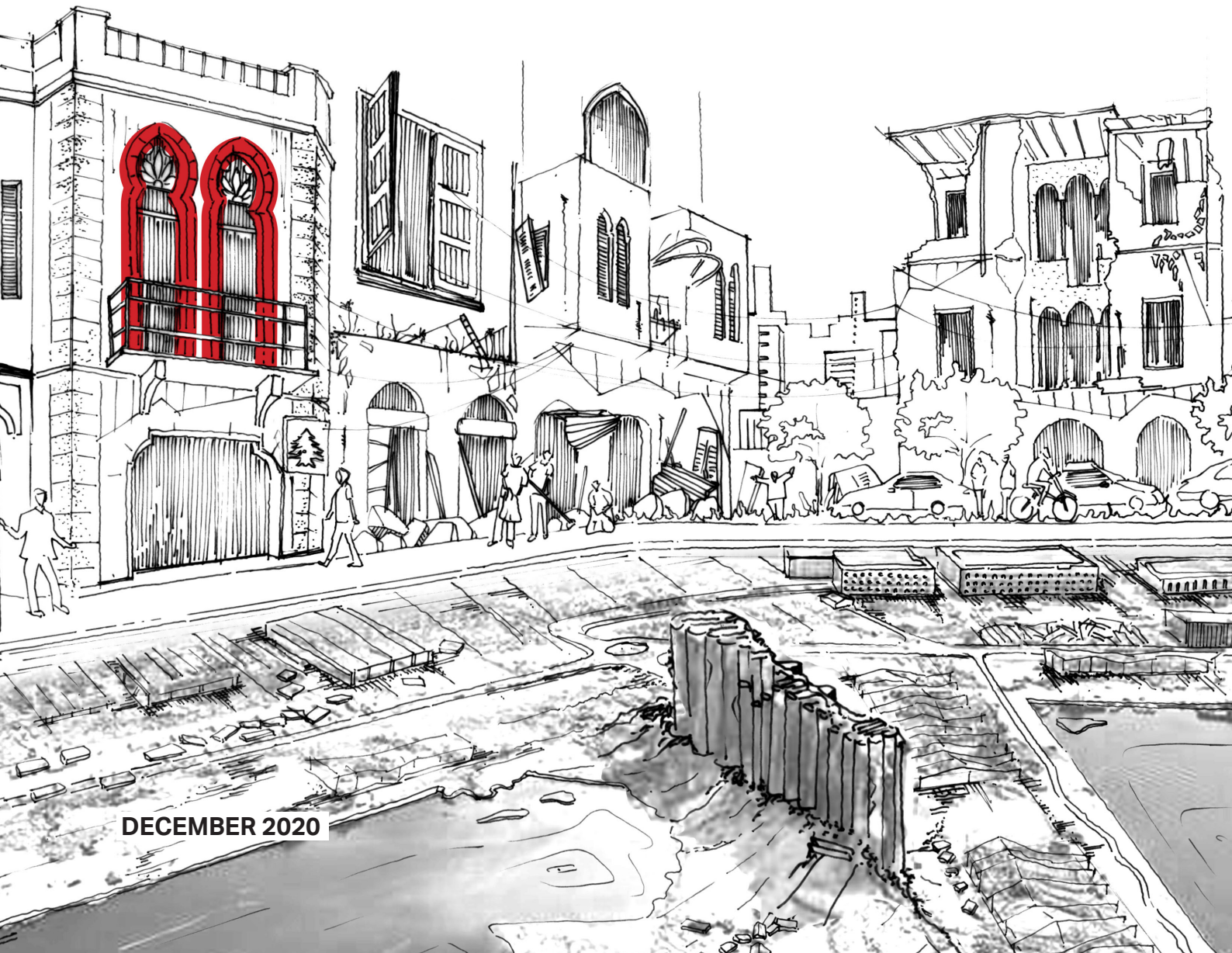


BEIRUT

BEIRUT RECOVERED

A SERIES OF ARTICLES
ON POST-DISASTER
RECOVERY

dar



DECEMBER 2020

STATEMENT OF WORK

On August 4, one of the most powerful non-nuclear blasts in history rocked Beirut, devastating the city's central and eastern neighborhoods and triggering a massive humanitarian crisis. When the dust settled, it fell on a Beirut that had been irrevocably changed. The neighborhoods and areas most affected by the port blast had not only provided shelter and livelihoods for hundreds of thousands of people, they had also served as the unofficial but vibrant heart of Beirut. By virtue of their outstanding character, rich identity, exceptional heritage, unique creative industries, and active public life, these neighborhoods were viewed as an inclusive, accessible foundation for the brighter future the Lebanese dreamed of. Within seconds, they were wrecked to rubble.

The Dar community in Beirut was shaken to the core – with thousands of its Lebanese employees directly or indirectly affected by the tragedy. Since its beginnings in Beirut in 1956, however, the company and its people had been deeply rooted in Lebanon, surviving and preserving across countless trials as we sought to build a better future for Lebanon and use Lebanese talent to help drive progress around the world. With tragedy striking so close to home, the entire Dar Beirut community was galvanized to help support their community. Over a hundred Dar architects and engineers were voluntarily deployed to the affected areas to support in needs assessments, and many were involved in immediate relief efforts.

It soon became apparent, however, that the scale of the tragedy required a more comprehensive recovery vision. To spark an essential community conversation, Dar prepared a series of articles. Our objective was to present, from a planning perspective, a comprehensive understanding of the multitude of challenges faced by Beirut in the aftermath of the port blast. These include the city's long-standing urban and socio-economic issues, which will continue to be aggravated in the immediate future. Together, the articles present an emergency plan that targets restoring a semblance of normalcy in the affected neighborhoods as well as a future plan which aims to inform a vision for the revival of the area as a whole, a vision that not only guides the reconstruction of the city but also addresses the vulnerabilities that existed before and restores the heart of Beirut.

