	3510	Total loss	CATAC B	Significant damage
8	1909	Total loss	CATAC C	Minor damages
9	4400	Total loss	CATAC D	Minor damages
10	4400	Total loss		
11	4400	Total loss		
12	5200	Total loss		
13	6720	Total loss		
14	6720	Total loss		
15	7840	Total loss		
17	6600	Total loss		
18	7700	Total loss		
19	8250	Total loss		
21	5200	Total loss		
AR	7500	Total loss		
			Miscellaneous Buildings	
			Building	Condition
			Silos	Total loss
			Ferry Passenger Building	Unknown/unclear
			Garage	Total loss
			Lot G Building	Minor damages
			Fire Station	Unknown/unclear
			Misc. Building (1 Misc.)	Unknown/unclear

Source: HPC

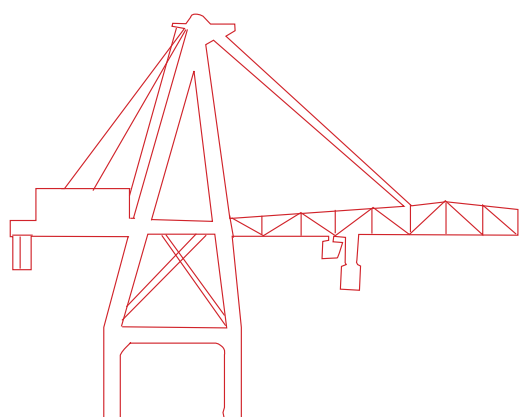


Figure 7: Free zone buildings condition

Free Zone Buildings	Approx. Size m ²	Condition
Building 2 (Free Zone Shop) ² (2 FZ)	4000	Major damage
Building 3 (Carpet Bazaar) (3 FZ)	2800	Major damage
Building 4 (4 FZ)	3626	Total loss
Building 5 (5 FZ)	4000	Major damage
Building 6 (6 FZ)	4000	Major damage
Building 7 (7 FZ)	2500	Major damage/Total loss
Logistics Building 1 (1 FZL)	3600	Major damage/Total loss
Logistics Building 2 (2 FZL)	10600	Major damage/Total loss
Logistics Building 3 (3 FZL)	9000	Major damage/Total loss

Source: HPC

Buildings not considered a total loss should be thoroughly assessed by an experienced civil engineer to evaluate their structural integrity and to determine the most suitable rehabilitation measures.

2.1.2.7 Recommendation

Quay Walls

Quay walls should be thoroughly inspected to determine the extent of damages and the associated requirements for repair or replacements of quay wall sections. Extensive inspections should be undertaken in the closest proximity of the blast, with a decreasing level/frequency of tests being performed ad-hoc depending on the damage observed as the distance from the blast incidence zone is increased.

Preliminary inspections could include a visual assessment to observe any obvious shifting of blocks examining their alignment/position both over and above the water and to check for any visible damage in the quay blocks. In conjunction with the visual assessment to determine general alignment/position, topographic/bathymetric surveys may be completed along the quay walls to make a comparison with the as built drawings, thereby allowing an assessment of possible movements of the blocks and foundations. These preliminary checks should be completed by a detailed assessment of structural integrity of the quays with regard to any changes that may have been caused by the explosion (displacement of blocks, damages, etc.).

Utilities

Utility network functionality testing can be initially completed with a simple capacity check ensuring outputs align with their original designs (e.g. adequate water pressure for water network at taps/buildings). In the case of obvious discrepancies, or when a complete lack of delivery of a utility is observed, further detailed investigation will need to be undertaken which may involve excavation of sections to visually and physically test for leaks or disruptions in electrical or IT cabling.

Pavement

Pavement inspection can primarily be completed with a visual inspection to determine any major damages to areas. When more detailed information is deemed necessary, non-destructive testing e.g. deflection, GPR or profile testing, or destructive testing measures such as coring or DCP tests may be required for a more accurate determination of a pavements' residual strength.

Basins

Hydrographic surveys should be completed within the basins to ensure that they are free of debris resulting from the blast, thereby guaranteeing the stated basin depths and ensuring future vessels safe mooring areas.

Buildings

Buildings that still remain and are not classified as a total loss should be thoroughly assessed by an experienced structural assessment contractor to determine the full extent of damages, thereby allowing a comprehensive set of repair and rehab.

2.2 Competition from other ports, industries and regional markets

2.2.1 Ports in the region – Context

Container ports have two main functions: gateway ports function and transshipment port function. Gateway ports are the maritime gateways to their respective hinterlands and mainly handle export and import cargo. Ports like the Spanish ports of Valencia and Algeciras, the Tanger-Med port in Morocco, Malta's Marsaxlokk, Piraeus Port in Greece and the Port of Beirut in Lebanon, along with the Egyptian ports like Damietta port and East Port Said are transshipment hubs. These serve not only for freight moving throughout the greater Mediterranean region but also act as a connector to ports as distant as the Americas and Far East.

Provided that gateway ports provide a minimum level of performance and their hinterland do not overlap, the port location with its hinterland are the major determinants in the choice of a freight forwarder, carrier or consignor/consignee in selecting a port.

The Mediterranean Sea is one of the busiest shipping routes for commercial traffic and is used by the largest container ships, most of which are deployed on the Far East - Northern Europe routes. The major transshipment hubs shown in the figure below have been established in the east, west and central Mediterranean.

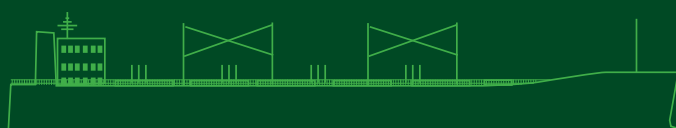


Figure 8: Major transshipment hubs in the Mediterranean



Source: HPC | Image: Google Earth

The Mediterranean Sea can be divided into three regions when it comes to transshipment traffic:

- The Western Mediterranean: Algeciras, Tangier.
- Central Mediterranean: Marsaxlokk, Gioia Tauro.
- Eastern Mediterranean: Damietta, Port Said, Piraeus, Beirut.

Transshipment in these ports serve two functions: Regional redistribution traffic and sorting between mainline services. To the west and at the northern exit of the Mediterranean, this „relay“ transshipment between North Europe and transatlantic services plays an important role.

Despite the increase in transshipment in most Mediterranean ports in recent years, growth has been slower than predicted. This is partly due to the impact of the even larger ships that are also deployed on services calling at Mediterranean ports from overseas ports that serve as gateways to Southern Europe. This trend is more important for services from the Indian sub-continent and the Far East to the Mediterranean.

2.2.2 Overview of Eastern Mediterranean Region

The Mediterranean has nine major transshipment hubs, of these two stand out because of their central location: the island of Malta's Marsaxlokk port and Gioia Tauro in Southern Italy. The strong development of the transshipment volumes at COSCO's container terminal in Piraeus is impressive and a direct correlation of the shipping line's engagement at the terminal.

Figure 9: Transshipment ports hubs in the Eastern Mediterranean



Source: HPC | Image: Google Earth

Transshipment volumes are footloose volumes that bring great risk and uncertainties to the hubs concerned, certainly when carriers are not (directly or indirectly via subsidiaries) financially involved in the terminal operations. Transshipment hubs base their competitiveness on a few critical factors e.g.:

- the geographical position.
- nautical accessibility.
- operational performance (fast and reliable), and
- pricing strategy.

Taking the above into account, the Port of Beirut's position and role as a major transshipment container port and gateway port should be assessed. The assessment should include import and export volumes for Lebanon of other commodities such as dry bulk, liquid bulk and general cargo volumes. The Port of Beirut handles 82% of Lebanon's imports and exports and it controls over 98% of all containers handled at Lebanese Ports. The majority of cargo handled through the ports is destined for the City of Beirut and the Mount Lebanon District (ESCWA & PoB, 2020).

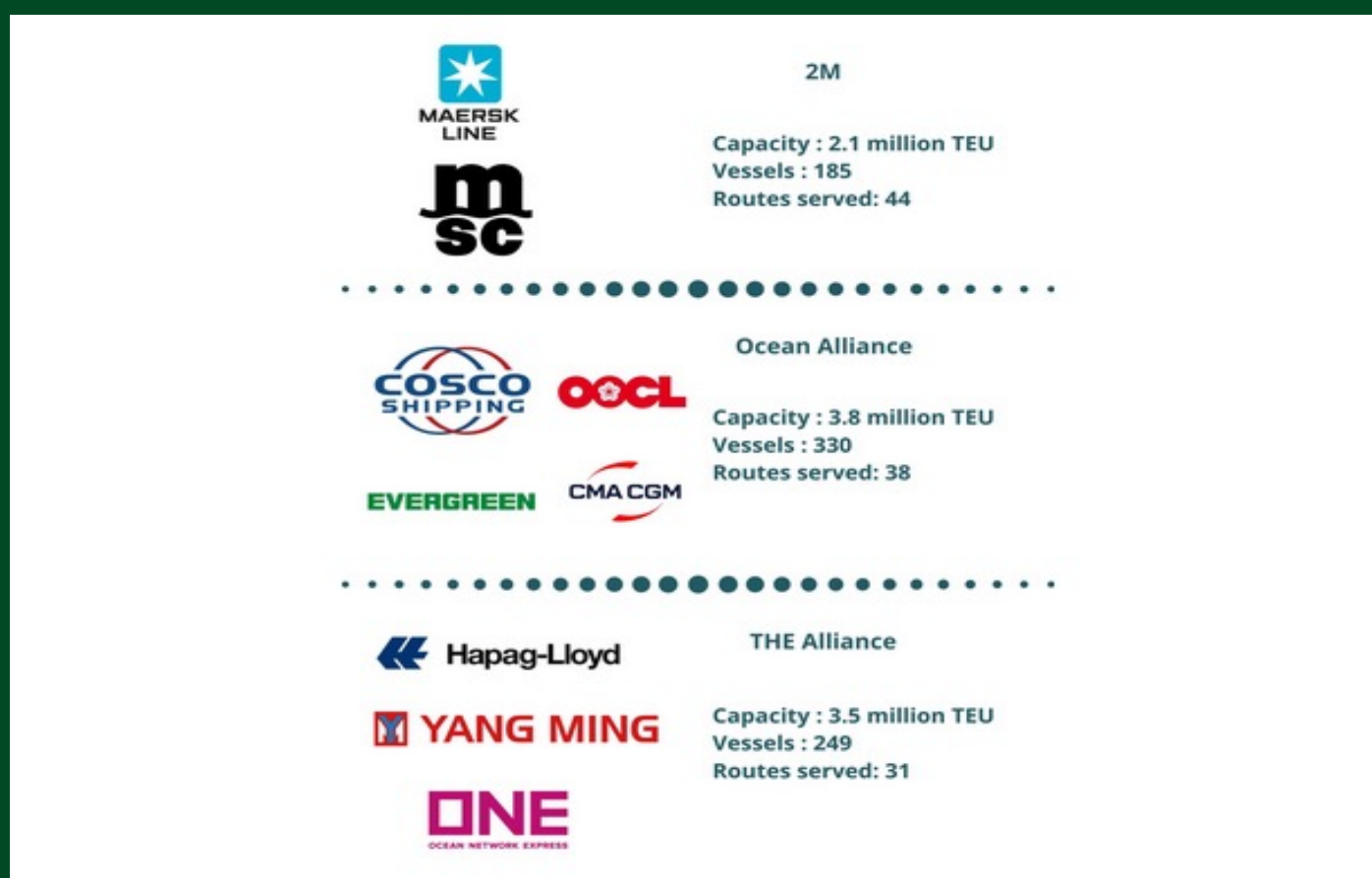
2.2.3 Transshipment Hubs

The development of a limited number of strategic alliances has created a strong concentration in the demand for container handling, putting this in a handful of players. In the Mediterranean Sea, carriers mostly invest in terminals for controlling pure transshipment hubs via wholly owned subsidiaries or partially owned subsidiaries. All main transshipment hubs have some form of involvement (directly or via terminal operating companies) from the top tier container shipping lines to better control costs and operational performance. Examples are e.g., Maersk Line which is based in Algeciras and East Port Said, COSCO Shipping Ports owns

the port of Piraeus and has minority shares in a number of Spanish ports, while CMA CGM has a considerable involvement in the Marsaxlokk terminal.

Piraeus' rapid development and growth is predominately due to Piraeus Container Terminal (PCT), a subsidiary of China's COSCO Pacific. The take-over of COSCO and the completion of the upgrading of the container terminal (Terminal III) will increase the capacity to potentially 6.2 million TEU. This move has led to COSCO concentrating the transshipment traffic for the region in Piraeus.

Figure 10: Maritime alliances



Source: HPC

The development so far has shown that pure transshipment hubs experience higher throughput volatility than ports with a mix of gateway cargo and transshipment cargo (see e.g. the development at East Said Port). By striving for a demand mix (i.e. gateway cargo and transshipment cargo), port managers and policy makers involved in port management can expect to reduce throughput volatility and related negative external effects (Notteboom, Parola, & Satta, 2019). In the table below one can see the importance of container transshipment volumes for Port of Beirut and the BCTC container terminal.

Figure 11: Overview of container volumes including transshipment volumes

Country	Port	TEU (2018)	Transship- ment (2018)	TEU (2019)	Transship- ment (2019)
Cyprus	Limassol	394,000	78,800	408,000	81,600
Egypt	East Port Said Port	2,521,021	2,385,237	3,003,840	2,840,177
	El Sokhna	654,510	7,861	634,656	16,569
	West Port Said	584,397	227,819	654,319	268,061
	Damietta	1,150,630	691,391	1,068,002	582,814
Greece	Piraeus	4,409,000	3,571,290	5,160,000	4,179,600
Israel	Haifa	1,463,997	292,799	1,379,000	275,800
Italy	Gioia Tauro	2,328,218	2,211,807	2,522,876	2,396,732
Libanon	Beirut	874,609	431,146	734,645	494,436
Malta	Marsaxlokk	3,310,000	3,177,600	2,720,000	2,611,200
Romania	Constanta	668,016	133,603	666,036	133,207
Turkey	Ambarli (Istanbul Area)	3,194,196	638,839	3,104,882	620,976

Source: Port of Beirut, secondary research, HPC

2.2.4 Port of Beirut's Role at National and Regional Level

The main hinterland for the port, apart from serving the demand from Lebanon, is transport to/from Syria, Iraq, Saudi Arabia, and Jordan. Estimated transport time for truck transport and transport costs are indicatively shown in the figures below (ESCWA & PoB, 2020).

The Port of Beirut is the most important and dominating port in Lebanon, followed by the Port of Tripoli, 80 km north of Beirut.

In 2019 the container terminal in the Port of Beirut BCTC, handled 1.23 million TEUs, whereas the Port of Tripoli handled approximately 80,000 TEU. The concentration of the population and industrial activities in the Beirut area result in approximately 70 percent of container volumes being distributed to this area and 30 percent to the other parts of Lebanon.

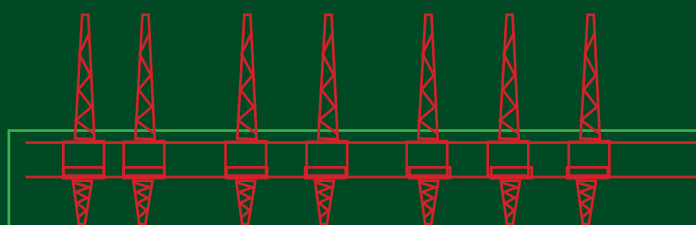
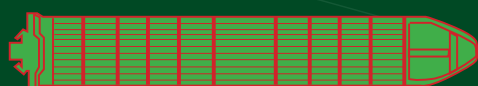
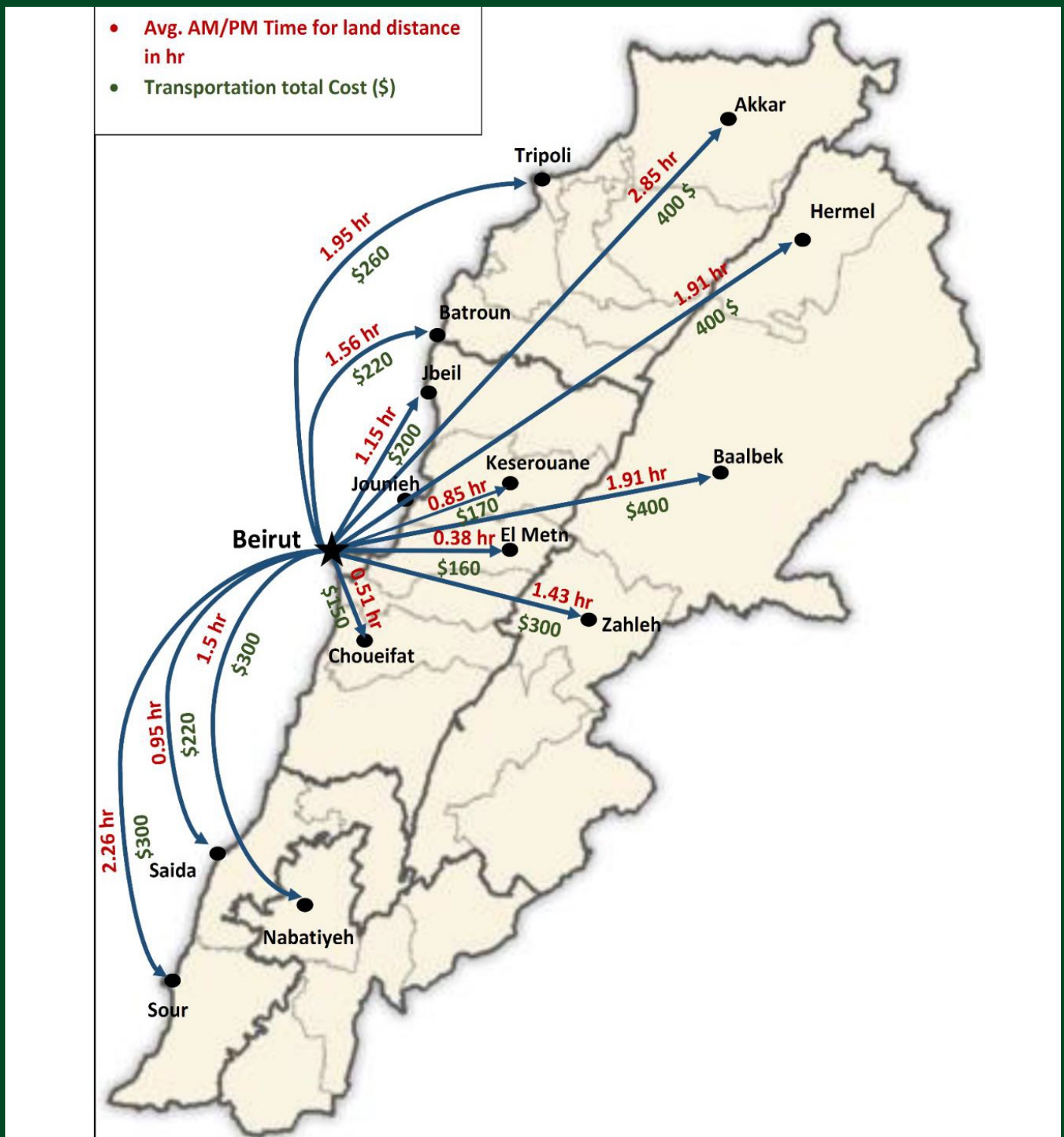


Figure 12: National hinterland transport - Transport time and costs

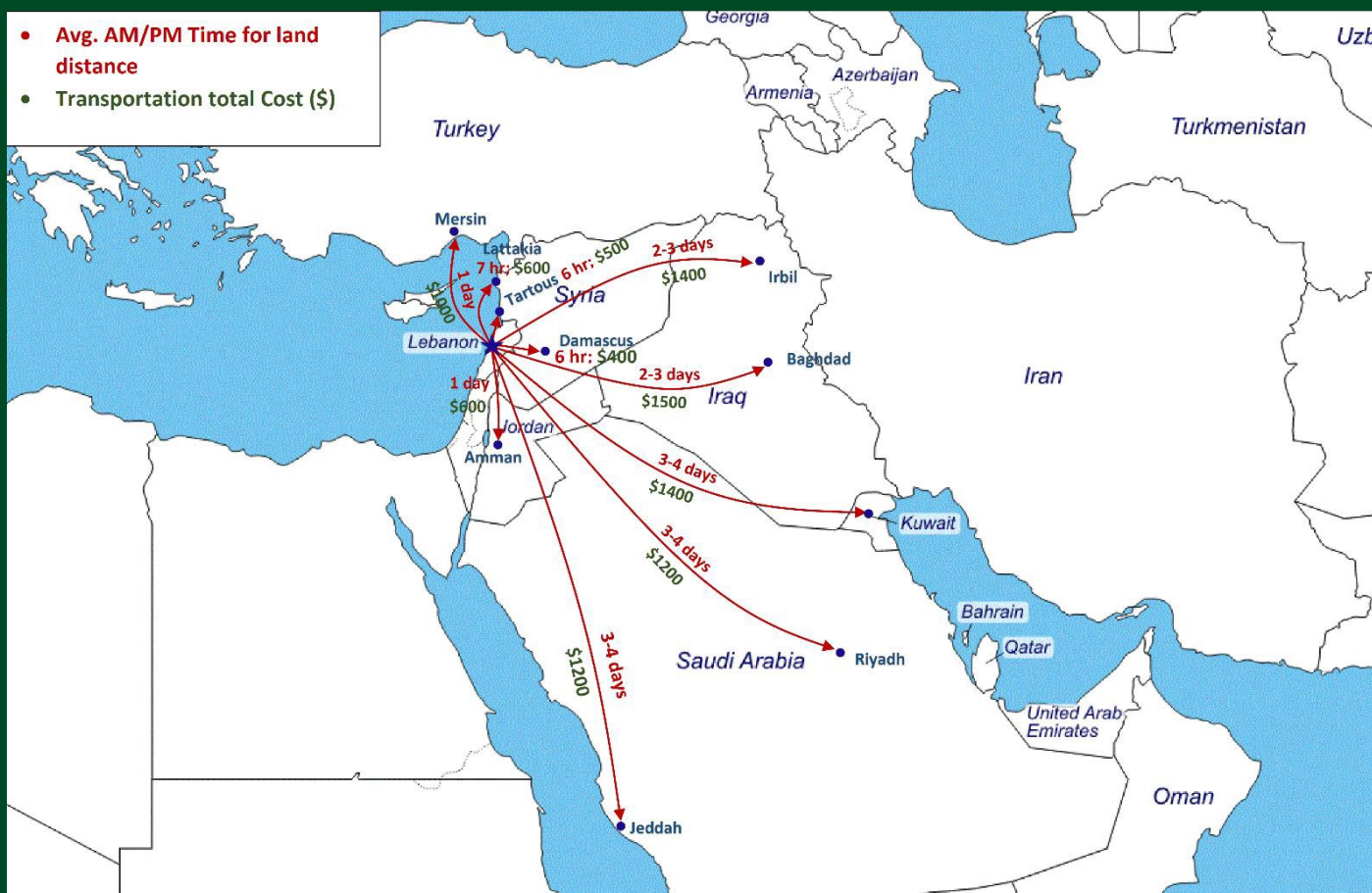


Source: HPC

Hinterland transports of container volumes to neighbouring countries currently include various destinations in Syria and some minor volumes to e.g. Iraq. These volumes are always transported by breakbulk trucks after the containers have been stripped in the port. Currently no containers can leave Lebanon, therefore Iraq, Saudi Arabia and Jordan

have become increasingly competitive discharge and stripping areas. The development of the container terminals in e.g. Um Qasr (Iraq) and Aqaba (Jordan) have already altered the regional playing field, and planned developments in the area, will continue to do make this trade difficult for Beirut to dominate anymore.