The topics chosen for these articles are reflective of the most pressing issues facing the affected neighborhoods: social sustainability restoration, housing sector reformation, creative industry rehabilitation, and public realm reclamation. Once addressed, these issues will enhance the overall resilience of the neighborhoods by enhancing the capacity of individuals, communities, institutions, businesses, and systems to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.

The findings of the articles are based on Dar's expertise and familiarity with the affected neighborhoods and are supported by desktop research and data collection. Each article presents a condition assessment of the topic in question before and after the disaster to tailor a context-specific approach before proposing a set of short-term solutions and long-term recommendations.

After August 4, there is a critical responsibility to build back better. Lebanon's under-resourced and neglected physical and administrative infrastructure will need to be seriously readdressed in order to create a powerful set of actions that will enhance community resilience in the face of such large-scale strife. Moreover, it is integral to the city's renaissance, development, and regrowth that the post-recovery effort address both urgent issues for short-term recovery and long-term strategies to seasonal, long-standing, and future challenges. This recovery and redevelopment must aim not only to preserve that which has always had value but also to improve on that which needs to be questioned and changed.

Through these articles, we hope to begin a conversation around an urban recovery that is people-centered, place-specific, and value-led.

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ACRONYMS

EDL: Electricité du Liban

IRENA: International Renewable Energy Agency

LCEC: Lebanese Center for Energy Conservation

OEA: Order of Engineers and Architects

RWH: Rainwater Harvesting

US: United States

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The study area of the articles (approximately 216 hectares with a population of around 59,500) mainly comprises the neighborhoods most affected by the Beirut port blast. These neighborhoods are characterized by their unique historic urban and social fabric, and they boast a rich mix of uses and a diversity of socio-demographic groups. The selected study area is outside of the limits of Beirut Central District under Solidere governance. It is worth noting that some of the proposed solutions or recommendations in the articles are not limited to the study area, but address the city in its entirety and can be even scaled-up to a country level.

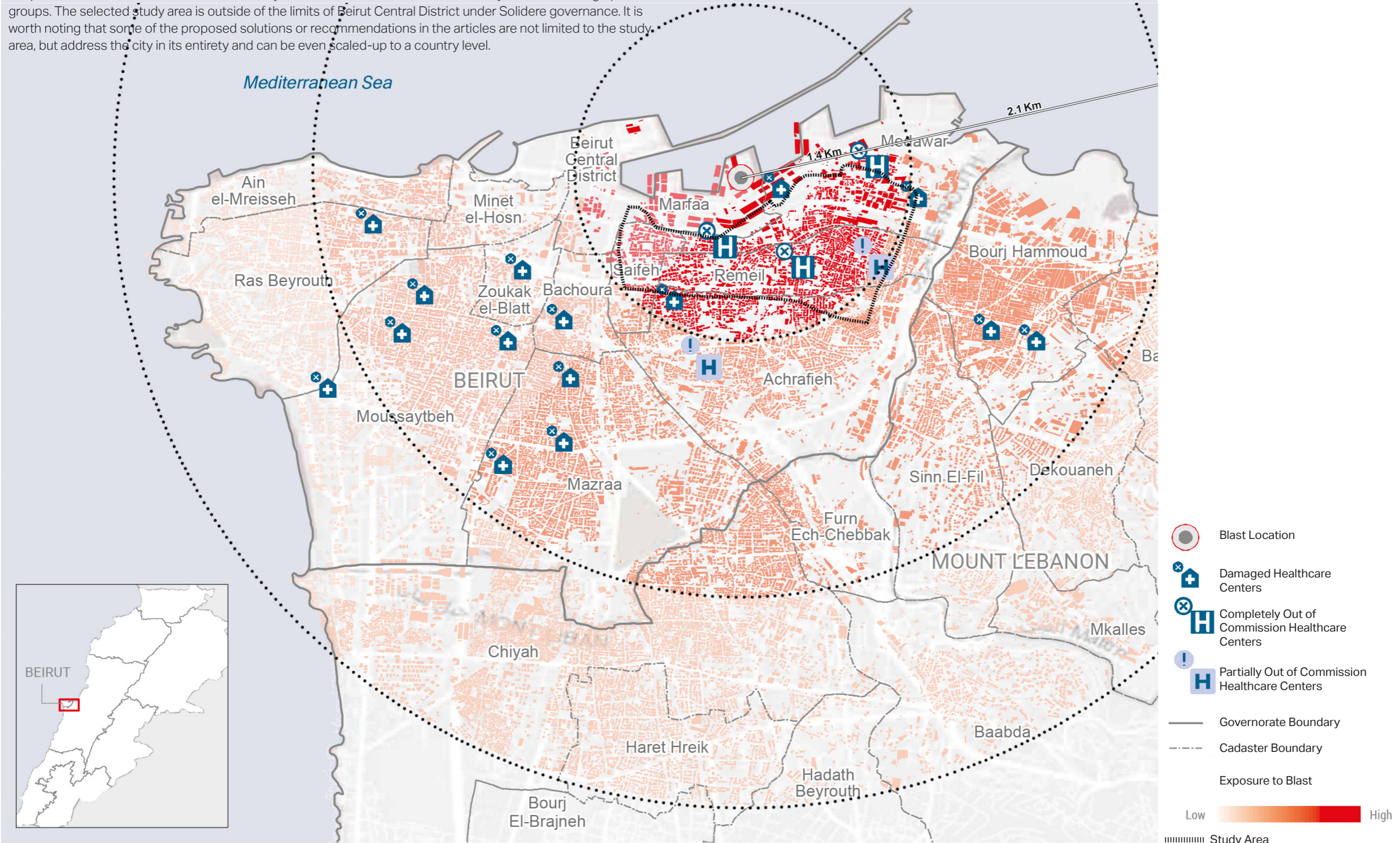


Figure 1.1. Beirut: Buildings Exposure to Port Blast with Damaged Hospitals and Health Facilities | Created on 14 August 2020