Figure 13: Regional hinterland transport - Transport time and costs



Source: HPC

2.2.5 Overview of key industries

Lebanon's macro-economy currently finds itself in a problematic situation. In October 2019, the economy plunged into financial crisis brought about by a sudden drop-off in capital inflow and a corresponding exchange rate crisis. At the end of March 2020, the Government imposed a lockdown to counter COVID-19 and in August 4, 2020, a massive explosion rocked the Port of Beirut, causing severe damage.

Real GDP is estimated to decrease by 19.2 percent this year and projected to decrease by a further 13.2 percent in 2021. Lebanon is experiencing a substantial contraction in economic activity and one indication of this is that cement deliveries and construction permits have experienced a decline of 55.7 percent 67.9 percent respectively, compared with Q1 2019. Net exports are expected to be the sole positive contributor to GDP, driven by falling import volumes (total value of imports declined by 48.7 percent during the first six months 2020, compared with the same period 2019) (World Bank, 2020).

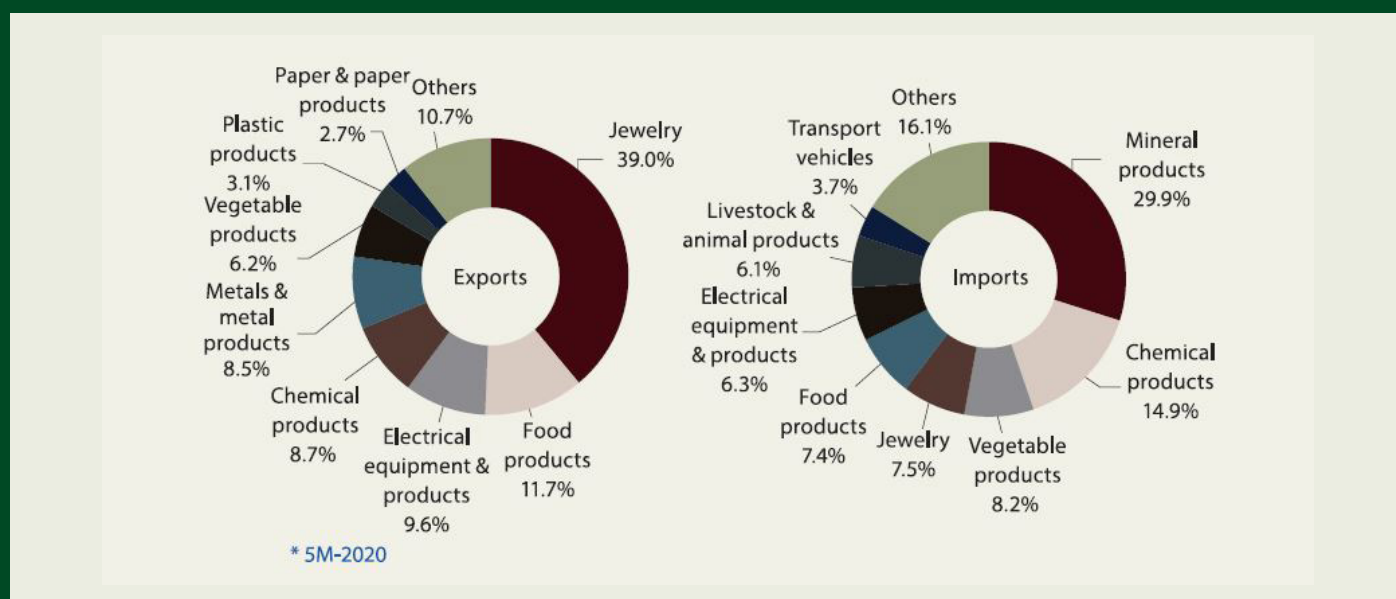
The implications of a sudden decline in capital inflow for an economy with a high import ratio for its consumption

basket, combined with an inability to sufficiently produce substitute goods in the short term, has led to a steady depletion in foreign exchange reserves. Added to this was the inflation rate in 2020 which was estimated to be 70 percent. The latest foreign trade statistics for the first five months of 2020 suggest a net contraction in imports of 50.4 percent, alongside with a decline in exports, which caused a reduction in the trade deficit by 44.3 percent.

The breakdown of exports by product suggests that the most significant decline among the major categories was reported for plastic products with 43.1 percent, followed by paper and paper products with 35.7 percent, chemical products with 26.1 percent, metals and metal products with 21.5 percent and electrical equipment and products with 19.0 percent. The report covered the first five months of 2020 compared to the same period in 2019.

The breakdown of imports by product suggests that the largest decline was reported for transport vehicles being by 70.4 percent, followed by metals and metal products with 69.1 percent, electrical equipment and products with 61.2 percent and mineral products with 57.7 percent.

Figure 14: Breakdown of exports and imports by commodity



Source: Bank Audi sal, Lebanon, Economic Report, 2020

2.2.6 Overview of competing ports development

In terms of competition between ports, one can differentiate between competitiveness between ports that are within the same country and located close to each other; and between ports that are located far away from each other. A different type of competitiveness also exists with regards to the transshipment of containers. As described above, container shipping lines use different terminals based on the perceived optimal routing for the respective shipping line, including the ownership of the container terminal.

Good hinterland connections are of increasing importance for the competitiveness of a port as well as the related processes of developing trade corridors. By doing this, the goal is to integrate the port system into a multimodal transportation network in order to improve market access, fluidity of trade and the integration in an industrial network. In this context, a port must have interfaces between major ocean trade and economic activities of the ports and inland terminals that provide intermodal structures and connections between the fore- and hinterland.

To be able to reduce port-related road congestion a strategy of shifting to other hinterland transport modes, such as rail, inland waterways, pipelines and short sea shipping can be pursued. At the Port of Beirut the main transport mode is by truck, or alternatively short sea transports.

Regarding competition between ports and container terminals in Lebanon the following ports have been considered relevant as potential competitors to the Port of Beirut due to their respective geographical proximity:

- Lebanon – Port of Tripoli.
- Syria – Port of Tartous, Port of Lattakia.
- Israel – Port of Haifa, Port of Ashdod.

To estimate their respective competitiveness different competitive factors have been assessed for the ports concerned.

Figure 15: Port competition analysis

Port Competition Analysis	Ports					
Criteria - Assessment of current situation	Beirut	Tripolis	Tartous	Lattakia	Haifa	Ashdod
A. Situation after the explosion 4.8. 2020						
1. Market and Location Strengths						
Close to population centre (>2.5 million inhab.)	5	3	1	1	1	1
Close to production cluster (existence of industrial zones nearby)	5	3	1	3	5	3
Strategic location to attract main line shipping services (container)	5	3	1	3	5	5
Regular ship calls (>100/year)	5	3	3	3	5	5
Large number of shipping related companies in the port	5	1	1	3	5	5
Sum	25	13	7	13	21	19
2. Maritime Access						
Sufficient depth >14 m						
*access channel	5	3	5	5	5	5
* berths	5	3	3	3	5	5
Short access channel (less than 4 nm)	5	5	3	3	5	5
Sum	15	11	11	11	15	15
3. Port Equipment Handling Capacity						
More than 8 STS Gantry Cranes	5	3	3	3	5	5
General cargo handling productivity (>500 tons/h) Comment: Capacity reduced since 4.8.2020	3	3	1	1	5	5
Dry bulk/Grain capacity - automatic unloading with > 1,000 tons/h, (No grabs used) Comment: Capacity reduced since 4.8.2020	1	1	1	1	5	5
Sum	9	7	5	5	15	15
4. Hinterland Access (shipping lines'/forwarders' views)						
Hinterland economic size	5	3	1	3	3	3
Road connectivity						
* good connections to/from the port	5	3	3	3	5	5
* good connections/accessibility to the main local and international network	5	3	3	3	5	5
*intermodal accessibility	0	0	0	0	3	3
Sum	10	6	6	6	13	13
Total	59	37	29	35	64	62

Source: Alphaliner, Port websites, Logistics assessments, UN statistics, interviews, HPC

The competition assessment shows that the Port of Beirut has a leading position together with the Port of Haifa and the Port of Ashdod in terms of technical parameters. The explosion 4th August resulted in the drastic reduction of general cargo and grain handling capacity in the Port of Beirut. Prior to the explosion, the Port of Beirut had the highest ranking.

The Israeli ports Haifa and Ashdod get a high technical ranking but can currently not be seen as real alternatives to the Port of Beirut due to the fact that the current legislation does not allow any imports via Israel to Lebanon. Whether this will change in the future is difficult to assess, but not likely to happen in the short term. Aside from their lower ranking, the current legislation in Syria does not allow Lebanese cargo to be imported via the Syrian ports, which means that they are also not a realistic alternative.

2.2.7 Growth potential in Port of Beirut hinterland

The main hinterland for the Port of Beirut is the greater urban area of Beirut and the Mount Lebanon District in Lebanon, followed by Syria and to a limited extent Iraq and Jordan.

Lebanon

Lebanon is a small country with an area of 10,452 km² with a coastline of 225 km and borders to Syria and Israel. The country's role in the region was shaped by trade. Lebanon is named „the Pearl of the Middle East.“ It serves as a link between the Mediterranean world and India and East Asia. The merchants of the region exported oil, grain, textiles, metal work, and pottery through the port cities to Western markets.

The Lebanese economy has fallen into a recessionary trap in the first half of 2020, with the real economy caught in a depression characterized by a significant contraction in real output amid the Corona Pandemic effects and the State's default on its foreign debt. Real GDP is forecast to decrease by 19.2 percent in 2020 and a further decrease of 13.2 percent in 2021. Lebanon is experiencing a substantial contraction in economic activity.

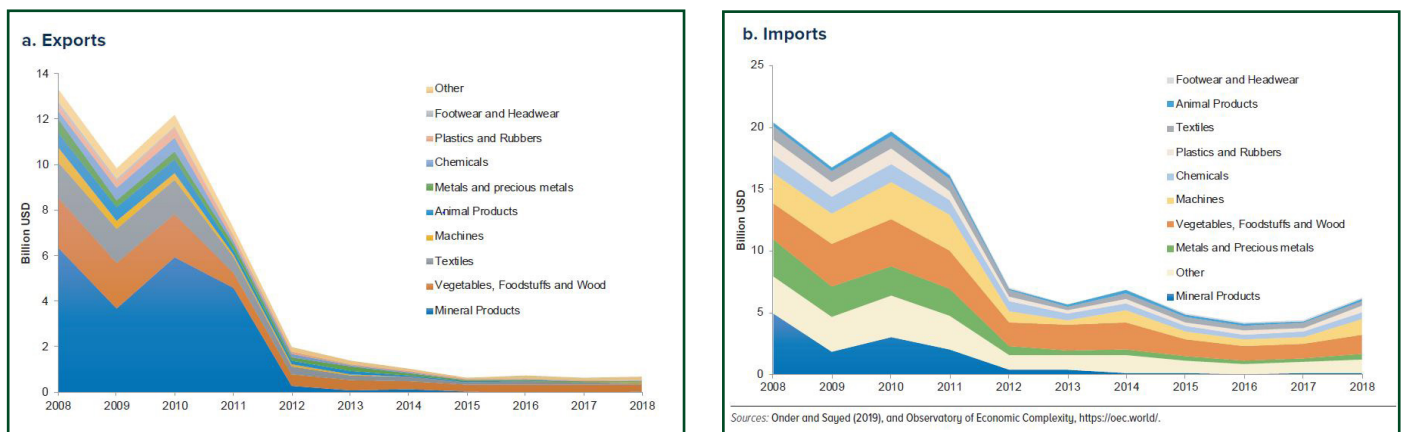
A contraction of the Lebanese GDP per capita in a real terms and two-digit inflation in 2020 will undoubtedly result in a substantial increase in poverty rates affecting all groups of population in Lebanon through different channels such as loss of productive employment, decline in real purchasing power, stalled international remittances and so forth (World Bank, 2020).

This means that the growth perspectives are negative and a net contraction in imports by 50.4 percent alongside a 7.3 percent decrease in exports can be expected. Which then will lead to a reduction in the country's trade deficit, a positive effect. In the latest World Economic Outlook (IMF, October 2020) projections for Lebanon, no projections have been made for 2021 and 2022 due to the large uncertainty of the further development.

Syria

Syria has experienced a reduction of economic development during the war between 2011-2018. Over that period, GDP has declined by two thirds compared to the pre-conflict level and Syrian trade has declined dramatically, as shown below.

Figure 16: Dynamics of Syrian Trade 2008-2018, US\$, billion [2009-2019; USD bn]



Source: World Bank



In a scenario simulation study by the World Bank, the potential effects of a more stable post-conflict Syria have been studied and simulated. The post-conflict outlook for the growth drivers in turn, depend on the political settlement outcome which directly affects the availability of reconstruction funds and the voluntary mobility of refugees.

Voluntary mobility would not only be preferable on humanitarian grounds but also on economic terms. The political settlement scenario will also significantly affect human capital growth and productivity growth. Focusing on the voluntary mobility case, under our moderate scenario of partial political settlement with strong guarantees for micro-security and property rights, the average GDP growth and GDP per capita growth are estimated to 8.4 percent and 6.1 percent respectively over a 10- to 20-year time period. A precondition is an assumption that a final and stable resolution of the conflict has been achieved (World Bank, 2019).

The results of this study are interesting and show a possible growth perspective under the assumption that peace will prevail, which would also have a positive effect on Lebanon and the perspectives for Port of Beirut and Tripoli.

Iraq

Iraq is in a fragile situation. The drop in oil prices and COVID-19 pandemic are placing unprecedented strains on its economy. Faced with this multifaceted crisis, growth is expected to contract by 9.5 percent in 2020, Iraq's worst annual performance since 2003. Oil-GDP is expected to contract by 12 percent (capped by the OPEC+ agreement) while non-oil-GDP is expected to contract by five percent with sectors like religious tourism affected by COVID-19 measures. Subdued domestic demand and the deprecia-

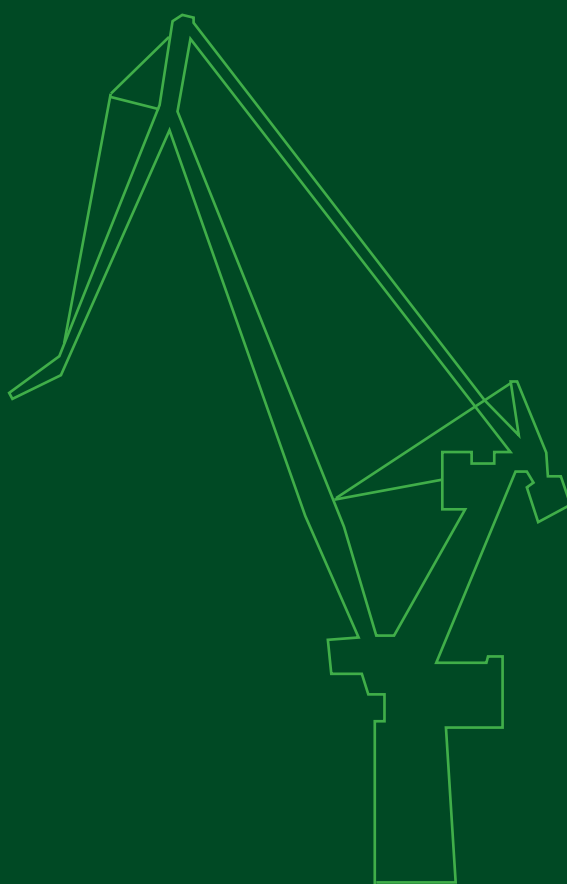
tion of the currencies of Iraq's main trading partners have kept inflation in check at less than one percent in 2020.

The outlook for Iraq will depend on global oil markets, the capacity of the Iraqi healthcare system to respond to COVID-19, and its economic reform process. If conditions ease, growth is projected to gradually return to 2 to 7.3 percent in 2021–2022, with the non-oil economy projected to bounce back to an average of 4 percent (World Bank, 2020).

Jordan

Jordan's economic growth slowed to 1.3% in the first quarter of 2020, reflecting only partially the impact of COVID-19 pandemic. Timid growth during the quarter resulted from an improvement in net exports and the marginal contribution of government consumption, while overall economic activity remained constrained by weak private demand and muted government investments.

Looking ahead, the pandemic will have as disruptive an impact on the Jordanian economy and its prospects as it is having on Jordan's trading partners and the MENA region as a whole; its gradual recovery over the medium-term could capitalize on lower oil prices and a steady momentum for reform to increase efficiency and boost productivity. For 2020 IMF WEO is estimating the GDP growth to be negative with -5 percent followed by an increase in 2021 by 3.4 percent.



3. PORT OF BEIRUT DEVELOPMENT STRATEGY

3.1 Current port situation and layout

That the Port of Beirut was able to receive the first vessels again within 14 days of the explosion says an extraordinary amount about the resilience and fortitude of the Lebanese people, and belies the massive damage caused to the overall and nearby landside infrastructure. The port has managed to maintain around 65 percent overall operations throughout, with the cleanup initially swift, but has increasingly labored under the lack of funds available for it. History has shown that as time extends, so to do the chances of a complete cleanup in a medium period, dwindle, as the world moves on.

The container terminal was able to be up and running almost immediately again, with most gantry cranes functioning as before, safely, and efficiently. Fortunately, with the silos dampening the blast, and thanks to sheer distance, the terminal was not seriously affected. However, the spare parts warehouse and workshops were completely destroyed, as were almost all containers on the western region of the container terminal, where the terminal had spilled over into the general cargo areas. In addition, over 180 containers were damaged or abandoned, requiring special intervention for their disposal. This included 52 hazardous containers which required specialized handling.

Some 1,250 vehicles being stored in the port have had to be written off and are currently piled for scrapping. In addition, approximately 30,000 mts of steel scrap and 50,000 mts of concrete and asbestos scrap have likewise been piled, awaiting funding for disposal. The steel is likely to be exported for scrap, while the latter will be treated and should be used in construction to fill areas of damage specifically in basin 3.

Quay 9, the site of the explosion, has a large crater approximately 124m in diameter, with the entire quay wall as well as the entire bulk discharging infrastructure based on it, destroyed. The Silos themselves remain partially standing and require full demolition and removal thereafter of the mixed materials. The point quay itself needs to be further investigated including geotechnical and underwater surveys to ascertain the integrity of the structure. The utilities however, require full replacement.

The passenger ferry, Orient Queen remains capsized alongside the quay 11, while 4 other floating wrecks remain moored at the old bulk terminal, with one sunken wreck along the opposite breakwater.

The overall salvage still required, is estimated to be between USD 50-100 m purely for removal and disposal without considering any further surveys or rebuilding actions. On the landside, severe damage has resulted in the almost total destruction of storage capabilities of the port. This is potentially one of the most urgent challenges to overcome, as well as presenting an opportunity as the storage facilities and bulk devices were generally severely

outdated and out of line with efficient modern structures and practices. At present, all non-containerized cargo can be discharged and delivered on a direct delivery basis only creating a revenue loss as well as severely negatively impacting the ports discharge performance. This leads to an increased cost of delivering non containerized goods, as well as a reduction in volumes causing additional revenue losses. Storage policies of the port must also be considered, in line with modern practices and more transparent allocation and contracting. This will be an initial requirement to resume storage asap and start to normalize practices in the port.

3.2 Port redevelopment and expansions strategy

At present, the port can be broken down into the historical old port and the partially modernized container terminal. The former is marked by a large amount of quayside with shallow or relatively shallow berths which, before the explosion, had poor utilization and limited the size of vessels able to call the port. The latter has a large quayside but is lacking in storage space, leading to the previously mentioned spillover into the rest of the port. The access to the port is generally via the port building, off the boulevard in the center of the city, with continuous congestion at the gate spilling over into the city. Even prior to the explosion, the storage space and cargo removal from the port was poor, leading to cargo landside congestion rather than the seaward side.

The focus, moving forward, must therefore be on optimizing port storage facilities and practices as well as cargo movement within and through the port, into the hinterland transport network. This transport network itself is also in need of review, and this should be undertaken dynamically as the politics of the region are rapidly changing.