Source: LRC, WHO/OCHA, ESRI, Google Feedback: www.unocha.org | www.reliefweb.int



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**RECLAIMING PUBLICNESS THROUGH
SUSTAINABILITY AND SOCIAL ACTION**

DEFINING THE PUBLIC REALM

The public realm of any city is representative of a number of interfaces between public and private agents and mediates a list of goals and intentions between different social and spatial structures. It creates a spatial dialogue between consumers, suppliers, and producers; between transportation systems and urban nodes of different functions (commercial, residential, recreational); between authorities and their citizens; between the climate and the terrain; etc. If treated as spaces of value to a given city, then the public realm, its design and its organization, should be taken as the first line of defense in any given crisis. Following this definition, the public realm would also include the amenities and services that municipal and governmental bodies provide to their citizens, as well as any alternatives to such amenities that can be privately or communally owned. This includes more specifically water, gas, drainage/sewage, electricity, and security.

The following principles act as the framework within which short-term and long-term strategies can be used to enhance and positively transform the public realm:

- The public realm as a space of social and cultural dialogue;
- The public realm as an enhancer to private economic and investment potential;
- The public realm as a multi-modal circulation space, which favors alternative modes of mobility while simultaneously respecting and critically addressing existing ones (such as private car use);
- The public realm as an ecological space that interacts with organic, terrestrial, and atmospheric phenomena; and
- The public realm as the first line of defense against immediate and prospective infrastructural challenges.

Acknowledging the many roles the public realm can play in a given urban environment, it becomes evident that Beirut's urban challenges are resultant of a sustained inability to evolve and enhance these roles in ways that are relevant to the local scale and the global scene. Studies and proposed strategies from within Lebanon will play a key role in addressing this issue but so will benchmarks and successful proposals from around the world and especially from places similar to Beirut in their environmental, climatic, socioeconomic, and cultural standings.

FRAMING BEIRUT'S CURRENT AND LONG-STANDING CHALLENGES

Both Beirut's immediate and enduring issues, in regards to the public realm and local amenities infrastructure, can be divided into the following:

- 1. Infrastructure**, including:
 - Water, its waste and scarcity;
 - Energy, its scarcity and unsustainable production;
 - Waste, its inefficient and environmentally detrimental management; and
 - Security, with, for example, the lack of cameras, adequate street lighting, etc.
- 2. Pollution**, in all its forms (noise, soil, air, etc.) as well as its unsustainable treatment;
- 3. Interactivity**, specifically people's ability (or incapacity) to change and add to their spaces creatively or socially;
- 4. Mobility**, specifically the city's prioritization of private vehicular transport;
- 5. Exchange**, its commercial, material, and financial dimensions; and
- 6. Investment**, its risk and lack of effective support.

LEBANON'S AND BEIRUT'S PRE-DISASTER CONDITION

Lebanon is a country that can easily be described as a land of untapped potential and compounded endemic crises. The year 2020 has only aggravated long-standing challenges in the area that have been neglected for so long. The decade leading up to now has also revealed the magnitude of the consequences of such systemic neglect on our infrastructure, mobility, and urban landscape.

In terms of our energy generation capacity, the national grid supplied by Electricite du Liban (EDL) only supplies 55-64% of the country's energy needs. The rest is supplied by private generator providers who also use fossil fuels (Raydan, 2020). All energy needs are 100% imported (IRENA, 2020). It is important to note that 23.44% of imports in 2017 were oil and gas products, making these products the top imports of the year (Daou, 2018), a long-standing trend in the country's import-export dynamic.