The port must however continue to be able to function efficiently throughout any rebuilding or re-development with the minimum interference possible. The options presented herein are therefore final layouts proposed, with an anticipated time scale of 15-20 years to realize them in, both the integration into the city as well as the development of the further port. These should remain flexible within the final plans, with reviews of space and requirements undertaken every 5 years for the next 20 years to ensure a dynamic developing port scenario.

Keeping in line with health and safety requirements, as well as developing trends in global ports, the storage of hazardous goods must be addressed. Moving the so-called 'dirty' cargos, as well as 'hazardous and dangerous' cargos, particularly those not transported in containers, to external terminals outside of city limits, is recommended. A final note, as with any port development this should be seen and integrated into a holistic national cargo transport plan on a regular rolling basis. They are usually set out as a 30 year plan, reviewed every 5 years.

3.2.1 Port operational layout development

Even before the explosion, storage and laydown space, as well as cargo standing and turnaround time within the limited port space, presented major challenges to the efficient operating of the port. This caused congestion of the facility as well as the accesses to the port itself, thereby leading to congestion in the city. Many cargos were left for extremely long periods within the port, or even abandoned there, with no authority taking final responsibility or ownership for their handling or removal. The prime cases in point here are both the ammonium nitrate which had been abandoned over 7 years ago in the port, and several of the hazardous containers within the container terminal which had been abandoned up to 13 years ago in the port, both indicating extreme risk to the port, as well as taking up valuable space within a limited facility.

The port does however have enough quayside to handle all operations required if this space is suitably allocated and optimal use is made of draft considerations.

The current challenges for the port can be overcome with this, as well as dedicated and modern storage facilities, including monitoring and packing facilities to ensure that cargo flows rather than sits. Coupled with this, a national masterplan that encourages the development of inland logistics depots, closer to end markets, will see cargo moving through the port to where more space is available, reducing storage costs and risk to the supply chain of having all goods in one location.

The largest space requirement is that of the container terminal, and while the current space can be optimized to accommodate more than it does currently, it requires additional space and layout facilities. This will be used to develop pack bases to facilitate trade through unpacking and resorting and repacking for traders, within the Freezone area. Berth depths and requirements should also be considered to ensure that deep water vessels have suitable berths, and that cargo handling and storage aligns with this.

New landside port entrance and exit gates should be considered, potentially aligned to designated cargos and potentially for containers with separate entrance and exit facilities to spread traffic over the city, if no direct access to highway can be considered.

3.3 Port of Beirut development strategy

A number of elements play a key role in reviewing the strategic position of the port of Beirut moving forward, and the Roland Berger study related to this paper outlines the future potential role of the port, right-sizing and pricing options for the port, as well as the crucial governance model alternatives. These are all key considerations that have been considered.

The Port of Beirut is historically a gateway port for local consumption with a large potential hinterland. Due to its history and tradition as a city seaport, this role will not change, but requires some refinements to allow it to continue to operate as the heartbeat of the city. The integration into the buzzing city that envelopes it, limits port operations in terms of space and capacity, while creating traffic congestion, pollution stemming and potential health risks from port operations and logistics flows. The goal must be to keep the link between the two, while removing the congestion and pollution.

As is the case with similar cities, such as Barcelona, Hamburg and Cape Town, the port needs to remain functional to the needs of its citizens and hinterland, while exploiting the riches of its heritage in the modern world and giving these and the port back to its citizens. In this regard, the layout needs to consider a modern port capable of sustaining itself, creating jobs and encouraging trade, while integrating into a vibrant city.

3.3.1 Port Layout options

The joint study understood 3 options that could speak to this and would be suitable for providing to the requirements of the city and industry. These can also be seen as stages within the development, and as such potential phases of the same very long-term plan. These should be developmental, yet flexible, as the city, port and needs evolve into the modern era.

Three high-level spatial plans have been developed and are shared on this pathway. They are distinct, yet also provide a potential sequential order of how a potential expansion of the port could be mapped out to enable future growth. The spatial plans provided in this section include an illustration of the Port of Beirut layout and the allocation of the different terminals and relevant port areas. These areas are outlined in specific sections including further detailed information. A color code links the sections to the illustrated layout and respectively refer to the discussed option.

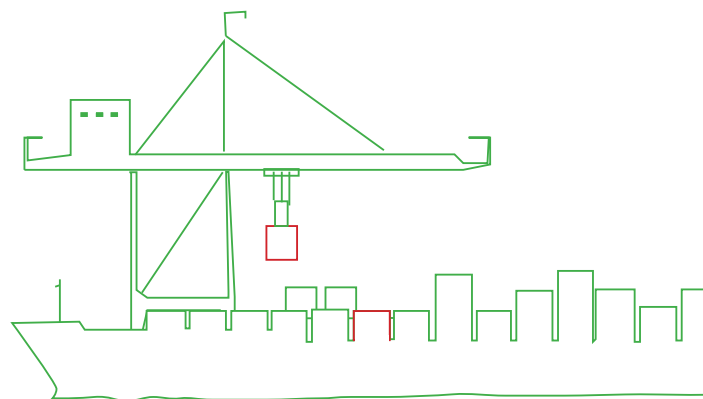
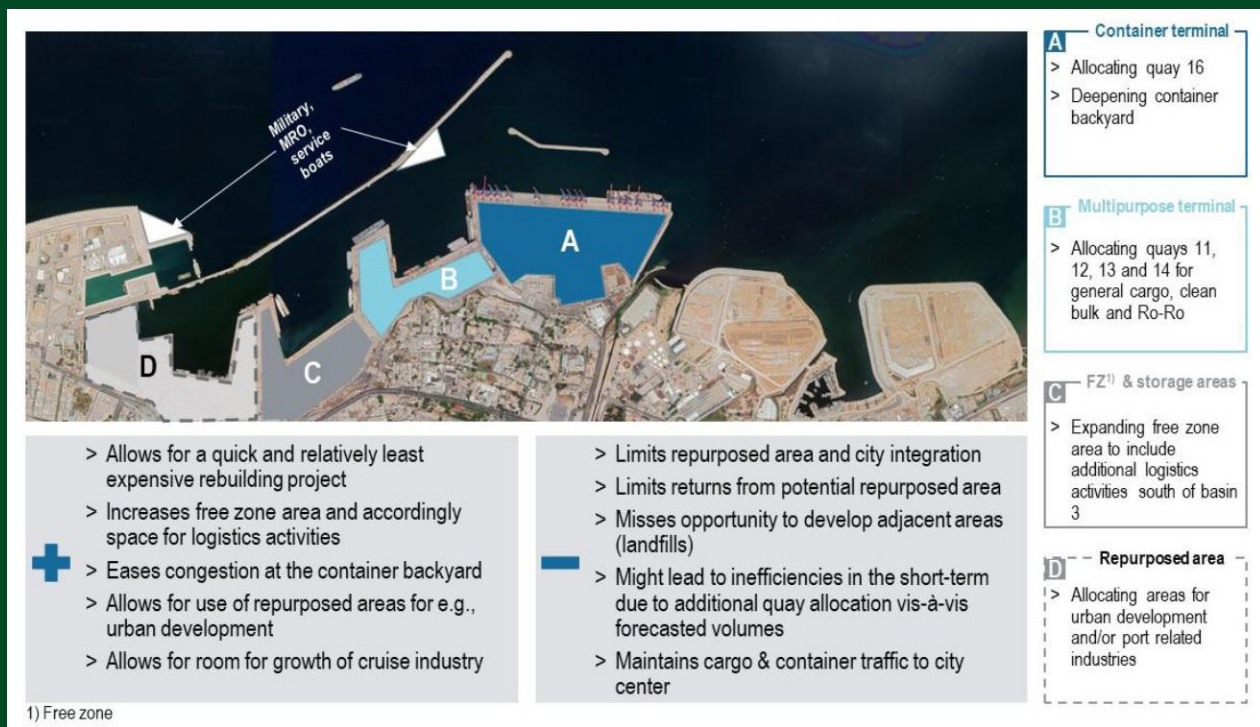


Figure 17: High-level spatial plan – Option A



Source: HPC, Roland Berger | Image: Google Earth

The first option builds on the status quo ante of the Port of Beirut before the explosion. In this option, the former tradition of business at the Port of Beirut is leveraged and right-sizing measures are carried out. It foresees the best use of the previous port area, maximizing capacity and streamlining cargo handling. Thus, some port land can be freed to be used either by port-related industries or for urban development.

Option A allows for a quick and cost-effective rebuilding project of the port. The damage caused by the explosion is repaired, yet no further major infrastructural changes are required. The free zone area is expanded, and related logistics activities can be supported. In addition, an adapted layout to the container backyard eases congestion in container storage. The repartitioning of the berthing capacity offers potential for the growth of the cruise industry. The envisioned set-up of the cargo terminal allows some port

land to be freed up which can potentially also be repurposed. Possible use of the area could be the integration of port-related industries or even urban development with some housing or other types of buildings. However, this option also faces some limitations. The quay allocation for multi-purpose terminals might lead to inefficiencies in the very short-term due to a slightly more dedicated berthing space. It only foresees a relatively small area to be repurposed which limits the potential for other, non-port-related uses, and thus misses out on the development of a true waterfront, preventing the development from being self-funding and requiring donors to fund the development. It would also limit future growth with no further space available for future expansion by missing the opportunity to develop adjacent areas, such as the current landfills to the East, which are then likely to be used in other ways and not available.

Option B: Expanding container storage and logistics park into first landfill area

Figure 18: High-level spatial plan - Option B



Source: HPC, Roland Berger | Image: Google Earth

The second option considers expanding the container storage and logistics operations into the first landfill area to the east. Thus, this option suggests pivoting from the past and developing a new port spatial plan after the August explosion damaged large parts of the non-container terminals and storage facilities. Due to expanding the container terminal and moving the free zone, a significant part of the previous port land can be made available for other use. This would facilitate housing of various types, educational and cultural buildings could also potentially be developed in its place.

A main advantage of this option is that by freeing up space for other purposes, the required port redevelopment would potentially allow for self-funding by channeling returns from the repurposed area development and logistics park¹. At the same time, the new location would allow for a large area of free zone storage with space for modern storage and repacking operations. The additional container terminal space has multi-fold benefits. The higher storage capacity allows for higher TEU turnover.

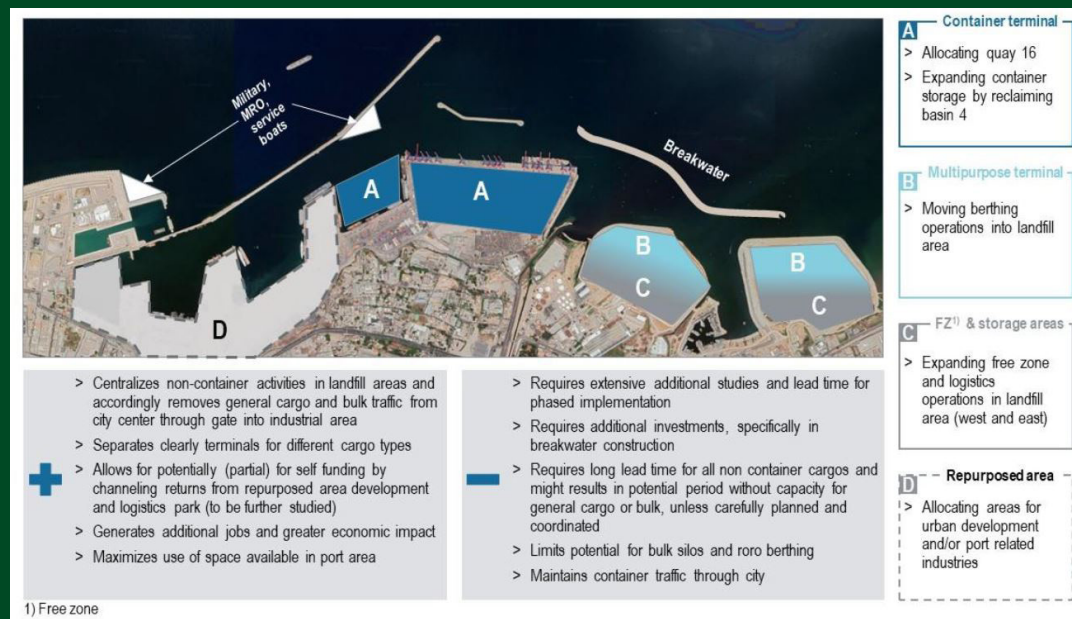
A new road access system would redirect the container traffic from the port through gate into the industrial area and away from the city center, easing congestion and pollution in the said downtown area. In addition, the increased activity could generate additional jobs and provide a greater economic impact. The second landfill area could also be made available for other potential storage, warehousing, freezone trading stations and logistics parks functions or for the development of offshore facilities not requiring the stringent port facilities of a developed port.

In order to realize this, however, further investigation into of the landfill and the exact requirements of the port and logistics park would be necessary. One potential negative could be limited growth for general cargo, and the need for project cargoes to be routed via other ports. Overarchingly, such a redevelopment plan would require a comprehensive political alignment on the expansion to the landfill and the plans to repurpose prior port land. This does however provide the most financially viable and integrated sustainable solution for the future Beirut port.

1) This assessment is subject to further studies and thorough feasibility assessment.

Option C: Expanding non-container terminals and logistics activities into both landfill areas

Figure 19: High-level spatial plan – Option C



Source: HPC, Roland Berger | Image: Google Earth

Option C offers the most extensive and expensive change to the current layout of the Port of Beirut and the position of the current operations. In this approach, most of the port activity except for the container terminal is shifted east towards both landfill areas. In addition, the current basin four is filled to provide room for expansion of the container terminal. This plan can only be realized though the construction of an additional breakwater to be installed to protect the to-be-repurposed landfill areas from strong waves. Due to the comprehensive restructuring of the port towards the east, a large plot of port land can be freed up and be repurposed for other uses.

It is especially this last point of providing potential for a repurposed use of large parts of the previous port area that make a compelling argument. It allows for the self-funding of the necessary construction work by channeling returns from the repurposed urban development area. Furthermore, it removes general cargo and bulk traffic from the city center through a gate into the industrial area and clearly separates the terminals for the different cargo types. In ad-

dition, both the extended port operations and the establishment of further companies in the repurposed area will generate additional jobs which will expand the economic impact.

Due to the extensive nature of this suggestion, however, extensive additional studies and lead time for implementation are required. The plan entails significant investments, specifically regarding the envisioned breakwater construction. Furthermore, the extensive changes would have a severe impact on the functioning of the port if not carefully sequenced. The construction to also might result in periods with no capacity for general cargo or bulk, unless other plans and developments pre-empt this. From a city planning perspective, this option foresees changes in the road system, yet significant amounts of container-related traffic would continue to be channeled through the city. As in option B, this plan would require political alignment in order to realize this option, and it is recommended that this should then be a potential considered expansion beyond option B.

3.4 Strategic roadmap

Although 3 options are provided for the purposes of comparison, they represent a fraction of a vast array of options, and simultaneously could be seen as steps along a greater timeline or strategic roadmap towards the growth of the port. The space required for the redevelopment and the growth of the port has been highlighted.

The current shape layout of the port, being long and narrow with little access to intermodal links, and the high cost in creating these, together with the shallow draft of the first 3 basins of the port, means that the historical old part of the port is not conducive to the expansion and growth of the port. To rebuild these as before, or even more modern versions in the same layout would severely limit growth potential.

Thus, the crucial aspect for the growth of a new state of the art digital port is the ability to be flexible and grow as automation and trade grows. The port needs to develop larger, more open plan facilities, preferably away from residential and inner-city areas. The landfill areas provide the suitable solution being both large and square in shape and could provide the further storage areas required. Together with the flexibility to handle large scale manual cargo handling, highly automated grid container handling, or logistics park warehousing and packing stations, or a combination of these, depending on what the port requirements may develop towards. Though must also be given to the non-containerised cargos, and especially during periods of growth, large project cargos should be brought in away from the city center to minimize their impact on the city traffic, while a state-of-the-art modern bulk facility allows larger ships to discharge quicker and more efficiently, and thereby also allowing quicker and smoother distribution from the port to market.

The concept developed provides the high-level blueprint towards this development with suitable flexibility for further studies to identify the level of automation and digitalization required and apply this accordingly. This should be used together with the terminal or logistics infrastructure operations methodology to allow the port and terminal to be optimally developed into the future, in line with future planning.

A strategic roadmap is however a living document and needs to be reviewed on a regular basis in line with the latest development in technology and cargo flows, in order to allow the terminal to remain in line with the most modern developments.

3.5 Implementation requirements

3.5.1 Reconstruction

History has shown numerous times, that projects like this must be initiated swiftly and develop traction within 3-4 years of the initial impetus or they will stall and seldom come to fruition. In order for the reconstruction to commence in earnest, serious decisions and implementations of new governance structures in line with international norms must be undertaken as soon as possible, clearing the way for investors and donors alike to safely invest in the selected development project.

Once these are in place, the selected option for development can be further developed, and it is recommended here that they are overseen by international organizations such as the World Bank and Transparency International. The same grouping should also be entrusted to carry out the full port implementation strategy to fruition on a clearly defined, transparent and structured basis.

3.5.2 Spatial/capacity development

The spatial development as recommended to see the integration of the city and the redevelopment of the port to be well aligned, flexible and coordinated. This ensures that the development is optimal to the requirements of both groupings, with accountability to the people of Lebanon for the delivery of a world class facility.

3.5.3 Capital expenditure estimation

The Capex estimation for the port is extremely broad, largely dependent on the planned rebuilding model, governance structure and physical structure. The variations alone between the proposed 3 options for the port layout already proposed is almost USD 750Mio. In particular the 3rd option, which includes the need for an extended breakwater, requires very detailed study given the geography of the region, while the governance model will play a large role in the structure of the port and its ability to attract investment and development across the whole port complex.

At one end of the scale is the possibility, or risk, of rebuilding the port in the exact or very similar format as prior the explosion. While this could be relatively cheaply undertaken at less than USD 200Mio Capex expenditure, it is not attractive to investors, and will be unable to achieve significant growth in port operations or throughput in the forecast future. This will in turn lead to a further falling back of the port in the regional rankings as competition ports with better governance structures attract investment and cargo.

On the other end of the scale is the potential for building an almost entirely new port, including requiring a high-tech breakwater required in deep water without firm bedrock. The redevelopment of landfill regions are as yet uninvestigated, meaning potential costs could easily soar above the USD 1Bio mark with it then being questionable as to if these could be recouped in the form of higher earnings and larger cargo volumes. This too is doubtful.

It is thus important that the right note be found in the middle that allows for a port that is flexible enough to grow as required and be part of a national masterplan. The ability to quickly return to the current market required levels is crucial. Optimization and efficiencies should be developed and terminals should be restructured while still operating efficiently. This should be achievable for somewhere between USD 500 – 750 Mio depending on the layout and equipment requirements of the new port.

Broken down into terminals, the majority of this Capex is likely to be spent on developing new areas of the port to the East of the current container terminal, meaning the cheapest alternatives will not open the port further but continue within the current areas, also affecting the direct city hinterland.

4. URBAN DEVELOPMENT

4.1 Context and concept basics

The development of the port opens the opportunity for an urban development reuse by converting and removing open spaces.

This section is based on the approaches of the „Joining forces for a new Beirut port area – A strategic study“ by Roland Berger for the World Bank. It has been co-financed by the German Federal Ministry for Economic Cooperation and Development. This study for the reconstruction of the port outlines options for an extension of the port to the east, making it possible to add areas close to the center for urban development.

HPC findings indicated that the western areas of the current port had little use and value as a continued operating part of the port, with drafts below what is required by modern commercial vessels, and storage areas that were poorly laid out and inefficient. Their recommendation for the usage of the large open land to the east opened the opportunity to develop other uses for at least the first 2 basins of the port. These will be used to fund the development of the new areas required to improve the port, as well as to open up significant storage capabilities closer to the container terminal. The creation of interim stores rather than long term stores within the rest of the new port layout will encourage transition of cargo through the port rather than long and expensive storage periods on valuable working land.

Associated with this is the great opportunity to generate the funds necessary for the reconstruction of the port facilities by marketing the developed areas and, in addition, to be able to provide significant impetus for the reconstruction of the city and the political stabilization of Lebanon.

4.2 Options for an urban development

In general, three different options are conceivable for expanding and converting today's port areas:

- **Option 1** is based on maintaining the previous port expansion and continued use of the area in an optimized function. The scope of urban development is very limited. In addition, there is in fact a need to use area D for port logistics. In the further consideration, this option will be treated as a possible first component of an urban development.
- **Option 2** is based on the expansion of the port and re-organization of the port functions. The extent of urban development achievable effects corresponds approximately to option 3. **Option 2 is the basis of the urban master plan.** Accordingly, the layout plan and the rendering view are detailed for option 2. This represented the best potential layout balancing port expansion with income that could be attained from the development of a waterfront, while still allowing for further development in the very long-term future, into an amended option 3. if further port expansion is required and financially viable after the timeline of the initial redevelopment project. It optimizes the layout of the current port, focusing on improving storage capacities in proximity to the container terminal, and opens the way for further growth into the bay at a later stage if required.
- **Option 3** enables urban development to go beyond option 2 by around 5%, with the associated effects.