Many of Beirut's sewage and wastewater outlets dump directly into the Beirut River and the Mediterranean

Sea. When assessed at the national scale, it should be noted that 90% of Lebanon's wastewater is dumped into the sea directly or through river streams, creating a major and long-standing pollution crisis (Moussa, 2018). In spite of the country's rich water resources — stemming from springs, aquifers, rivers, and rainfall — the people are victim to water shortages caused by pollution and wasted water. For example, Lebanon wastes 4.1 cubic kilometers of rainfall every year, considered as rainwater runoff (Food and Agriculture Organization of the United Nations, 2009). Wasted and unharvested rain is also a secondary consequence of the country's reliance on bituminous road infrastructure which hampers water filtration for groundwater recharge or river replenishment. Lebanon has over 22,000 kilometers of roads (IPT Energy Center Report, 2016). Following that pattern, most streets in Beirut are also asphalted and considered impermeable. The lack of a beneficial rainwater harvesting or filtration strategy, coupled with the city's reliance on asphalt as a surface treatment for vehicular roads, explains the seasonal mild flooding that affects Beirut in the winter and inconveniences the residents and users of the city.

Lebanon's current approach to waste management is another factor that adds substantially to the environmental degradation in the country as well as to the continued pollution of local water bodies. The country has a number of landfills that are directly adjacent to the sea. Many have reported that leachate, a toxic chemical created by such dumpsites, has already run off entirely into the sea from these coastal landfills (Sherlock, 2018). This is due to how most of the country's waste, instead of being treated, is sent to landfills for land reclamation projects and profit generation through the creation of new developable land offshore (Kadi, The Arab Weekly, 2018).

In regard to the country's transportation network, public transportation is almost an absent concept. The trains and tramway that defined the city and country since the Ottoman Empire are no longer functional. Busses and vans constitute the nation's only mode of public transport, but it should be noted that 85% of vehicular presence in the country is from passenger cars (IPT Energy Center Report, 2016). Congestion by such a high percentage of private vehicular dependency causes losses worth hundreds of millions of US dollars in idle time (Otayek, 2019). An over reliance on private vehicles that consume fossil fuels also takes a toll on the environmental condition of the country, causing an estimated 485 million dollars in yearly environmental degradation costs (World Bank/METAP, 2003). The transport sector also accounts for

22% of greenhouse gas emissions in the country (IPT Energy Center Report, 2016).

As for the urban fabric of the region, sprawl and dense urbanization has a high cost. In 2015, Lebanon's percentage of urban green spaces decreased to less than 13%. Beirut has only 0.8 m² of green space per capita, while the minimum ratio recommended by the WHO is 9 m² (Nazzal and Chinder, 2018). Streets in Beirut are especially ill-equipped for sustainable social action or pedestrian comfort (lacking shade, bins, benches, etc.). Sidewalks tend to be too narrow, especially those in traditional areas like Mar Mikhael and Gemmayzeh, which were paved and developed after residences had already been built in the area. These same sidewalks are dominated by bollards, park meters, and even electric cable poles that block the way for pedestrians. There is little to no room at that point to even consider planting or lining the streetscape with trees that could provide shade from the summer sun or the winter's rains. These characteristics also rule out potential strategies that make use of both vegetation and pavement to deal with rainwater runoff, which is the main cause of flooding in the lower areas of the city. The lack of trees and green spaces, together with the overuse of impermeable asphalt, has also contributed heavily to the depletion of the city's aquifers and groundwater reservoirs, which are now unusable due to seawater intrusion and wastewater pollution. Rainwater filtration through soil or permeable surfaces would tackle this issue, but this strategy has not yet been considered by the ruling authorities. It should be noted that historical residential development should not be to blame here; the real culprit is the authorities' prioritization of vehicular access and circulation, which allocated the largest ratio of the road network to vehicular parking and flow instead of pedestrian mobility and public space.

CONDITION ASSESSMENT

Dar undertook a condition assessment to study the quality of physical assets in terms of their functionality, attractiveness, purposefulness, or safety of use prior to the blast. The purpose of the assessment was to establish a better understanding of the pre-disaster conditions of the open spaces.