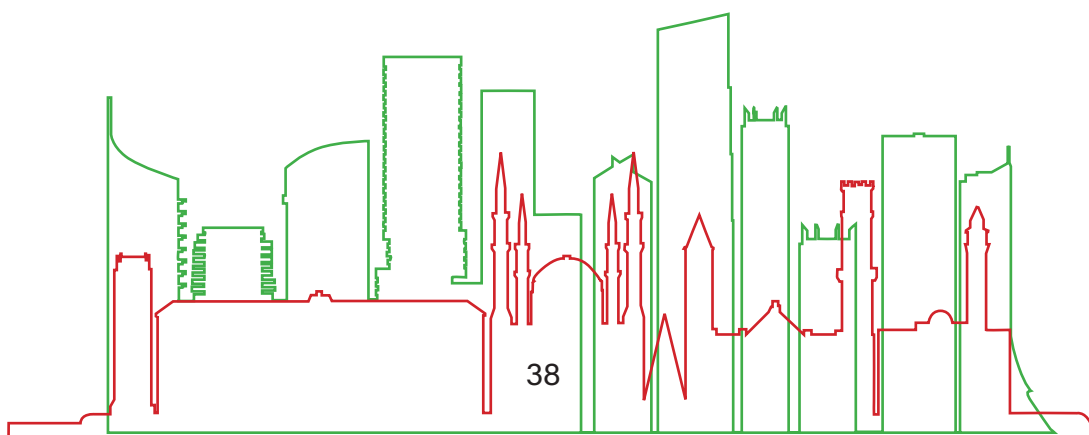


Figure 20: Options for an Urban Development

Option 1

Field D
DE 6-12
1 Beach
2 Park sections
15.000 Habitants
25.000 Workplaces



Option 2

Field D
DE 1 and 2 50%; DE 3 30%
DE 4-14
2 Beaches
All Parks
35.000 Habitants
38.000 Workplaces



Option 3

Field D
DE 1-14
2 Beaches
All Parks
36.000 Habitants
44.000 Workplaces

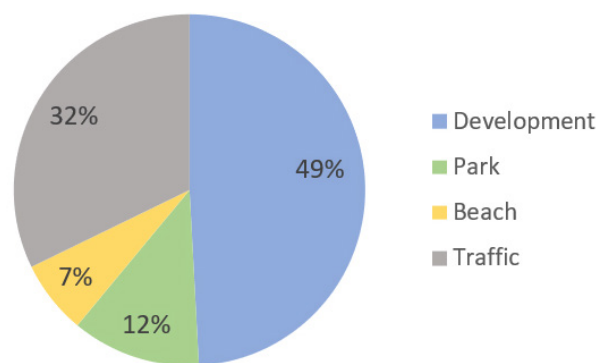


Source: Colliers International / Plan Roland Berger

These 3 options result in different land use (available and new formed ground), assumed population and workplaces, as indicated above and in the following figures.

Option 1 consists of land reclamation in the western and rather flat harbor basin. It creates the opportunity to develop a beach and park facilities in a limited amount of space. The total land used will be rd. 60 hectare.

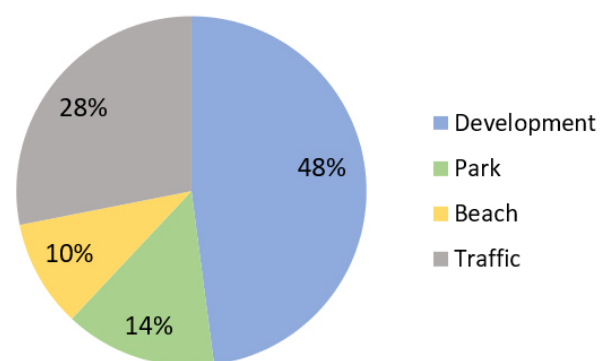
Figure 21: Option 1 for an Urban Development



Source: Colliers International

Option 2 is the area as per option 1, but includes a second basin with the potential to develop beaches and park facilities. The total land use will be rd. 120 hectare and is therefore about twice the size of option 1. Option 2 will be explained in detail as it is the most promising option to fulfill a sustainable urban development as well as optimized harbor functions.

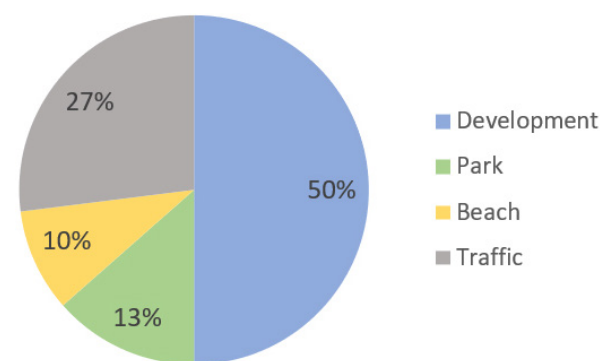
Figure 22: Option 2 for an Urban Development



Source: Colliers International

Option 3 is only slightly larger than option 2. The total land used will be rd. 126 hectare.

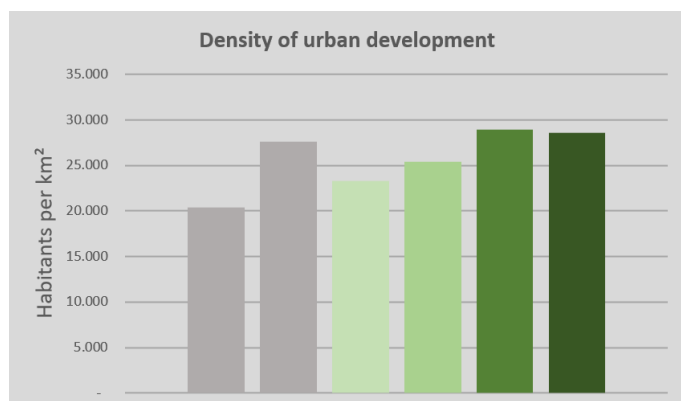
Figure 23: Option 3 for an Urban Development



Source: Colliers International

The following illustration indicates the population density in these 3 options, in relation to comparable urban city centers.

Figure 24: Density of Urban Development



Source: Colliers International

Option 2 will be further explored for the development of the master plan. This is the target-oriented option in the context of economic efficiency, as well as creating the possibility of a comprehensive, differentiated, and balanced urban development and integration of the adjacent urban areas, especially as regards the development and growth of the port.

Option 1 is simply put, to none, and thus the ratio of effort to expected profit is unfavourable.

Option 3 represents an extreme expansion which would cause major disruptions in the working of the port in order to implement. It represents a development which is likely to be extremely expensive in terms of not only the redevelopment of the working areas within the port, but also in the development of a major breakwater. This will in itself require extensive and long-lasting studies in order to confirm if implementable. While this option may be required if port growth is significantly larger than forecast, it should not be needed within at least the next 30 years. A version of this should be considered in an expanded long-term master-plan, but not for the initial and swiftly required redevelopment of the current port. area.



Source: Colliers International

4.3 Masterplan

Developing the harbor in a west-east direction could provide an opportunity for sustainable urban development of the vacated land. The area has only shallow harbor basins that can be filled in as a beach or for land reclamation. The existing military base can be relocated.

The urban development would follow international models such as those implemented in Cape Town or Barcelona, where such development has led to a significant improvement in the social structure, perception of the urban space and international attractiveness. The master plan aims to achieve a balanced social mix within the area and provides several anchor points for this:

The focus would be on residential buildings of varying qualities. The spectrum ranges from high-end, family-oriented buildings on the park to high-rise buildings on the first waterfront. This mix, combined with targeted promotion of affordable housing for families, as implemented in Vienna, for example, would create a vibrant, mixed-use neighborhood. In addition, public facilities for children (kindergartens, schools), education (university, be created. Here there is also the possibility of achieving an international appeal

through outstanding buildings, as has been realized in Bilbao or Hamburg.

Public open spaces such as beaches and parks could be created with good connections to the existing downtown. These would be publicly accessible.

The heights of the buildings set accents and at the same time provide a connection to existing structures. Environmentally friendly aspects (renewable energy, greening, renewable resources) are encouraged in the development. The existing urban highway, which today separates the city center from the waterfront as a barrier, would be deconstructed and replaced by a wide boulevard. This would be available as an experience space and connect all areas of the district development. There would be the possibility of a tramway running along this route to the stations, connecting the east (Historic Station Bus Terminal) with the west of Beirut's old city. (History Park).

Overall, the area has a high but clearly structured building density.



4.4 Guiding principles

Figure 25: Guiding principles



Source: Colliers International

Concept – the Best of Three Cultures in a Balanced Synthesis

The available site can be developed along a balanced synthesis of International Real Estate Expertise, European Urbanistic Fundamentals and Local Architecture Principles.

- International Real Estate Expertise for robust revenues from the privately funded development.
- European Urbanistic Fundamentals for diverse and lively neighborhoods.
- Local Architecture Principles for acceptance and a consistent city Structure.

Utilization – a Fair Mix of:

- International high-level architecture and living for local families - supported by a large amount of Public Infrastructure Buildings for Education, Culture, Health and Sports.
- Accessible parks and city beaches.
- Public Transport and Green Energy as a starting point for a sustainable Beirut.

Realization – transparent and compliant

- Urban development activities should be guided by a Development Company under international transparent control - committed to the project goals Harbor Expansion, City Repair and Family Living.
- During the development and building phase the project should be a Tax-Free Zone.
- There should be an intensive Project Communication with the Beirut Citizens and the Civil Society.

4.5 Layout plan

Figure 26: Masterplan Urban Development (red:Public Areas)



Source: Colliers International

The semi-circled development around the former basins of the Beirut port rises behind the new Grand Boulevard, that could be replacing the existing elevated motorway. The new Grand Boulevard will provide similar traffic capacities to the rudimentary continuous motorway / flyover.

Behind this multi-lined east-west-connection and the included (potential) tram line, the six to ten story high campus buildings are forming the introduction towards the green city with its thirteen districts. From here, the height of the buildings increases slowly from south to north.

Parking spaces are located underneath the Grand Boulevard and serve the adjoining districts south and north of the Grand Boulevard. Several green bridges connect the Areas of Downtown, Gemayze and Mar Mikhael with the new mix of social housing, student dormitories and communal buildings. Schools, kindergartens and a hospital will provide new focal points in the city-infrastructure.

Figure 27: Urban Development



Source: Colliers International

- | | | |
|-------------|------------------|------------------|
| 7 Hasbaya | 5 Bekka | 1 Bcharré |
| 8 Al Janoub | 6 Zahlé | 2 Tripoli |
| 9 Sour | 11 Chouf Jezzine | 3 Akkar |
| 10 Saida | 12 Jbail | 4 Baalbek |
| | 13 Batroun | 14 Keserwan-Metn |

Looking at the urban development area, there is the possibility of association with the geography of Lebanon. Based on this, and in order to be able to map a scalable development, the area was divided into 14 „regions.“

The new neighborhoods of Baalbek, Bekka and Zahlé could form the entrance to the central park, which would serve as the green heart of the urban development. The park would function as a gently curving green axis dividing the entire site from east to west and surrounded by residential buildings to the south and north.

West of the central park, bridges would connect the Hasbaya Rachaya, Al Janoub, Sour, and Saida neighborhoods to Downtown Beirut. They would form the cultural, retail and commercial districts clustered around a circular man-made harbor with restaurants, stores and small businesses. The opera house, which appears to float on the water, would be a landmark similar to the grand opera houses of Sydney, Oslo or Hamburg.

Chouf Jezzine and Keserwan-Metn would form the northern boundary of the green central park and mark the beginning of the high-rises, the ten- to fifty-story buildings that would slowly rise toward the sea. The apartments would face the park directly. The Promenade would run along the water-line with cafes, restaurants, hotels and apartments. From

there, the view opens onto the two new public city beaches nestled between the bustling life of Saida and the high-rises of Jbail, Batroun and Bacharré. Tennis courts, cafes, and a swimming pool would make this new development a recreational destination for all of Beirut. Buses and the streetcar provide easy transportation from downtown Beirut to this well-connected public beach.

The northern developments form the residential and office towers that would offer fantastic views over the harbor and beaches. The Jbail and Batroun neighborhoods are mostly apartments and restaurants, with family-friendly housing and large green terraces, while the eastern Bcharré and Tripoli neighborhoods are the commercial center. High-rise office buildings would be combined with a cruise terminal and streetcar station, providing easy access to downtown Beirut.

The parameters of use, urban dimensions and thus typology in relation to the existing urban structures are simulated in the financial model in terms of a virtual city and form the basis of the calculation.

In the further implementation and specification, this model can be continuously adapted and refined, e.g. via urban planning competitions. There is thus the possibility of continuous referencing to the basic assumptions of this study.

Figure 28: Masterplan Urban Development, Rendering Birds eye view skyline



Source: Colliers International

This Aerial View from the east border of the development shows the green Axis located between the Campus buildings and the Grand Boulevard to the left and the green terraces of the residential high-rises of Batroun that overlook the new public beaches.

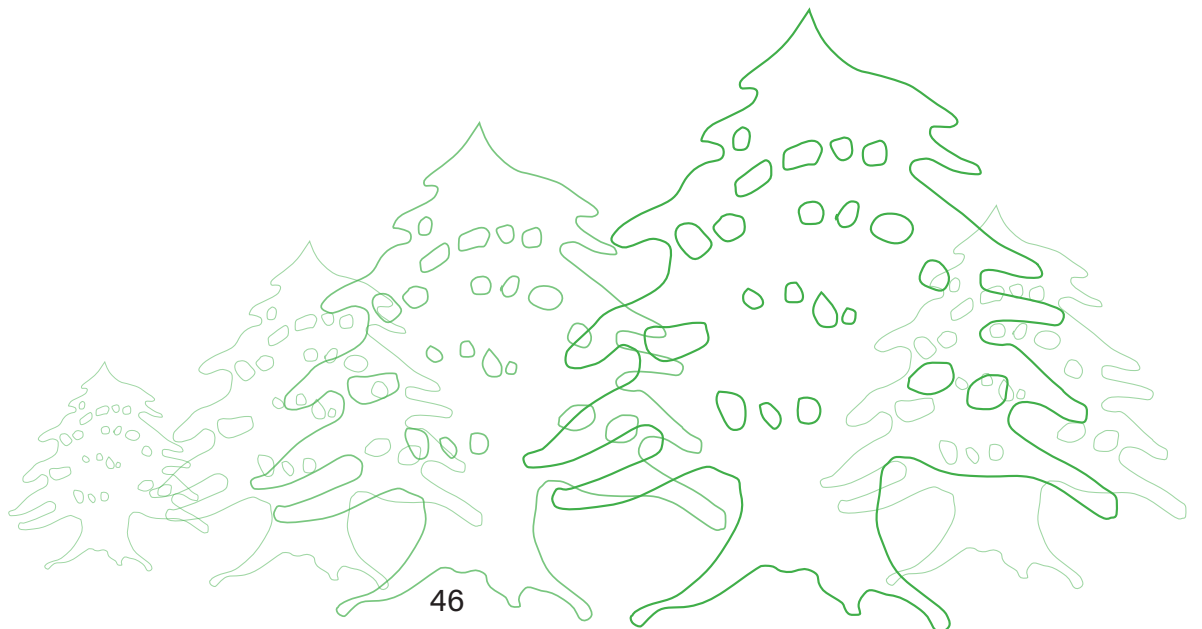


Figure 29: Masterplan Urban Development, Rendering Neighborhood for local families



Source: Colliers International

Crossing the green bridges spanning over the Grand Boulevard, we enter the districts of Zahlé, Bekka and Baalbek. Optionally the districts can also be accessed through the vast underground parking under the Boulevard. Here, the 5-10 story residential, social- and campus-buildings form the prelude to the slowly rising development and define the transition into the green Central Park. While a big part

of the new port of Beirut consists of multi-story buildings and high-rises, the masterplan in this area forms a block development with inside courtyards and large openings towards the park. It allows a more classical approach towards an urban development of connected Courtyards for the residents.

Amid strongly differing building types, that consist of classic materials as well as modern glass facades, we find large expanses of public space in the green courtyards with their mix of housing, public amenities, and student housing. We catch a view through the courtyards into the green Central Park and the new skyline beyond. Cafes, seating areas, a network of pedestrian and bike paths, daycare centers, and student facilities make this a highly mixed neighborhood that interlocks closely with the adjacent parts of Beirut. In the lower stories, children visit the schools and daycares, while the large windows of the upper floors look onto the park. The beach and promenade are within easy walking distance through the park.

Social housing and publicly supported student housing make the neighborhood culturally and socially a diverse and vibrant part of the development.

4.6 Financial model

4.6.1 Model structure

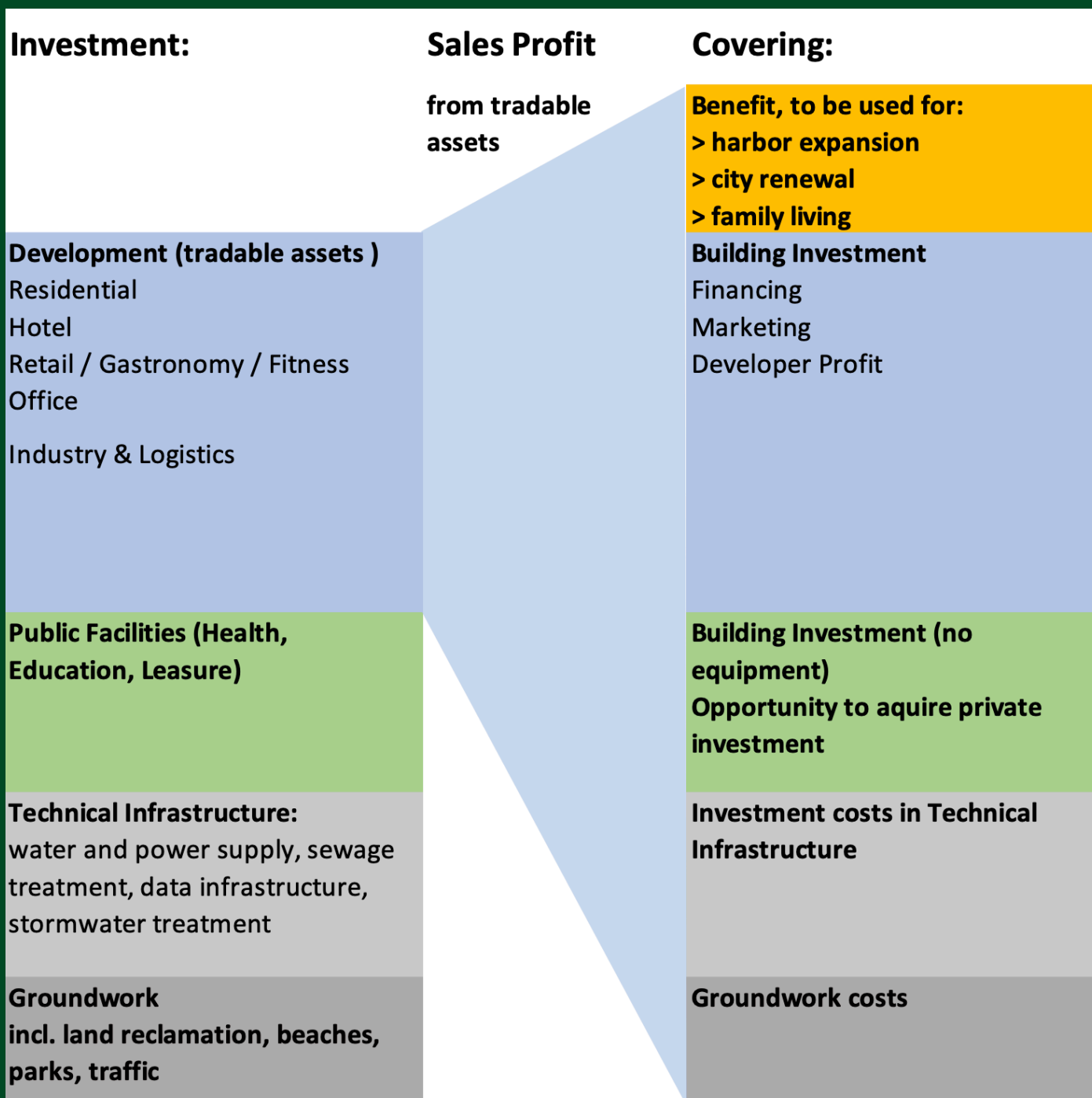
The model structure consists of an estimation of costs to evaluate the necessary investment.

For the sake of completeness, the model examines all 3 options and compares them. Option 2 is recommended in the implementation, as set out and further elaborated in the master plan.

The investments include:

- All civil engineering measures such as demolition and clearing of the site, land reclamation through fillings and backfills, including the city beaches and piers.
- Development of the technical infrastructure for supply and disposal with water, electricity, information including cisterns and pumping stations, treatment capacity, power supply, data connectivity, stormwater treatment.
- Road construction including the dismantling of parts of the city motorway.
- Public facilities (Health, Education, Leisure).

Figure 30: Financial Modelling



Source: Colliers International

Costs are explained in detail in chapter 4.6.3 Costs considerations, see also Appendix. Based on the development of tradable assets, the sales profit is calculated based on market research explained in detail in chapter 4.6.4 Revenues. The financial model underlying the urban development is based on the assumption that the investments required for their construction are covered by the marketing of the tradable assets (apartments, offices and areas for retail, catering, industry) that are being created on the site and that a significant surplus can be generated. For parts of the

technical infrastructure such as the public facilities there is an opportunity for private investments. The effect was examined in the form of a scenario consideration. The form (PPP or direct investment) in which this can be implemented has not been examined in depth.

The surplus generated can be used to co-finance the reconstruction of the port and the city as well as for social projects. In addition, indirect effects from development were examined.