The true challenges that plague the area's public realm, its streets and open spaces, predate the Beirut blast by decades. Many of the issues observed on site are rooted in a history of top-down policy making that prioritizes private cars and the mega infrastructures that those same vehicles need. This can be seen in the proportion of the right-of-way of any given street dedicated to cars instead of to pedestrian mobility, and the number of vehicular street elements (park meters, traffic signage, and bollards) over those needed for pedestrian comfort. Even plots of land become representative of this hierarchy, as parking lots in the area outnumber the green and open spaces by more than 5 to 1, which makes it all the more troubling that most streets are also used for informal parking, and many of the car owners go so far as to park on the sidewalk to create a spot for their vehicles. This shows not only the high reliance of users on private vehicles, but also how that dependence negatively impacts the urban experiences of others.

There is a clear issue of untapped potential when it comes to existing public spaces and public staircases. The existing network of public spaces has been neglected for too long and is in major need of enhancement and repair, while the public staircases, though successfully activated by both residents and users, could have their provisions and aesthetics enhanced in ways small agents cannot provide alone. Vacant lots are another missed opportunity. They could be appropriated for more productive uses, like gardens, multi-level parking to replace street parking, or community spaces.

Yet in spite of the overwhelming neglect the public realm has been subjugated to, there is opportunity to be found in the private and communal initiatives and gestures that have been taken by the greater public to enhance the area, from small planters on the sidewalk and benches on the street sides, to large murals and festivals dedicated to the enlivenment of the region. It is the actions of these stakeholders, who have chosen to interact positively with their space, that should be considered the core of the recommendations and their engagement would prove more than vital when tackling the feasibility, nuances and perhaps amelioration of the strategies proposed here and any

future tactics to be considered.

DAMAGE ASSESSMENT

Dar undertook a damage assessment to analyse and track the total or partial destruction of physical assets in the aftermath of the blast and to assess repair/ replacement needs and ultimately the costs thereof.

The blast caused extensive damage not only to buildings and infrastructure but also to urban elements of the public realm that should be fixed primarily to ensure the safety of users.