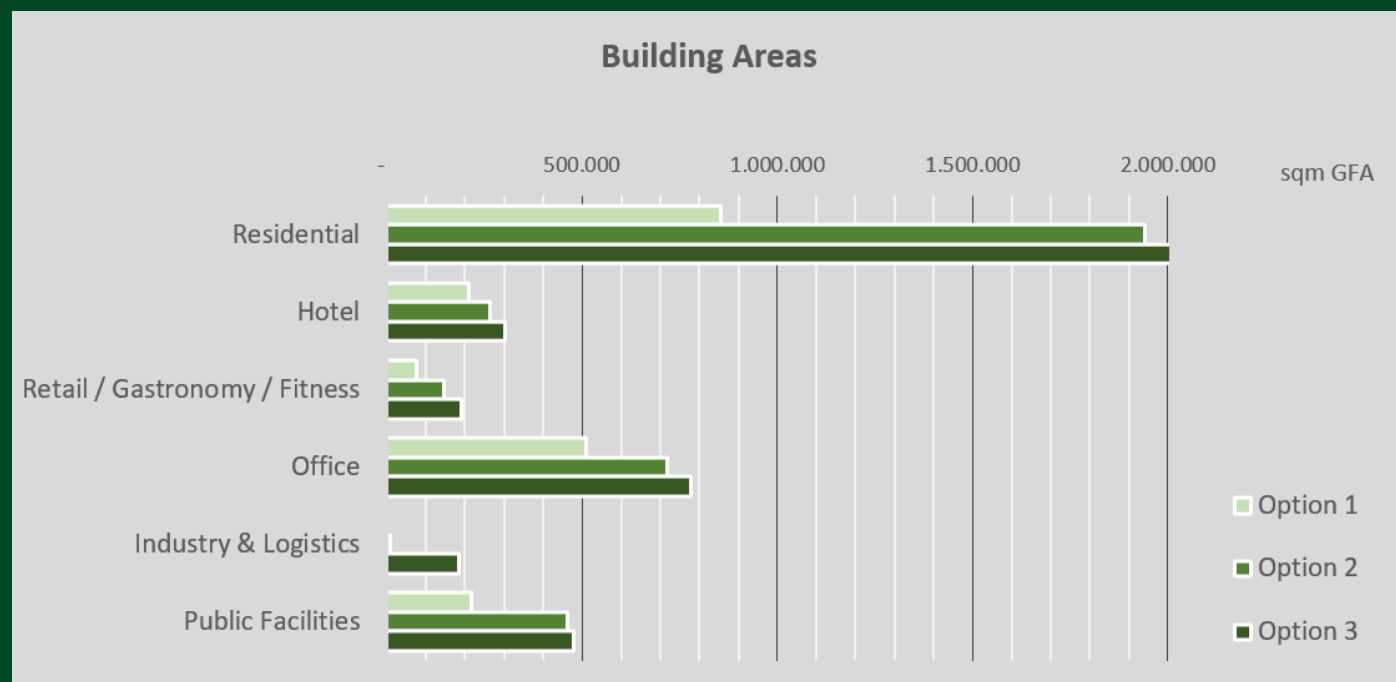
4.6.2 Development components

Asset mix in the scope of developments

The aim of the master plan is to enable an attractive, diverse and socially balanced development of a new city quarter. Therefore, the focus is on residential real estate. Sustainable, green residential high-rise buildings with a healthy mix and diverse population structures in direct connection

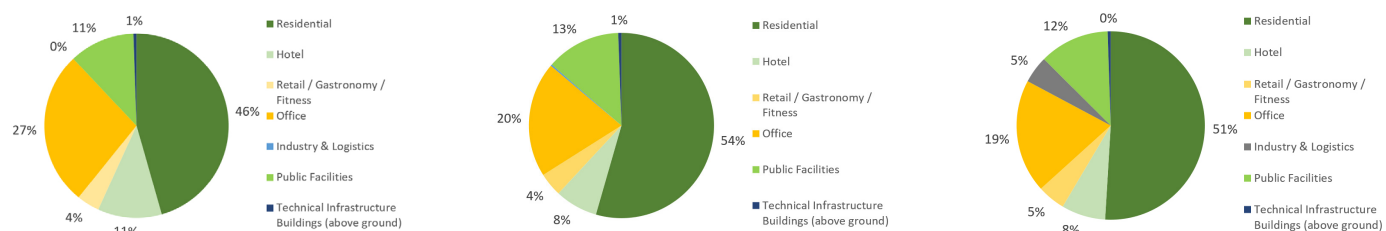
to local amenities, recreation, sports, cultural and health facilities form the basis. Offices, hotels and shopping areas are also added. The distribution of functions follows urban centers. The focus on residential also reflects the real estate market in Lebanon. A utilization higher 80% is aimed for.

Figure 31: Development components: mix of assets for 3 options in sqm GFA



Source: Colliers International

Figure 32: Percentage of asset in option 1,2,3 (from left to right)



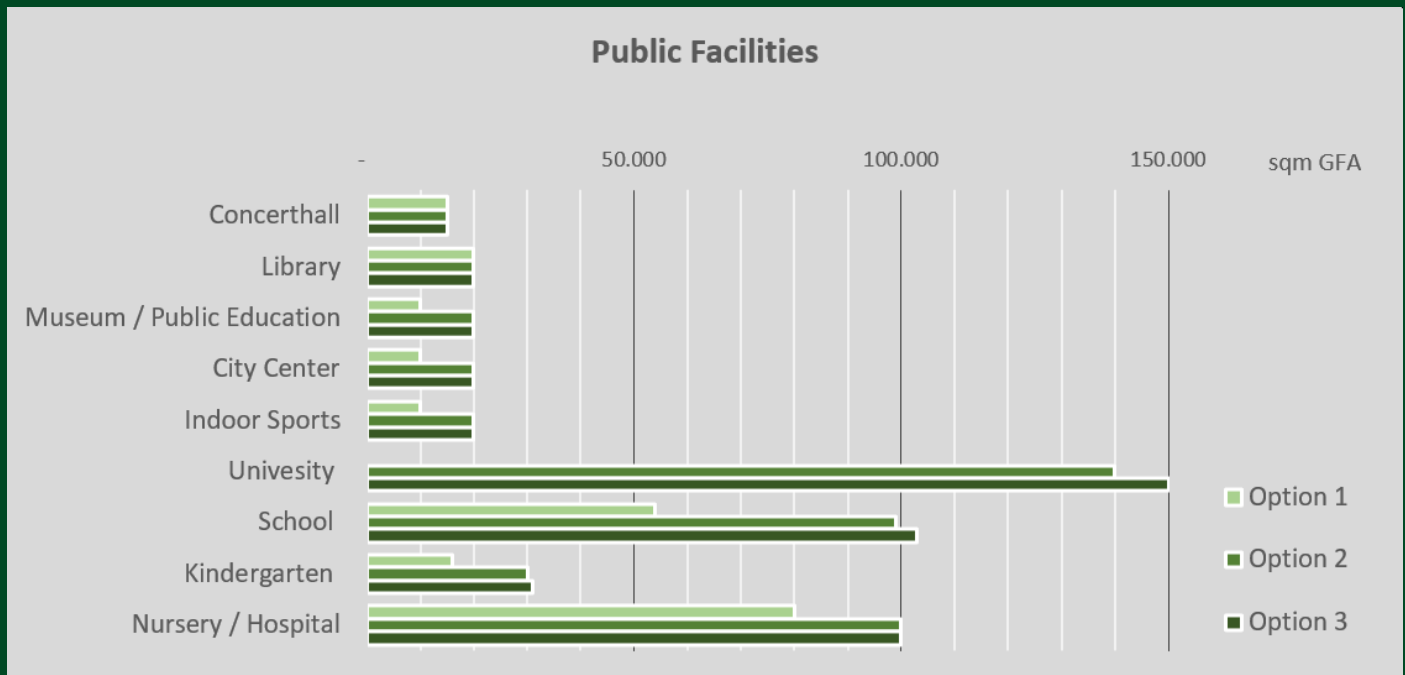
Source: Colliers International

The main driver of the development is the residential sector. This asset class accounts for around 50% of the development, followed by office (around 20%) and hotel.

Industry & Logistics only comes into play with Option 3 at the eastern transition to the port facilities.

Public Facilities

Figure 33: Public Facilities: Volume in Sqm GFA for public facilities for the 3 Options



Source: Colliers International

An essential element of the master plan is the development of public facilities:

- Facilities such as concert hall, library, facilities for public education / museum and city center are intended to act as magnets beyond the limits of development and acquire symbolic power for the reconstruction and renewal of Beirut.
- Options 2 and 3 make it possible to establish a campus university on the premises.
- The size of the kindergartens and schools is based on a population model with a proven proportion of around 20-25% children in this age group.
- The health sector comprises around 50% around nurseries, health centers and medical practices. 50% are to be built as a primary care hospital with around 500 beds.

The public institutions can be financed from sales revenues and are thus included in the model. In principle, there is also the possibility of private donations and international aids. The kindergartens, schools, universities and health facilities can also be financed through private investments, combined with subsidizing the operation.

Technical infrastructure

The implementation of the master plan goes hand in hand with the establishment of the necessary technical infrastructure. The goal of a largely self-sufficient area and the implementation of sustainable and contemporary infrastructure concepts during the groundwork is pursued.

Private investments can be included as well as public financing can be initiated in the protection of international guarantees and within a free trade zone to be created.

Water supply

Lebanon has sufficient water supplies. The connection to the existing infrastructure is assumed to be possible. In addition, a redundant distribution network with cisterns for storage, water treatment and pressure booster pumping stations are added. The calculation is based on an estimate of 300 l per day and habitant.

Sewage water treatment

Three section sewage treatment plants incl. gas treatment and electrical self supply via block-type thermal power station. Separate collection grid aside development areas for wastewater and rainwater, including rainwater retention basins for heavy rain. Treatment capacity should take place in coordination with the neighbouring areas.

Electricity supply

Structure in addition to existing grid. New powerplant as far as possible „green“ e.g. geothermic plant if possible; peak power via block-type thermal power stations; exact dimension and type to be considered in following planning; redundant grid a side development area. 3,000 kWh per habitant per year.

Internet connection

Construction of a redundant fibre optic network with required data management. Public WiFi in all public areas.

Ongoing examinations

In the financial model, all investments in technical infrastructure are based on model calculations and comparative values and have to be proofed by planning.

The extent to which private investments can be integrated needs to be clarified in ongoing studies. Herein also potential synergies between port and urban development need to be examined.

4.6.3 Costs considerations

Current construction cost parameters are not publicly available for Lebanon. The financial model therefore draws on comparative values from other projects in the region. This also includes the approaches for the area of groundwork (based on the planned areas and cubatures) and technical infrastructure. Hereby cost parameters based on dimensioning parameters USD per MW power plant output or per cubic meter of water / wastewater) were used. The chosen approach reflects an average price level in 2020.

The construction costs of the development measure include approaches for a necessary interim financing of 5% and a developer profit of 20%. This approach, which is low compared to free development, reflects the assumption that the structural development takes place subject to international supervision within an area designated as a free trade zone and with financial security from international institutional credit institutions.

All measures are considered in determining the profit. As with all cost approaches, there are fundamentally risks and opportunities for changes upwards and downwards. The model contains essential, tangible and thus quantified factors:

Development of construction costs

Basically, construction and selling costs are related, so that an increase in construction costs can at least partially be compensated for by rising prices in selling. A spread of up to 10% is taken into account in the model. These 10% have been applied to all investment costs.

Revenue development

In the current situation, the Lebanese real estate market is bottoming out. The future revenue situation was considered in detail and considered in the model in scenarios. The spread between the minimum and the best case is 20%.

Financing options

The entire costs for technical infrastructure and public facilities are priced in as a public investment, which is financed from the expected profits from the selling. There are opportunities here for private investments and refinancing via user fees.

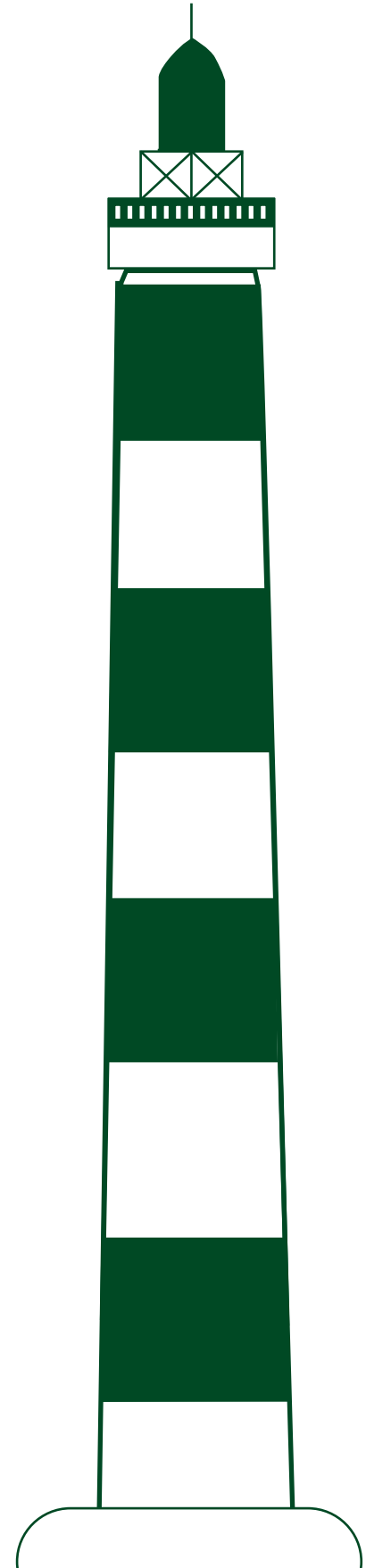
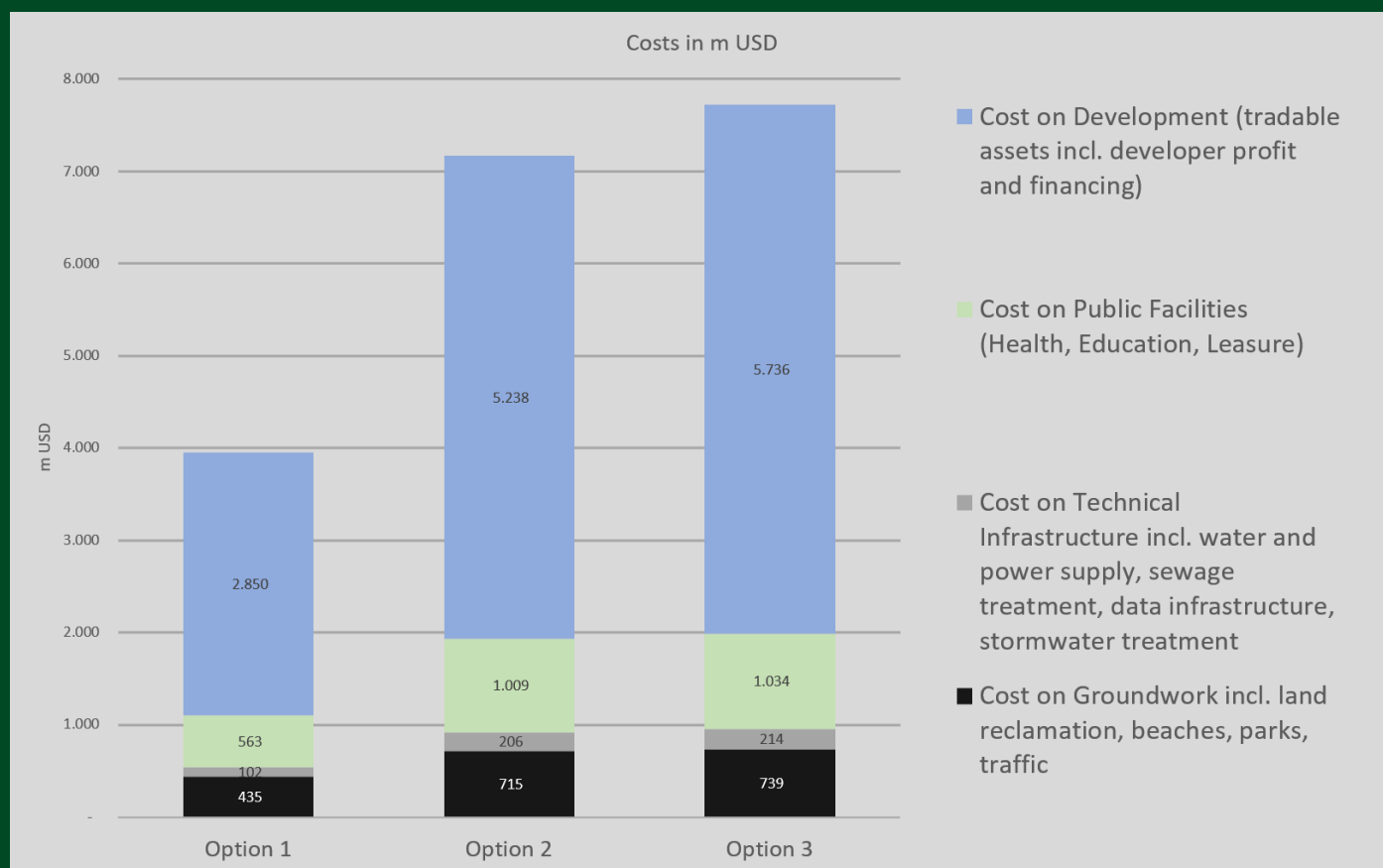


Figure 34: Investment cost for the options



Source: Colliers International

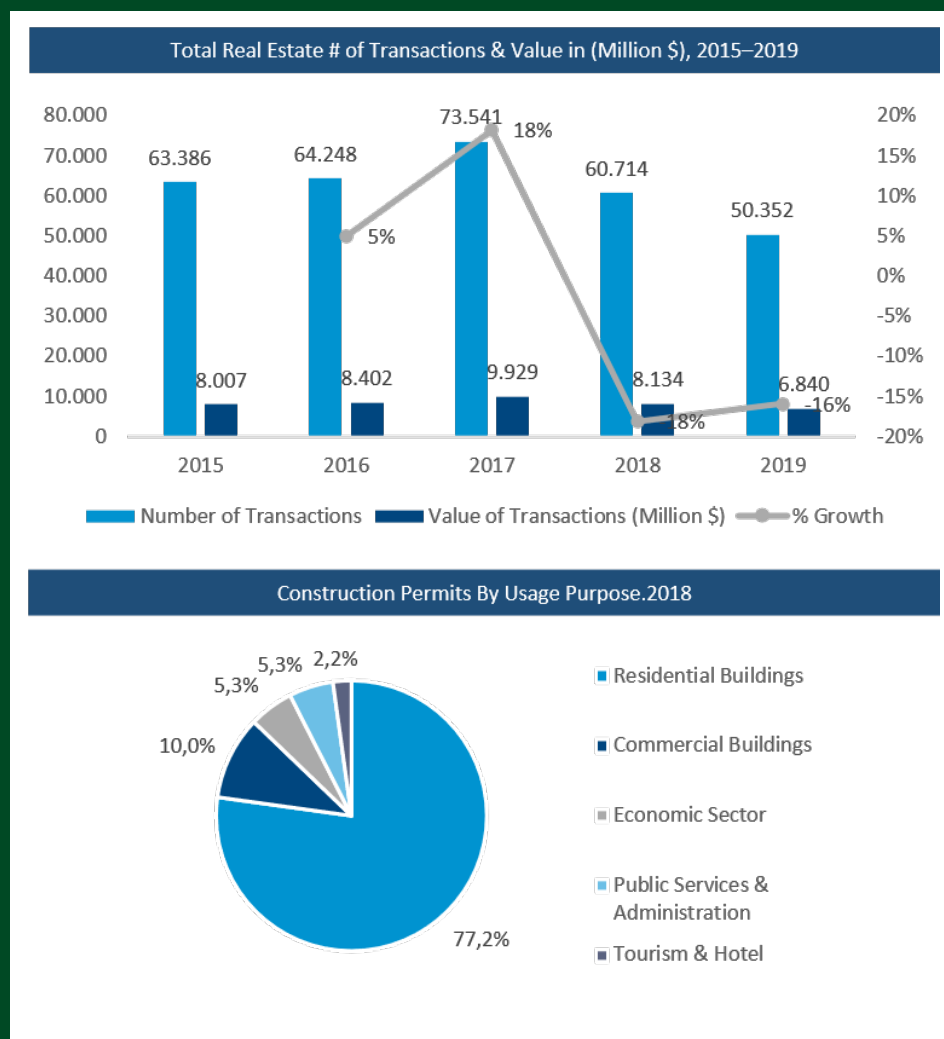
4.6.4 Revenue

Lebanon Real Estate Market

The real estate market is a key driver for the Lebanese economy. It is predominantly residential oriented. It has witnessed further sluggishness during 2019, amid an adverse domestic political environment and lack of sufficient financing options, plunging the economy into recession. This decline caused a fall in state revenues from fees and taxes on real estate transactions.

- 2019, the value of the real estate transactions amounted to USD 6,840 million compared to USD 8,134 million in 2018 (a decline by USD 1,294 million, 16%).
- 2019, 32.2% of all property sales transactions value by region occurred in Beirut area.
- According to Bank Audi Report, 77.2% of all construction permits issued are for residential usage purpose followed by commercial usage 10%.

Figure 35: Revenue the Real State of Real Estate report, Lebanon Opportunities, Lebanon Real Estate Sector, Bank audit report 2020.



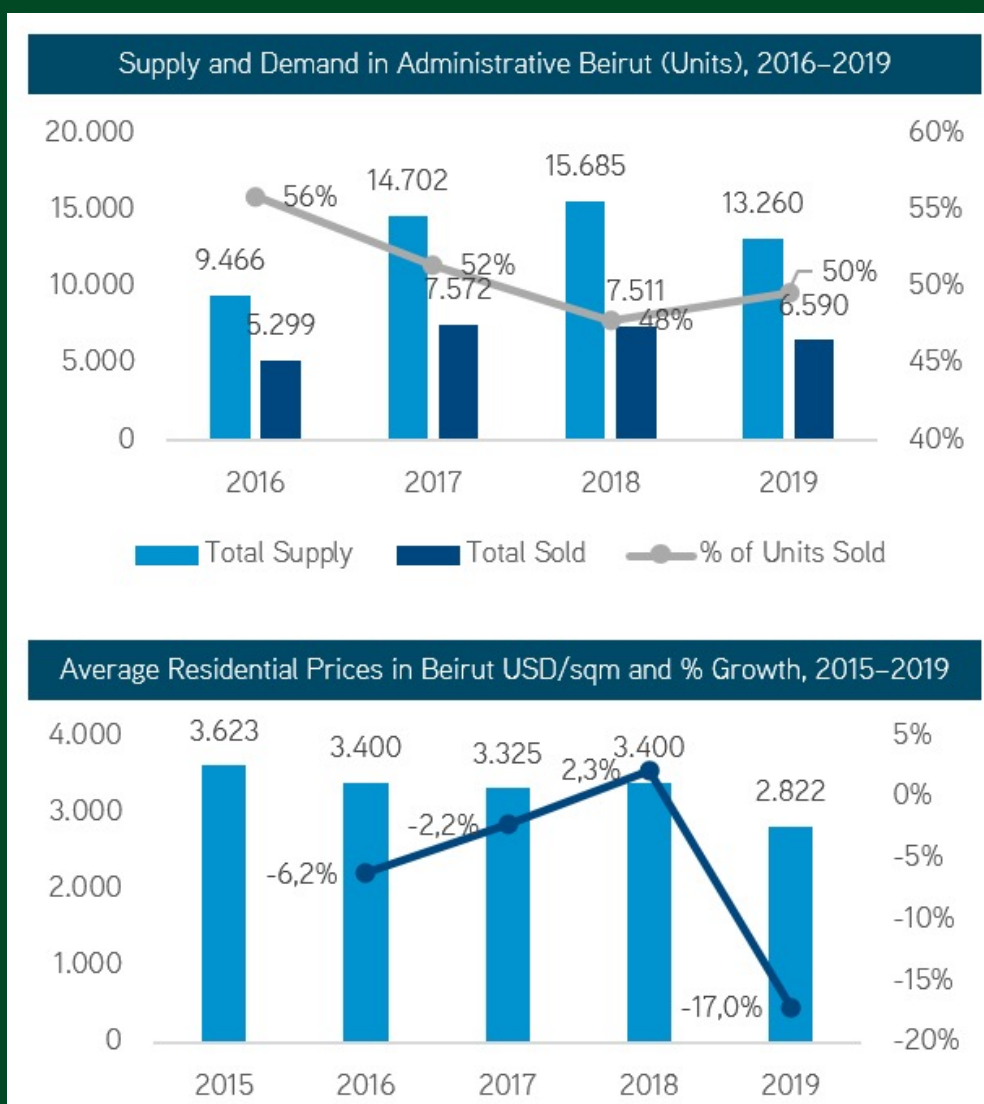
Source: Colliers International Research 2020

Residential Market und Prices

While no official figures in 2020 available for residential pricing, evidence on the ground shows an upward pressure on realty prices and specifically the residential market. In June 2020, the asking prices of residential real estate in Beirut

rose by growth 20%-30% relative to the previous year (ca. USD 3,528 in Beirut), meaning it regained the position at the beginning of 2019.

Figure 36: Revenue



Source: The Real State of Real Estate Report, Lebanon Opportunities, Lebanon Real Estate Sector, Bank Audi Report 2020 The Unit, Colliers International Research 2020

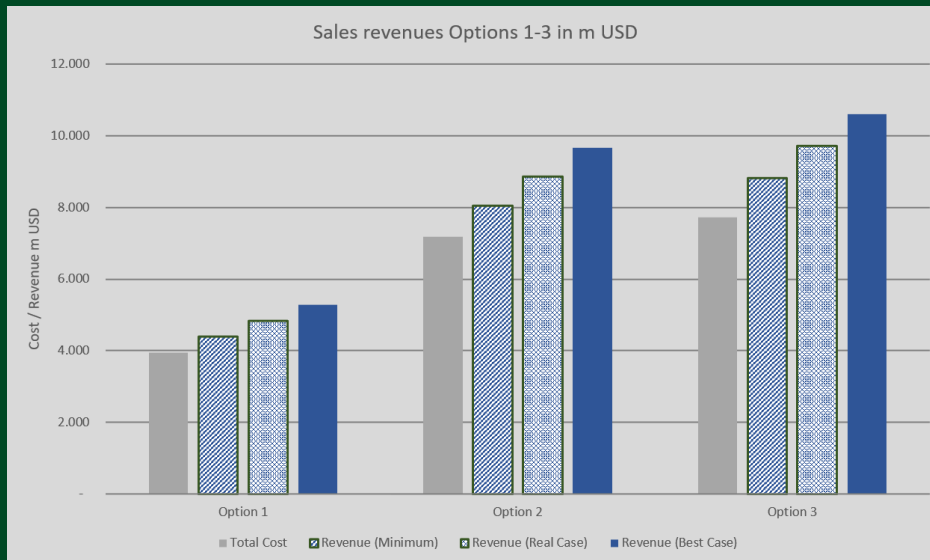
Revenue calculation

For the financial model, an approach 10% above the average level for the years 2015 to 2018 was used as a Real Case. The average mark for the years 2015 to 2018 was used as the minimal case. Best case 10% upon Real Case:

- **Best Case residential price USD / sqm: 4.200**
- **Real Case residential price USD / sqm: 3.850**
- **Minimal Case residential price USD / sqm: 3.500**

Prices for other assets accordingly to relation of building prices due to the lack of detailed information in these asset classes. A marketing fee of 2% is deducted to determine the profit.

Figure 37: Revenue Calculation (estimate Sales prices for Options 1-3, considering marketing costs)

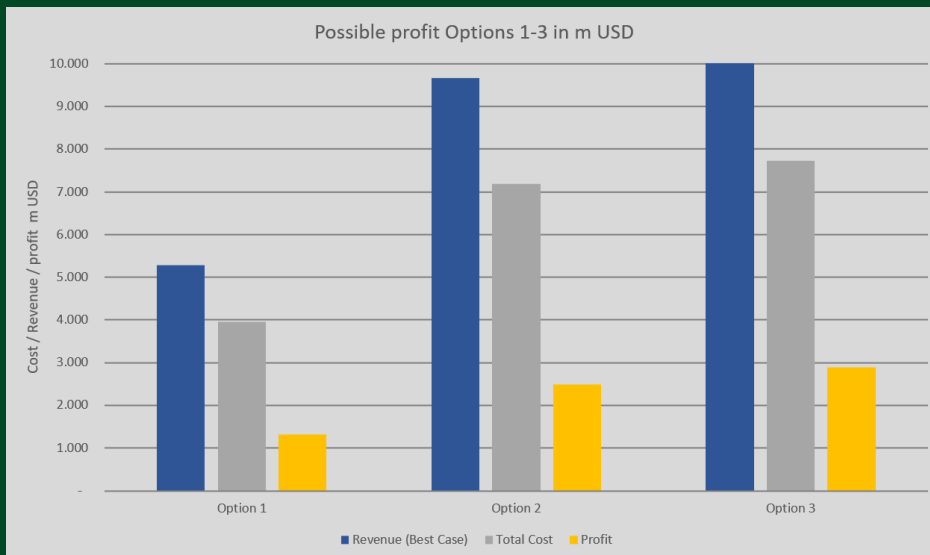


Source: Colliers International

All these calculations are assumption driven and are highly subject to the development of the country. The realization of the shown revenues is strongly dependent on existing risks due to the political and economic situation in Lebanon. On the other hand, there are chances. In case a comprehensive reform plan on a country level is established and the economic situation improves, the conservative real estate prices in this location, can be significant higher.

These conservative prices have been chosen to cover risks in price developments. Due to the exceptional location and the expected outstanding architectural and urban quality of the development, prices up to 30% above the average level can be assumed. Due to the general project risks still present at this early stage of development, this "reserve" was not set in order to avoid too high expectations.

Figure 38: Direct profitability investment costs account for approx USD 7 Billion (Option 2)



Source: Colliers International

4.7 Direct profitability

As shown in the above sections, the total revenue of urban development is around USD 8 to 10 bn (Option 2), Option 1 is around half that volume, as there is slightly half the land available and area to realize. Option 3 goes up to USD 10,5 bn.

Based on the investment costs (including profits for the developer and financing) and the different scenarios of generating revenue (including marketing costs), different calculations are possible.

In a sensitive analysis we also included a variation of the level of potential PPPs for public infrastructure investments. Depending on the scenario (cost development / revenue development / volume of private financing), the development will potentially generate a profit of up to USD 2.5 bn.- in Option 2. These profits will be generated after the sales process generates higher income as investment therefor. Different models are conceivable here, the implementation of which depends heavily on the framework conditions and the design of the specific marketing process and would go beyond the scope of this study:

- The time and package of the sale of undeveloped / developed land / buildings / apartments has a significant influence on the cash flow of the development.
- The associated allocation of risks of the structural implementation has a significant influence on the realizable profits of the overall development.

The aim should be to develop an optimal marketing strategy after defining an option and providing more detailed information on the project organization in a further study. The model is based on a comparison of the estimated investments with the forecasted marketing profits. In the further development, an in-depth investigation and optimization of this model is required. The following aspects should be examined further:

- Models of property transfer and sale to developers.
- Marketing models based on market forecasts and underlying possible customer profiles.
- Synergies from joint developments in port and urban development in the field of technical infrastructure.
- Possibilities and limitations of public-private models.

Basically, the assumptions of the model must be verified through further studies and planning:

- Investigations of the building site (subsoil, contamination, load-bearing capacity, etc).
- Investigation of the areas of land reclamation (including hydrogeological conditions).
- Traffic planning.

Here, too, there are synergies between port and urban development and the need for coordination. The full amount of the expected profit is only available after all assets have been sold. A period of up to 15 to 20 years can be assumed. The profit can be invested in the expansion of the port, the reconstruction of the historic center and social projects (i.e. family living).

5. INDIRECT PROFITABILITY ANALYSIS FOR URBAN DEVELOPMENT

5.1 Introduction

The catastrophic detonation in the Beirut harbor on August 04, 2020 resulted in a significant number of fatal casualties and damages amounting to approx. USD 3 to 5 bn. Since then the city of Beirut has been left in the predicament of how to undertake the reconstruction of the area. One consideration is to rebuild the harbour at a new location further to the east, outside the city centre and to optimize its capacity, accommodating the requirements of modern transport systems. At the former location of the harbour, a new urban quarter ("Beirut Waterfront") with direct connection to the old town would be built.

The Beirut Waterfront project in its current option 2 has a direct investment volume of approx. USD 7.2 bn (w/o contingencies). This would mainly be used for the construction of living space, office premises, hotels, gastronomy and retail, but also schools, utilities, parks, cultural, sports and leisure facilities and to a minor extent small trade and logistics. Public facilities including preparation, groundwork and infrastructure sum up to approx. USD 1.9 bn.

5.2 Methodology

Large-scale investment projects like the Beirut Waterfront produce considerable direct, indirect and secondary economic effects. These are reflected in (a) increased added value, (b) higher employment rates and (c) income as well as in the generation of (d) additional earnings for public authorities through taxes and social security contributions. The entirety of these effects is called the indirect profitability of the investment project (also referred to as flow-on analysis).

The indirect profitability is calculated to show that a project - or in other cases a state funded institution - has significant positive effects that exceed the costs for the public. Chronologically, the building / investment phase is separated from the operating / utilisation phase for analytical purposes. The investment phase is usually regarded in total over the building period. For the utilisation phase, a typical year in full operation is used as a basis. Thereupon, an increase of the usage can be applied starting with an initial low volume reaching full capacity after a certain period. This is particularly relevant for large-scale and long-lasting building projects with different completion dates.

Besides the direct (primary) effects of the project on the economy, the analysis also includes influences on downstream industries and markets. In this regard, indirect effects refer to purchased materials and services while secondary effects reflect overall consumption effects through increased income.

The indirect profitability analysis thus, greatly exceeds a project-specific economic feasibility study. However, it is nonetheless based on main assumptions and results of the underlying venture. The following scheme illustrates the relationship between the different effects:

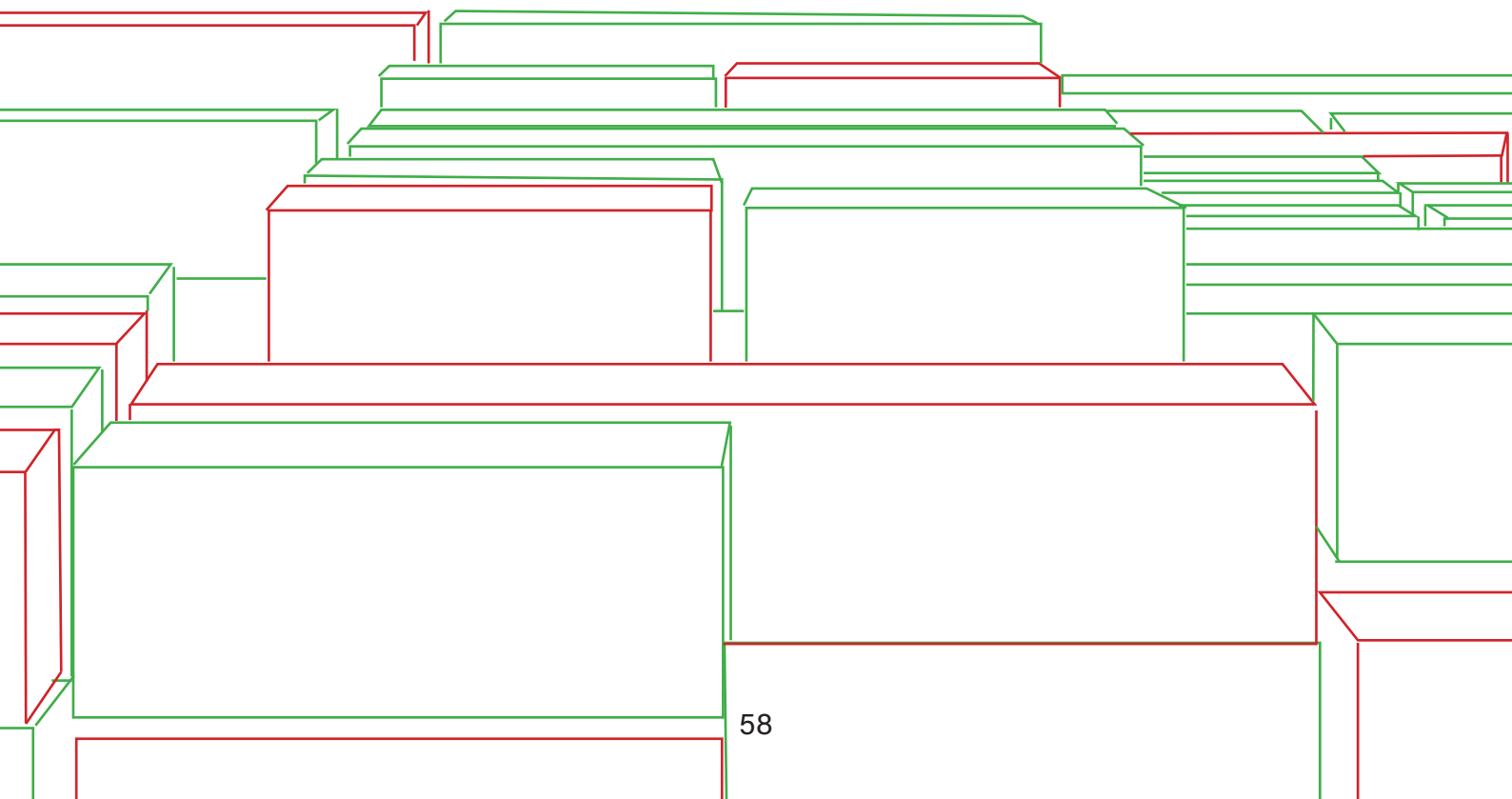
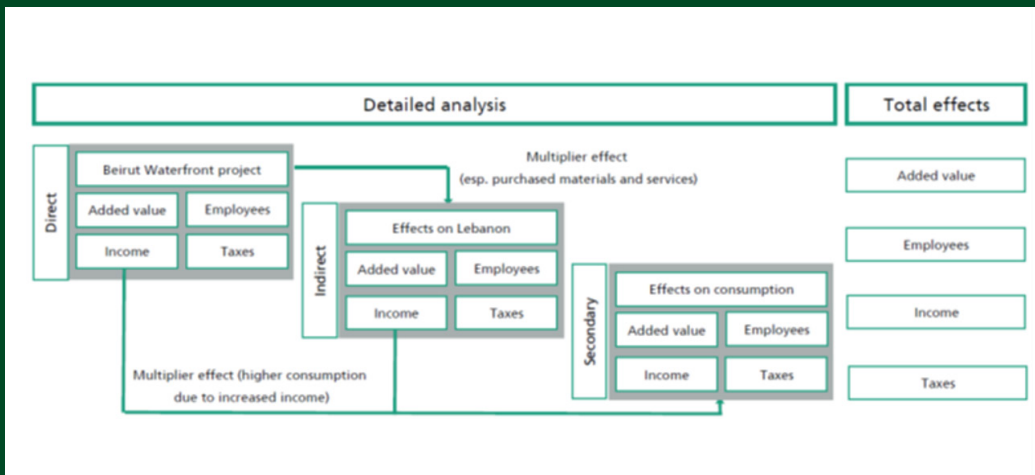


Figure 39: Methodology



Source: Fraunhofer IMW

On the other hand, the public sector must finance infrastructure investments that cannot be transferred to the private sector directly or via PPP (Public Private Partnership) models. These investments mainly encompass roads, park areas and cultural locations but also schools and hospitals. In addition to the quantitative approach described above,

qualitative effects can play a significant role in the examination of the overall feasibility of a project. These impacts can affect political and socio-economic stability, environmental and sustainability criteria as well as image improvement, cultural and other public targets.

5.3 Analysis of the Beirut Waterfront project

5.3.1 Assumptions

An indirect profitability analysis requires large amounts of input data in numerous categories. However, this is only available to a limited extent for Lebanon and therefore a substantial amount of numbers had to either be derived from comparable data on an international level or be estimated. Even though some input was received from local contact persons, a high level of uncertainty remains. In addition to the detailed assumptions (see appendix), the following general guidelines were applied:

- Dislocation and expulsion effects were widely disregarded because of the current economic situation in Lebanon, which is characterized by a high unemployment rate and a significant underutilisation of capacities in many sectors of the economy; the project would thus be a step towards higher occupation rather than leading to expulsion to a greater extent.
- In the calculation, the investment phase was considered as one unit over the assumed building and construction period of 15 years. To show the annual effects, the numbers were then divided and allocated to the respective years. The increasing utilization of the Beirut Waterfront is reflected in higher shares of the full effects over time (see scenarios).
- Due to the unknown number of import shares and the possibility to impose certain demands regarding local value creation, the economic effects in Lebanon are varied in three scenarios (80 %, 60 % and 30 % local value creation).

- In line with this, VAT was only applied to goods and services purchased locally (VAT-exemption for imports), so the indirect profitability in Lebanon increases with higher local value creation. Potential customs duties were not considered.
- All project-related assumptions were taken from the plan developed by Colliers with reference to the current base case option 2 (contingencies for cost overruns are not included).

Based on these assumptions this analysis will determine whether the Beirut Waterfront project is likely to not only become an urban quarter that is economically, socially, and ecologically sustainable, but can also generate additional growth and public income to co-finance the new construction of the harbour in a nearby location. Some of the public earnings could also be used for social measures such as support for low-income families and ecological improvements such as the implementation of a sustainability concept.

Due to the limited availability of reliable and detailed data, the results for the different parameters are given as scenario-driven ranges that for some effects show significant deviations (see 3.5). In sections 3.2 through 3.4, the base case for the current planning option 2 is presented in more detail.

5.3.2 Added value

Direct effects

Direct effects result from the immediate economic activity of the building and construction companies that are involved in the project. The direct added value is primarily generated through the jobs and employment created by the project. For the Beirut Waterfront project, the assumed number of employees in the investment phase is 4,000 over a 15 year period. 80% of these are expected to be workers and 20% head workers, engineers etc.

Throughout the utilisation phase starting on a low level in year 9 in the base case scenario, up to 32,000 people will be working in the offices, hotels, gastronomy, retail, and other facilities within the area. Industry is only planned on a minor scale. Just like in the investment phase, the direct added value is mainly calculated based on the personnel expenses; materials and services are mostly purchased.

Indirect and secondary effects

The indirect effects can be calculated by summing up the expenses for goods, materials and services purchased from component suppliers, subcontractors and commercial enterprises in the investment and utilisation phase, mainly by the building companies and service enterprises. Goods and materials are assumed to be purchased at 100%, services at 80% to 90% either locally or abroad.

Despite the fact, that suppliers and subcontractors would purchase some of their goods and materials from other companies further downstream, the entire resulting added value is summarised as indirect effect. Hence, this is not only driven by personnel expenses but comprises the whole range of value creation.

Secondary effects result from the consumption of employees induced by higher income from their occupation that flows back into the economy. The obtained purchasing power leads to an increased demand for goods and services, e.g. food, clothing and convenience goods but also for accommodation, gastronomy, cultural and sports events and leisure. It is driven by direct and indirect effects in the investment as well as in the utilisation phase and stimulates the economy as a multiplier effect.

The stimulus for consumption might be reinforced if the Beirut Waterfront district attracts large international companies and highly qualified staff with above-average income and consumer behaviour.

Results

In the base case, the added value amounts to approx. USD 7 bn in the investment phase, thereof approx. USD 2 bn caused by direct and approx. USD 5 bn by indirect and secondary effects. 60% of this volume is assumed to be generated in Lebanon, whereby this number depends on the sourcing of goods, employees and services.

The utilisation in this case is expected to reach up to 85% of the Beirut Waterfront capacity in year 16. Added value would then amount to approx. USD 1.5 bn p.a. of which ca. 70% could become locally effective.