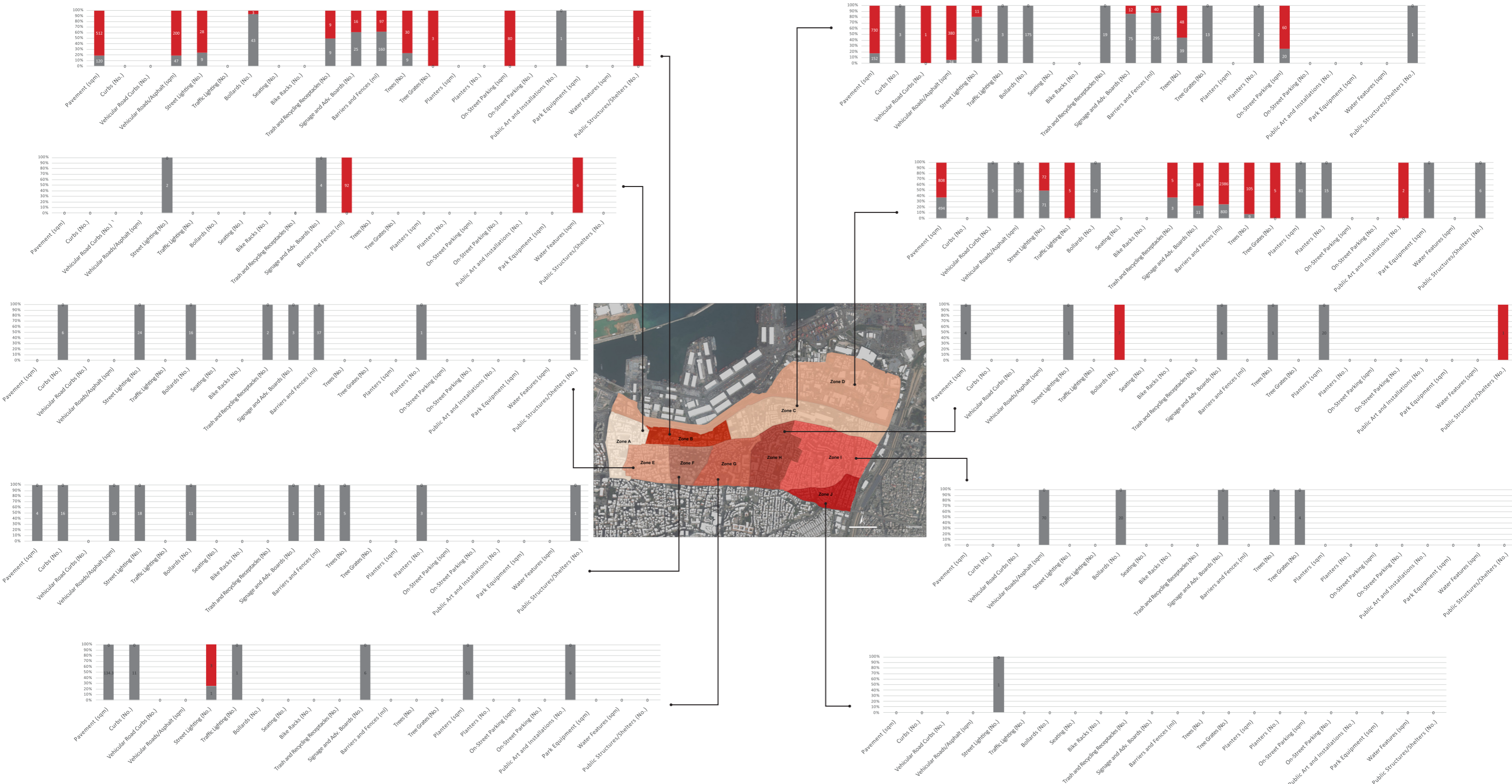


Figure 1.2. Results of the Damage Assessment

FRAMEWORK FOR PROPOSED STRATEGIES

A comprehensive analytical sense to strategic development as well as a solution-oriented approach are both essential to tackling the challenges in these six categories: infrastructure, pollution, interactivity, mobility, exchange, and investment. As such, it would be considered limiting to narrow the applicability and responsiveness of any strategy to a single challenge. On the contrary, solutions proposed should aim to tackle multiple issues in the same way that a single weakness deters from the potential strengths of many other fields.

Therefore, the strategies that will be discussed and expanded upon in this paper will be divided into immediate, short-term actions and mid-term and long-term strategies.

It should be noted that the concepts of “immediate,” “short term,” and “middle and long term” are used in this paper to refer to the timeframe of implementation and not necessarily the immediacy of impact. For example, an immediate action is an action that is considered urgent to implement but could have only long-term implications and results. By defining the chronology of strategies and actions by their executive urgency instead of their impact, it becomes clear that we are using a comprehensive lens that takes into consideration large scales of time and space concurrently with localized and necessary disaster response needs.

Both categories of strategies mentioned earlier are also further subdivided into three main domains common to both timeframes: Mobility, Infrastructure, and Public Spaces and Streetscapes.

IMMEDIATE SHORT-TERM ACTIONS:

MOBILITY

1. Restrict vehicular access and street parking in the area to stakeholders and residents

Considering the damage done to sidewalks, building frontages, and roads, it is urgent and necessary to minimize vehicular traffic and street parking in affected areas. Moving forward with such an action would entail scheduling and managing street closures for emergency and repair access and strategizing access

and exit points while paying close consideration to spaces that have already reopened and would need eased access for clientele to sustain their owners' livelihoods.

Some of the immediate benefits of such an action would include:

- Easing access for emergency vehicles, aid vehicles, suppliers and repair agents, residents, workers, and students who attend schools in the area;
- Facilitating survey works in the area for the study and assessment of external damages especially to sidewalks and streets;
- Designating a small number of roads for private car use so as to ensure the continued economic dynamism of the area while discouraging open access and potentially severe congestion; and
- Diverting street parking capacity to parking lots in the area to provide necessary funding to local parking lot owners who would normally have made a profit from the nightlife that characterized the neighborhood. Additional private car flow would also be diverted to these parking lots, minimizing or, if possible, eliminating their on-road presence.