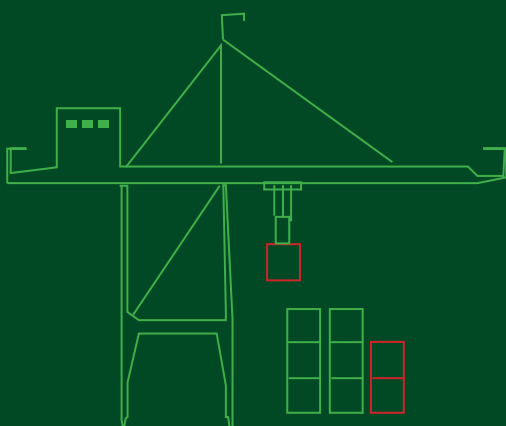
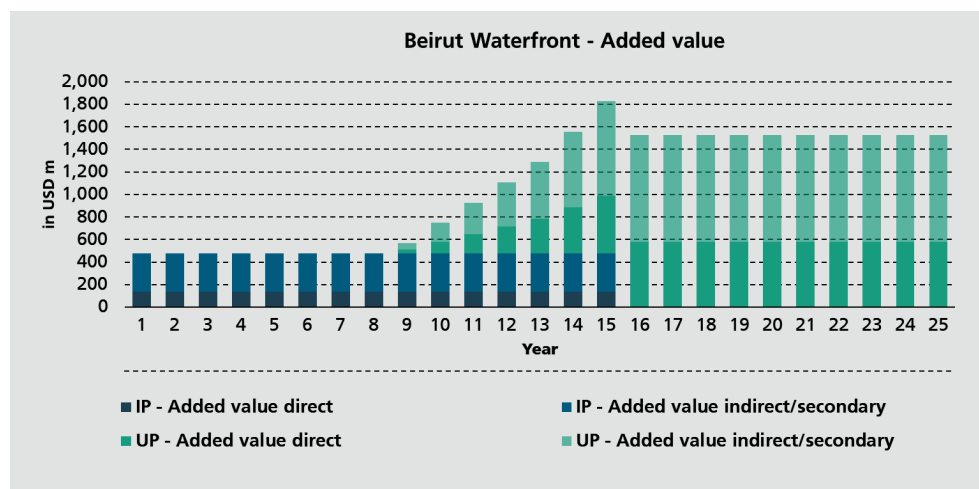


Figure 40: Added Value (IP= Investment Phase, UP= Utilisation Phase)



Source: Fraunhofer IMW

5.3.3 Employees and income

Direct effects

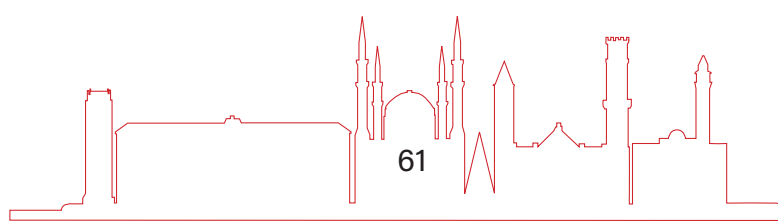
A large-scale building project like the Beirut Waterfront creates a significant number of workplaces especially in the construction phase, starting with the preparation (e.g. groundwork). For planning purposes, an average of 4,000 employees over a 15 year period is assumed.

Due to the current economic situation in Lebanon, dislocation and expulsion effects were widely disregarded. The high unemployment rate ensures the availability of a skilled workforce locally without adversely affecting other businesses and projects. Furthermore, a significant number of workers – in the base case approx. 50% - are expected to be foreigners, as has previously been the case in past projects of comparable size within the local and greater region.

Average income for workers (80% of total employees) is assumed to be USD 1,750 per month and for head workers and engineers (20% of total employees) USD 5,250 per month.

The utilisation phase will provide the new urban quarter up to 37,000 workplaces of which in the base case on average approx. 85% will be manned from year 16 on. Wage and salary structures are assumed to be in line with the investment phase, with a higher share of employees coming from Lebanon itself or living there on a long-term basis.

A high utilisation and occupation can also be achieved and supported through tourists and business travelers that the Beirut Waterfront as a new attraction in the Middle East should attract.



Indirect and secondary effects

Through occupation effects in supplier and subcontractor companies as well as increased consumption, up to approx. 10,000 additional workplaces could be created in the investment phase over the 15 year period.

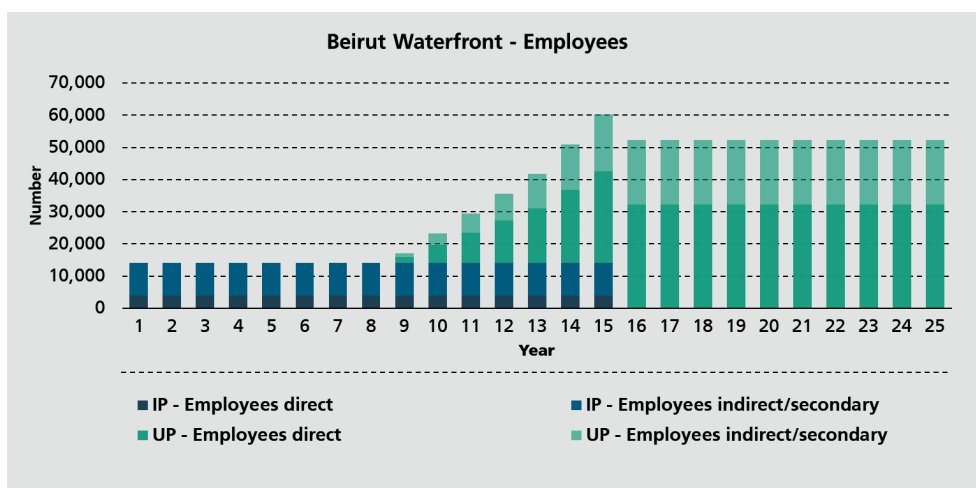
The long-term Beirut Waterfront workplaces will mainly be created in the labour-intensive service sector (offices, hotels etc.), leading to a lower multiplier effect. The approx. 32,000 people that are employed in the base case would result in approx. 20,000 further workplaces through indirect and secondary effects.

Results

The assumptions and timeline described above would lead to a direct total income of close to USD 2 bn in the investment phase. Approx. 2/3 of this amount is expected to go to Lebanese employees as they are assumed to make up a higher share of employees among the head workers. Indirect and secondary effects with approx. 10,000 workplaces would

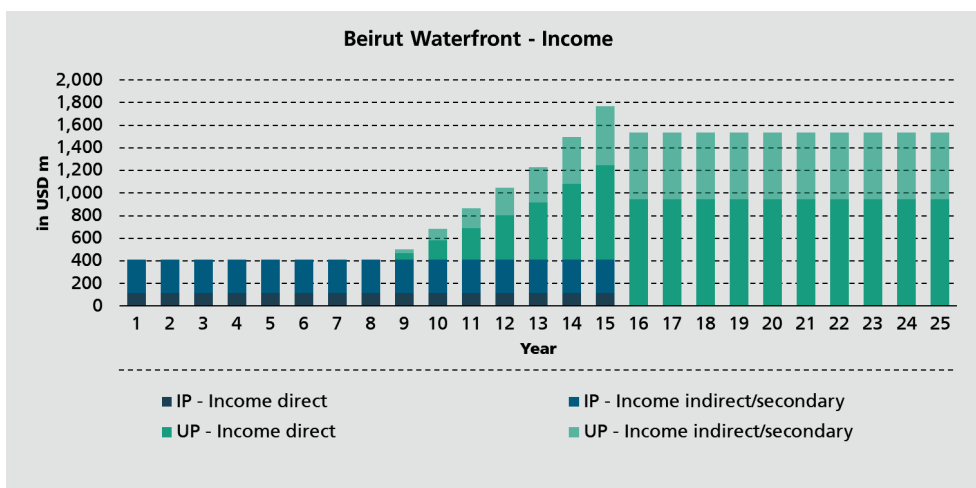
lead to an additional total income of approx. USD 4.4 bn. In the utilisation phase, direct income p.a. would be approx. USD 0.9 bn. Almost 80% of this amount would go to employees in Lebanon, as would 80% of the approx. USD 0.6 bn p.a. generated through indirect and secondary workplaces.

Figure 41: Employees (IP= Investment Phase, UP= Utilisation Phase)



Source: Fraunhofer IMW

Figure 42: Income (IP=Investment Phase, UP= Utilisation Phase)



Source: Fraunhofer IMW

5.3.4 Taxes and other public funds

Overview

Value generation, the creation of additional workplaces and higher income will lead to higher earnings for the public budget and social insurance agencies. In turn, public spending on unemployment and social welfare could be reduced.

The main tax effects are referring to corporate income tax (assumed at 17%, for retail, an average tax rate of 16.3% considering business tax was applied), wage tax (assumed at 13.7% on average) and value added tax (VAT, 11%). Social security contributions are calculated with 25.5% of personnel expenses.

Effects on taxes and other public funds equally occur in the investment and in the utilisation phase. Regarding the distinction between direct and indirect effects, VAT is only calculated on the direct level to avoid double counting via the taxation of purchased goods, materials and services (input tax reduction for companies). However, secondary effects are subject to VAT because (consumption) spending funded by increased income on that level, is not included in the investment budget itself and hence, creates additional effects.

Earnings from the development that might be realised through sales of buildings, flats and other facilities to private investors compose another source of public funds. The structure of the project company as well as future ownership has not yet been decided upon. Therefore, these earnings are subject to further discussion, as well as property tax and real estate transfer tax effects that have not yet been considered.

Minor revenues could also be generated e.g. through parking management which has not been considered at the current early planning stage and will not play a significant role in the overall project volume.

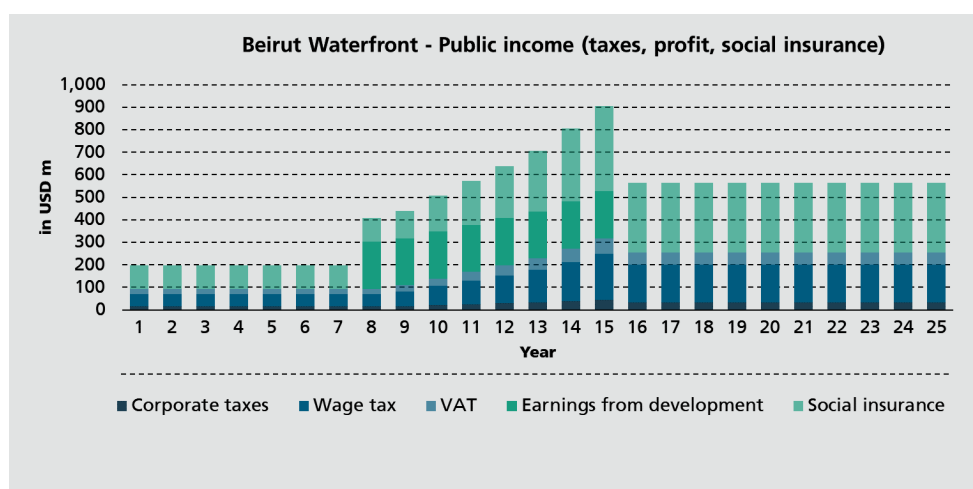
Results

Total tax income in the investment phase is estimated at approx. USD 1.4 bn. This figure equates to approx. 75% of the spending currently planned for public facilities including preparation, groundwork and infrastructure of approx. 1.9 bn. Until the end of year 25, approx. USD 3.3 bn could additionally be generated from the utilization of the Beirut Waterfront project by inhabitants and resident enterprises.

Social security contributions are driven by the number of employees and average salaries. To the approx. USD 1.6 bn in the investment phase, a further approx. USD 4 bn could be added until the end of year 25 through employment in the utilisation phase.

The earnings from development depend on the project scenario and could reach a total volume of approx. USD 1.7 bn in the base case.

Figure 43: Public Income



Source: Fraunhofer IMW

5.3.5 Scenarios

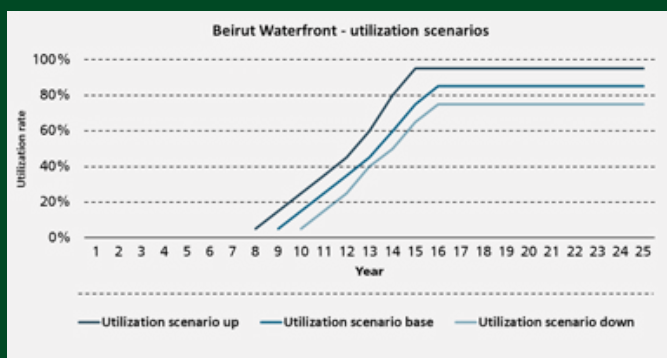
Assumptions

Within the scope of the indirect profitability analysis, variations of two factors have been considered:

- During the investment phase, the value creation in Lebanon is assumed at 80% (upside case), 60% (base case) and 30% (downside case). This includes expenses for materials, purchased goods and services as well as for personnel.
- As the construction of the Beirut Waterfront will likely proceed in several stages, its utilisation can start before year 15 and economic effects could begin to materialise as early as year 8, 9 or 10. This is reflected in three scenarios that reach different levels of long-term average occupation (see graph below) with 95% (upside case), 85% (base case) and 75% (downside case).

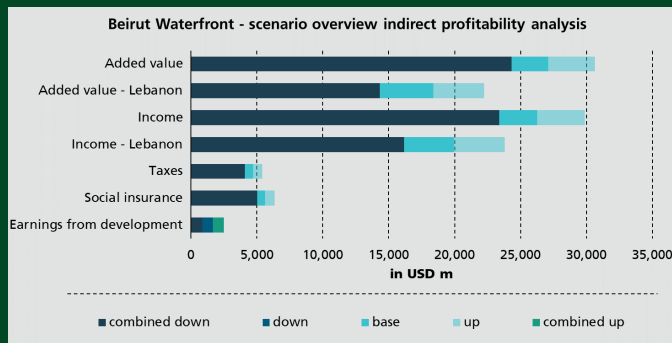
For purposes of the analysis, the economic effects of the investment period have been equally distributed over a period of 15 years. The total period under consideration is 25 years to illustrate a steady state of the utilisation for approx. a decade. However, it is clear that the utilisation of the Beirut Waterfront can be extended to a prolonged period and the indirect profitability of the project could therefore be calculated even further based on consistent annual values.

Figure 44: Utilisation Scenarios



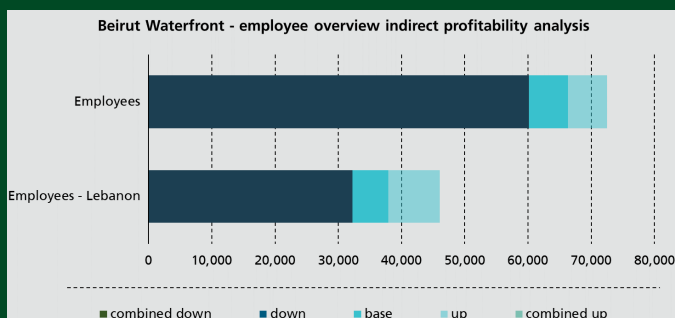
Source: Fraunhofer IMW

Figure 45: Scenario Overview



Source: Fraunhofer IMW

Figure 46: Employee Overview



Source: Fraunhofer IMW

Results

The analysis identifies the following principle results:

- Local value generation and job creation play an important role. The graphs below illustrate that the overall differences between the scenarios are lower than for Lebanon alone. Therefore, the outflow of economic capacity should preferably be limited esp. though the inclusion of local companies in the construction consortia during the investment phase.
- With earlier utilisation, the results turn out to be increasingly positive. While this comes as no surprise, it provides a clear hint that an optimised staged building phase is of major importance and that the hampering and obstructive influence of interest groups should be avoided as much as possible.
- Even in a downside case, earnings for the public authorities through taxes and social insurance contributions reach more than USD 9 bn. Therefore, substantially exceeding the initial investments for public facilities of approx. USD 1.9 bn. These numbers alone do not account for the positive qualitative effects (see section 3.6) that can be expected and that might also stimulate further investment.

In addition to the cases described above, the Beirut Waterfront project scenarios themselves include sales price variations that lead to changes in the respective earnings from development. This effect is considered in the overviews below, but it does not affect other criteria. Contingencies for higher project costs are not included and would – at least if covered by the investor group – only further increase the positive results of the indirect profitability analysis.

5.3.6 Qualitative effects

In addition to the economic aspects of the indirect profitability analysis, attention should also be paid to qualitative effects that arise from the project. Such impacts can e.g. consist of influence on political, socio-economic, ecological and image factors not directly representable in economic terms but likely to be of great value for a community or country. On the other hand, many of these qualitative effects are closely linked to economic hard facts that thus, have an impact far beyond results that can be rated in monetary terms.

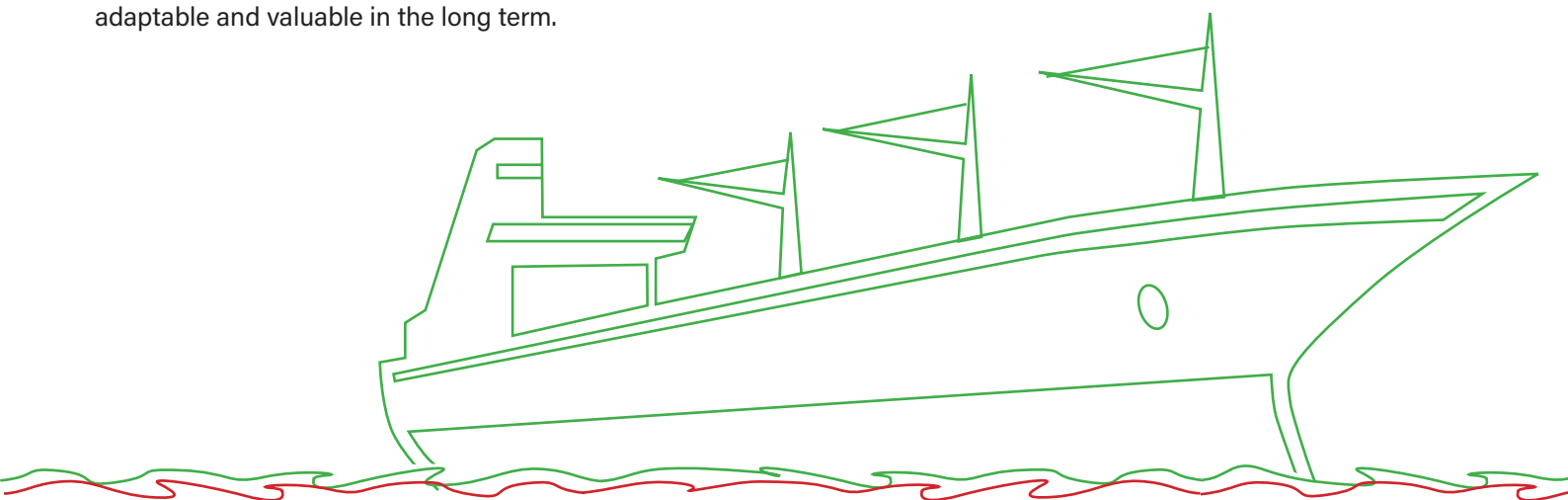
While employment effects have already been analysed from an economic point of view, additional workplaces also play a major role for political and socio-economic stability. High and long-lasting unemployment leads to discontent and tensions in a society. In such an environment, confusion prevails and if a lack of economic perspectives coincides with unrest and violence, people might find themselves forced to leave a country or region and search for a better future for themselves and their families.

Despite the Beirut Waterfront project at first sight seemingly only having a small influence on the countrywide circumstances, it has the ability to play an important role in improving the attractiveness of Beirut and Lebanon. Particularly, in transforming the region into a gate to the Middle East for international companies as well as attracting tourists, business travellers and investors from all around the world. By becoming a lighthouse project, the image of the country might fundamentally change from a region of instability to one of economic prosperity. As described above, there is a good point of departure for such a development given the skilled and motivated people and the suitable infrastructure surrounding the location.

Further stabilising and integrating effects can result from social measures strengthening low-income families and providing incentives for a mixed structure of inhabitants. The settlement of different population groups can be fostered through combining working and living areas as it is currently included in the concept. This not only has advantages in terms of social aspects, but also makes the district adaptable and valuable in the long term.

Already within the scope of project preparation and planning, it would be favourable to involve local companies and civil society to increase the acceptance of the new urban quarter. Experience in Beirut, shows that this is of great importance to create a liveable neighbourhood that can attract day travellers and people from other parts of Beirut and the adjacent communities – who then also contribute not only to the atmosphere, but to its economic success. The challenge hence is to combine the attractiveness for the international community with the interests of the local population and the small and medium-sized businesses in Lebanon.

In this way, the Beirut Waterfront project can play an important part in an overall successful urban development. This should also consider ecological aspects and sustainability criteria, e.g. regarding building structure and materials, nature of the utility infrastructure and the share and design of green recreational areas which have a positive effect on the microclimate and biodiversity. The new district even has the potential to become an initial point for the development of a public transport system. This could then gradually be extended to other parts of Beirut, mitigate automobile traffic, increase traffic safety, decrease noise levels and reduce pollution.



5.4 Summary

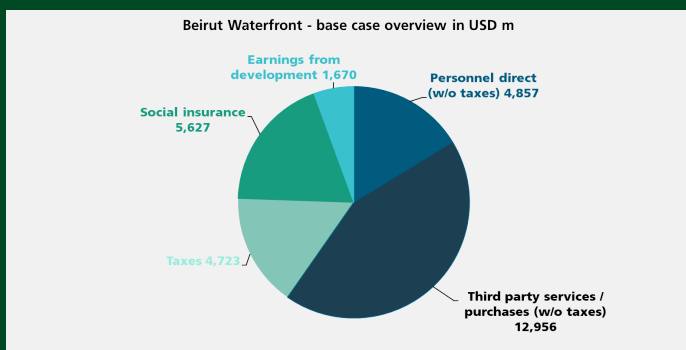
While the idea for the Beirut Waterfront project resulted from a catastrophic event it has the prospect to be converted into a positive chance for the city and Lebanon altogether. It provides the opportunity to construct a lighthouse project that sends out its rays to the region and could improve the image of a country that for a multitude of reasons has had to play below its proper level for far too long.

In the current option 2, the project has a direct investment volume of approx. USD 7.2 bn (w/o contingencies) that allows for a new urban quarter with all the necessary infrastructure of an attractive venue, including gastronomy, schools, parks and beaches as well as cultural, sports and leisure facilities. In addition, a significant number of workplaces in offices and the hospitality industry can be created and provide improved economic perspectives for its inhabitants.

Besides uncertainties due to the lack of data and the early stage in the planning process, the analysis shows that the investments in public facilities adding up to a total volume of approx. USD 1.9 bn would in the medium-term flow back to the public budget (and the social insurance system). Furthermore, tax revenues would generate earnings that could be used to co-finance the new construction of the harbour as well as social and ecological measures. Overall, the project has significant positive effects that exceed the initial costs for the public.

The following figure summarises the overall results of the indirect profitability analysis for the Beirut Waterfront project by different effects. Basis is a calculation period of 25 years with an investment phase of 15 years and a utilisation of the facilities beginning step by step from year 9 on in the base case:

Figure 47: Summary

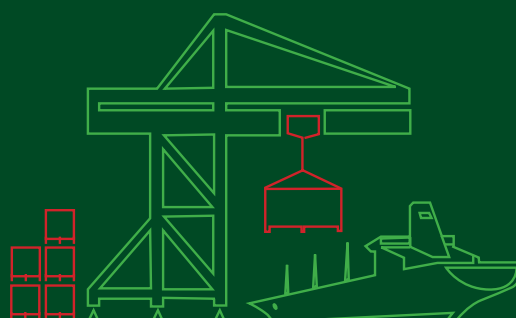


Source: Fraunhofer IMW

Based on the assumptions made, public refunding through taxes and earnings from the development totals to approx. USD 6.4 bn, more than threefold of the initial spending. The scenario analysis showed that favourable results can be achieved even in a supposed downside case. In addition, social security funds would receive payments of approx. USD 5.6 bn and in turn reduce expenses because of unemployment and the underutilisation of economic capacities.

The share of personnel expenses (based on direct added value w/o taxes and social security contribution) and third party services / purchases (based on indirect and secondary added value w/o taxes and social security contribution) that would come into effect in Lebanon depends on the contribution of local companies and employees to the construction of the Beirut Waterfront project.

Including earnings from development and on the assumptions made, the indirect profitability of the Beirut Waterfront project could generate to approx. USD 30 bn in the base case over a period of 25 years.



6. REALIZATION URBAN DEVELOPMENT

Project Goals: Maximum quality and revenues for

- Harbour Expansion
- City Repair
- Family Living

Transparent and compliant realization with EU-Standards

- The urban development activities should be guided by a Development Company under international transparent control.
- Private Investments should be insured against Political Risks by German Ministry of Economics.
- There must be a commitment exclusively to the project goals: Harbour Expansion, City Repair and Family Living.
- During the development and building phase the project should be a Tax-Free Zone.
- There should be an intensive project communication with the Beirut Citizens and the Civil Society.

Opportunities

The realization offers the opportunity to exert a positive influence on the development in Beirut and Lebanon beyond economic effects including the described indirect profitability.

1. Implementation of climate-friendly concepts on a macro and micro level:

- „Green technical infrastructure“, e.g. power generation from regenerative and environmentally friendly energy sources (geothermal energy, sewage gases, solar and wind energy). The aim here is largely autonomous supply of the district.
- Sustainable rainwater management including green roofs.
- Development of local public transport (people mover). Reduction of pollutants by reducing the volume of traffic. Promotion of e-mobility.
- Use of sustainable building materials and implementation of C2C concepts.

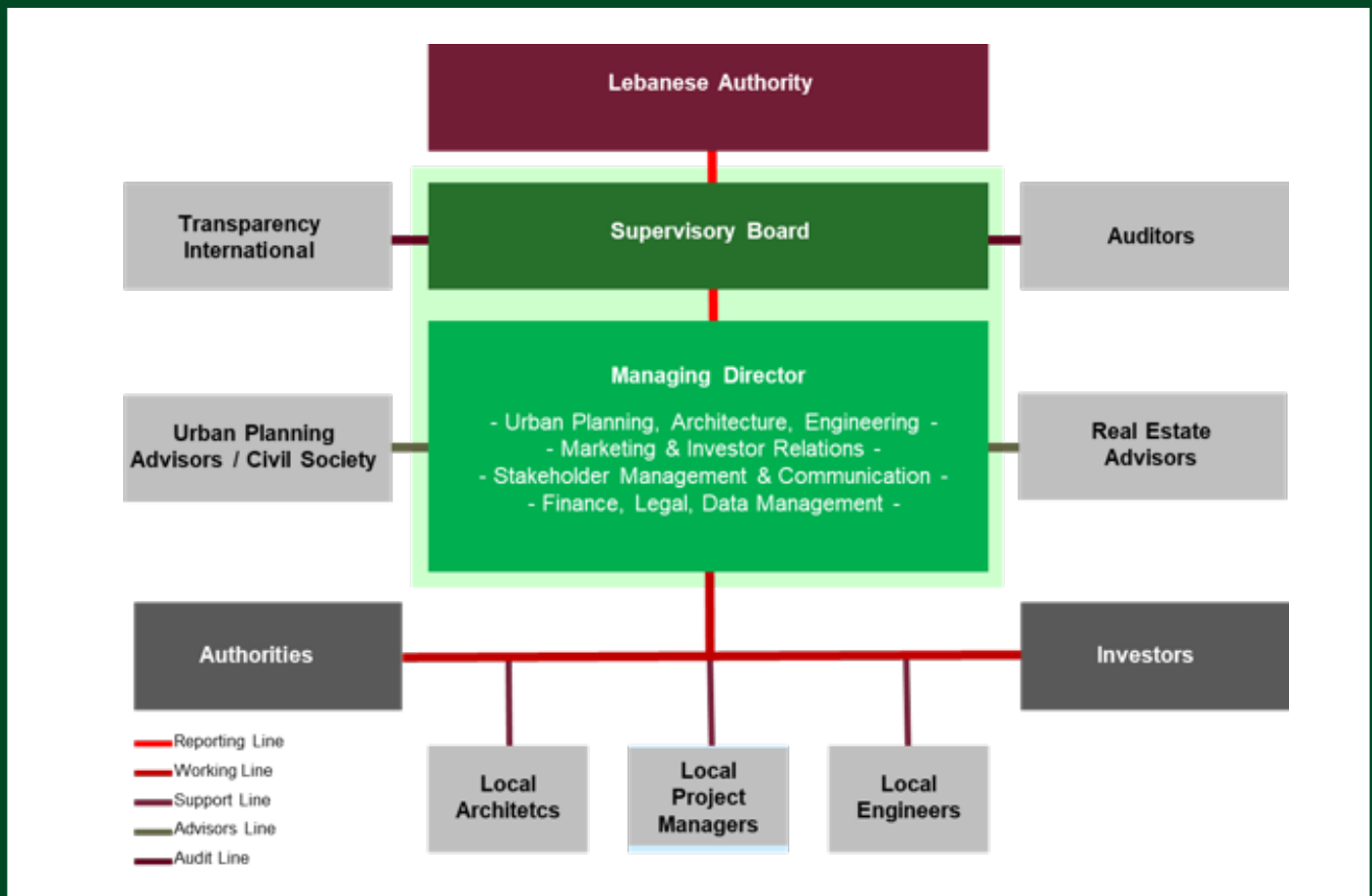
2. Support social integration

- Promotion of family-oriented living. Kindergartens and schools. Socially funded buildings in the campus area.
- Creation of places for education, culture and creativity spaces.
- Implementation of urban artistic aspects, attractive pedestal zones and passages.

Fundamentals for organizational structure of the development company

- Urban development activities should be guided by a development company under international auspices.
- Private investments (with German guarantees).
- During development and building phase the project should be a Tax-Free Zone.
- Intensive project communication with Beirut Citizens and Civil Society.

Figure 48: Realisation of Urban Development: Suggested Urban Organisation



Source: Colliers International

Business Purpose of the Development Company

- Master Plan and Organizing Architect Competitions
- Management and Control of Infrastructure Elements
- Tendering and Awarding the different Development Sites for B.O.T.
- Quality Control of Architecture and Technology
- Coordination with Harbour Expansion Project
- Communication with Stakeholders

6.1 Risk assessment

An urban development project of this size is subject to various risks. These are roughly divided into:

- Environmental risks: e.g. Availability of the site, political stability for implementation, approval risks and political influence on the project (overriding), inflation and investment background.
- Technical risks: subsoil, building price development, planning stability.
- Market risks: purchase price level and marketing risks, purchasing power, economic and tourism development.

At this stage, it is essential to identify the foreseeable risks, which mainly arise from the economic and political situation in Lebanon, and to minimize them by taking countermeasures at an early stage.

Within the financial model, possible risks were mapped and assessed in the form of scenarios. At the same time, opportunities were examined and evaluated:

- Political and economic security through international guarantees with influence on financing and risk surcharges for project development.
- Possibilities for the implementation of project parts in the form of a public private partnership, whereby the scope can vary between 0 and 100%.
- The chance to generate discounted imports by designating a free trade zone for the building area.

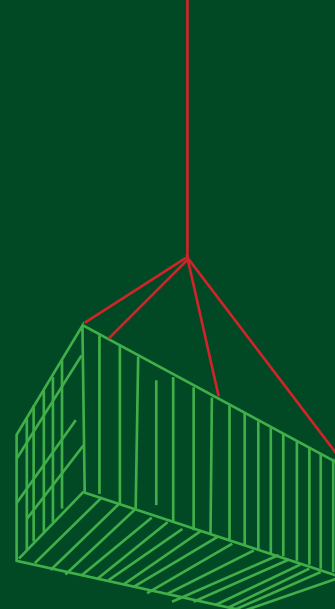
Above all, however, the project offers serious opportunities, due to its location, dimensions and accompanying measures, to provide a decisive impetus for the economic recovery of Lebanon.

Figure 49: Risk Analysis of Urban Development

Risk	Probability	Effect / % of project volume	Possible Risk Mitigation
1 Availability of the site	1	2	Scenarios; Holistic Concept Harbor / Urban Development; early integration of all stakeholders; consideration of all known
2 Side effects contra realization of the project	2	2	Scenarios; Holistic Concept Harbor / Urban Development; early integration of all stakeholders; Consideration of all known
3 Political stability for implementation and instable investment background; instable justice	3	2	International project organisation and observation; internationally secured investments; international political support; Arbitration
4 High Inflation	3	1	International financing; Free trade zone; International project organisation and observation
5 Building site: Ground Condition incl. Contaminations, Sea water level etc.	2	1	Realistic building prices based on comparable objects; next: site investigations und planning
6 Increase of construction costs	2	1	Building prices are linked to sales prices; additional deviation up to 10% in the model
7 Planning quality and stability of decisions	1	1	International Program and Project Management; Observation
8 Purchase price level and marketing risks; purchasing power national / international; Economic and tourist development	1	1	Effects +/- 10% = 1000 m USD due to market price variety included in financial model. Financial model based on average price level based on detailed market research; assumption that prices can go up to +20% due to exceptional location as a buffer

Probability/Effect	1	low	0-30%
	2	middle	30-70%
	3	high	70-100%

Source: Colliers International



6.2 Time milestones (best case)

Figure 50: Timeline milestones

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Governmental agreement																	
Organization set up																	
Set up Program and Project Management																	
Financial clearance																	
Harbor Expansion																	
Technical Planning																	
Groundworks incl. Traffic																	
Technical Infrastructure																	
International Architects Competitions																	
Planning and commissioning																	
Approvals / Building permits																	
Building Phases					1				2			3					
Marketing and selling																	
Utilization																	

Source: Colliers International

Implementation period of approx. 15-20 years from

- Advance planning: civil engineering, technical infrastructure, detailed urban planning including permits approx. 3 years.
- Basic work approx. 4 years, phased implementation from west to east, parallel: land reclamation, relocation of the city motorway.
- Development of the technical infrastructure approx. 4 years.
- Building construction in 3 construction phases from west to east as part of the expansion of the port; approx. 4 years per construction phase.

Major upcoming milestones and decisions

- Decision on implementation option.
- Structure and staffing of the project organization.
- Clarification of the organizational financial framework of the project.
- Clarification of the property availability.
- Planning approval (recommendation: international competitions).

7. NEXT STEPS

Crises present opportunities: however, time is of the essence.

One cannot and should not simply look to restore the Port of Beirut as is, but to look to the future of the country and specifically the port sector in Lebanon generally. A redesigned national governance structure as postulated by the world bank study, as well as Roland Berger, is urgently to bring transparency, efficiencies and to unlock safe operations and pave the way for real development that benefits to the country. This port authority must have clear roles, responsibilities and accountability to allow a plan on a way forward.

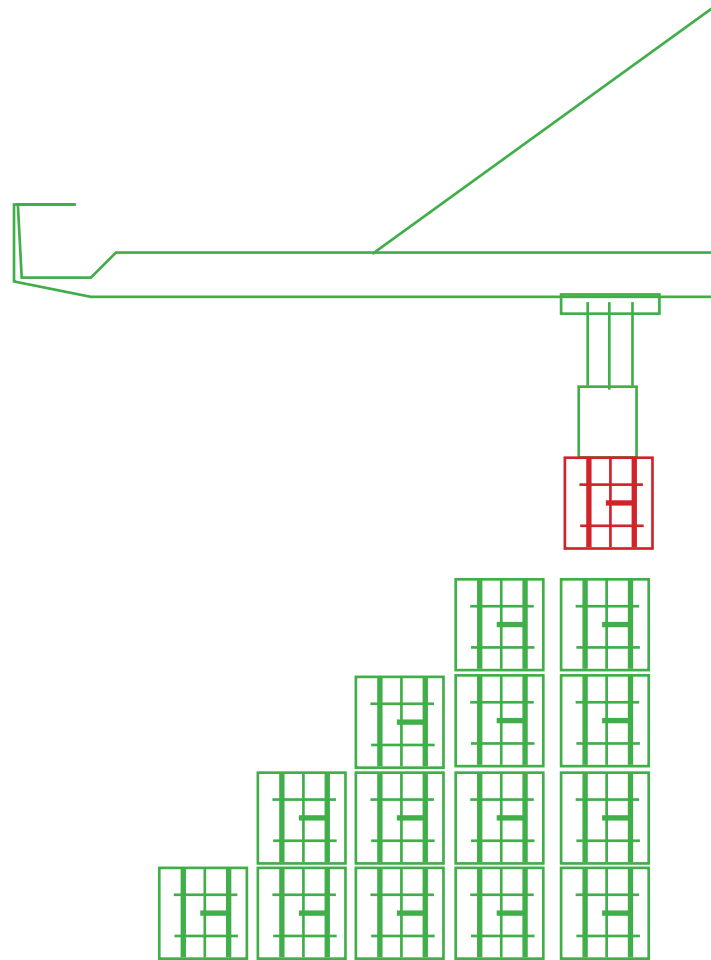
Building on this then should be a long-term plan to establish vital donor and investor confidence to encourage investment in the country for meaningful international investment in the development of the country. An internationally lead custodian for the reconstruction efforts, including the steering committee and the project management office will help develop this and not only that development plans and coordinated and developed, but that they are transparently and fairly executed giving all an opportunity in the new development of the port precinct.

The Immediate activities must be to clear the damage, dispose safely the waste and rehabilitate the port of Beirut should be carried out, however thereafter, the revamped governance structure, must be established, as is clearly outlined by multiple reports.

This study provides a path thereafter towards the development of a realistic, viable, self-funding and sustainable concept as a strategic development blueprint for the Future City-Port of Beirut. The concept is considered for the benefit of the country and her people, but also as a potential regional model to integrate historical heritage and future potential into a working model for the City-Port. The detailed development needs to be carefully coordinated between the stakeholders as well as the international bodies and investors, in order to ensure the development, which will take place over many years, is well coordinated, has minimum impact on the working of the port, or on the Lebanese supply chains, but takes the long-term view to establish a new precedent rather than just returning to the old. For this purpose, it is important a long-term board is established including all stakeholders, to oversee the planning, development and operation, and that this is kept throughout the process, to ensure continuity and accountability to the people of Lebanon for the development of the concept into a working integrated Urban development and an internationally linked efficient port.

These must be done in close parallel to reap the benefits of synergies and create a compelling value proposition to attract international investors. Alongside the involvement of these international players, a clear capacity building plan at the Port of Beirut should be enacted.

In its turn, this serves the goal to make the Port of Beirut a transparent, safe and efficient economic hub for Lebanon and the region – offering long-term opportunities to the population.



8. APPENDIX

Sales Prices

Best case	4.200 USD / sqm
Base Case	3.850 USD / sqm
Minimum Case	3.500 USD / sqm

Costs

Building Costs Developments	600 - 2.100 USD / sqm GFA	differentiated consideration, dependent on asset
Building Costs Public Facilities	1.300 - 4.000 USD / sqm GFA	
Land reclamation	1.000 - 2.000 USD / sqm Ground Area	
Groundworks	50 - 300 USD / sqm Ground Area	

Water supply	8 - 10 USD / sqm GFA
Sewage treatment	20 - 25 USD / sqm GFA
Power supply	17 - 20 USD / sqm GFA
Data Connectivity	8 - 10 USD / sqm GFA

Developer profits	20% of Building Costs	internationally secured, otherwise 10%
Interim financing	5% of Building Costs	
Marketing costs	2% of Sales Prices	
Cost Level IV/2020; net prices including planning		

Dimensioning Factors

Land Utilization	15%	footprint building on Ground Area sqm GFA / Ground Area
Building Dimensioning	3,0 - 3,5	

Living space / habitant	45 sqm / GFA
Utilization	80%
Percentage Children of habitants	25%

Working places	
Office	1 / 25 WP / sqm GFA
Retail	1 / 50 WP / sqm GFA
Hotel	1 / 120 WP / sqm GFA
Public	1 / 200 WP / sqm GFA

Source: Colliers International

Base case assumptions				
Tax rates and social security				
Corporate income tax	17.0%	incl. share for business tax (non-corporate entities)		
Blended tax rate	16.3%			
Wage (income) tax - average rate	13.7%			
VAT	11.0%			
Social security	25.5%			
Household income				
Weighted average port city	US\$ p.a.			
	40,062			
Employees				
a) Investment phase			Origin of employees	
	US\$ p.m.	share	Lebanon	International
Average wage/salary level 1	1,750	80%	54%	46%
Average wage/salary level 2	5,250	20%	85%	15%
b) Utilization phase			Origin of employees	
	US\$ p.m.	share	Lebanon	International
Average wage/salary level 1	1,750	80%	70%	30%
Average wage/salary level 2	5,250	20%	90%	10%
Travel				
	Overnight stays /	Spending in US\$		
	number	p.p. and day		
Tourism	650,000	225		
Day travel	1,000,000	50		
Businessstrips	480,000	275		
Cost structures				
	Building & construction	Consumption (services)	Consumption (goods)	
Material costs	51%	10%	50%	
Personnel costs	27%	65%	27%	
Services and other incl. rent	9%	12%	10%	
EBIT	13%	13%	13%	
EBT	9%	9%	9%	
Revenue p.a. per workplace and sector				
	US\$			
Hotel	39,294			
Retail / Gastronomy / Fitness	35,365			
Office	39,294			
Industry & Logistics	47,153			
Public Facilities	39,294			

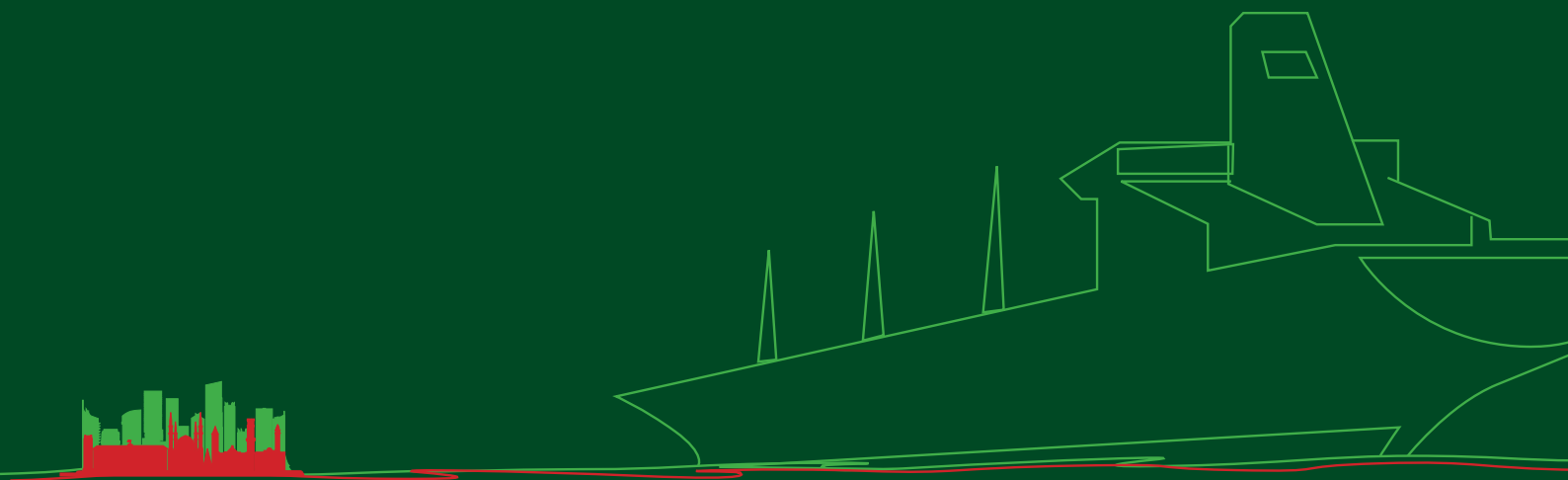
Source: Colliers International

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