2. Construct vertical or underground parking units to replace majority street parking

At present, Beirut does not have an efficient public transportation system, or even a multi-modal strategy to tackle congestion and car dependency. That, however, should not deter the development of pedestrianized streets and areas, especially if such development encourages healthier alternative mobility modes such as walking and cycling. A middle ground to respecting people's need for cars and people's other need for calmer, greener, and safer leisurely spaces would be the prohibition or minimization of street parking and its diversion to parking nodes that would be multiple stories high or deep.

The selection of key vacant lands, perhaps the same plots that already satisfy excess parking needs in the area, would allow for a handful of vertical parking structures that can serve smaller radii. An agreement can be negotiated with parking lot and vacant lot owners and the municipality to turn these into public-private ventures and to guarantee discounts or free parking for residents, business owners, and employees in the area, perhaps through a car sticker that can be stamped or provided by the neighborhood's local official, the mukhtar, upon approval of documentation.

A 'mukhtar' is a locally elected official, representing the

community of a neighborhood, the boundary of which has been defined by the municipality, in this case the municipality of Beirut. The common pattern when it comes to the election of such officials is that they are trusted, well-known, and long-standing members of the community registered in the area. Mukhtars typically handle processing, procuring, and signing the official documents requested of them by individual members of their given community. They also respond to the concerns of their community members and are normally conceived of as having the best interest of their neighborhood in mind. In this case, the surveyed area would consider the mukhtars of four cadastral areas in North East Beirut: Rmeil, Saifi, Medawar, and Marfaa.

Fourteen sites across the area have been designated as suitable for such a development (refer to Figure 4.9). If all fourteen lots are successfully constructed as multi-story parking lots, then any given resident or user in the area would be within a 400-meter radius (a five-minute walking distance) of a parking lot. Twelve of these spaces exist within the area of study and one borders the site, from within the area developed by Solidere. Therefore, negotiation with the company would be needed to come to an agreement regarding the development of one of their plots; however, it is noteworthy that that plot is already being used as a parking area. Assuming that each lot would be built with two basement levels and three above-ground floors, the total projected capacity would be 8,370 car spots. This also signifies that just as many cars would no longer need on-street parking provisions, creating an opportunity to widen sidewalks and allocate pedestrian amenities and other elements of comfort. Assuming that all streets are either formally or informally used for on-street parking for one side of the road, while all main streets and highways can afford both formal and informal parking on both sides, then multi-level parking lots can potentially host up to 57% of on-street parked cars.

Multi-story parking facilities should not be designed to permanently satisfy that role alone. It is recommended that design standards which would enable such facilities to be repurposed, appropriated, and enhanced for commercial, residential, and public functions be implemented during the design of such facilities. In the future, when public transportation use in Lebanon finally outclasses domestic vehicle use, these multi-story parking spaces can be rehabilitated into any of the following:

- Affordable housing units;
- Office spaces;

- Community center or public program spaces (exhibitions, workshop facilities, market spaces, etc.);
- Data banks;
- Warehouses; and/or
- Nightlife venues.

Potential policies to explore and stakeholders to consider:

- **Religious institutions owning inalienable plots of land (known colloquially as 'Waqf lands'):** In the area under study, the Maronite Archdiocese owns one plot of land that was assessed to be suitable for a multi-story parking lot (refer to Figure 4.9). The establishment of such a space for the religious institution would provide necessary funding to local parishes for their own welfare projects and possible new programs. A few of the Archdiocese's other plots of inalienable land could be considered for the purpose if necessary.
- **Plots of land owned by the Beirut Municipality:** Two of the locations suggested for multi-story parking lots are owned by the municipality. In fact, those two plots have the potential to be among the largest multi-story parking facilities proposed (refer to Figure 1.10). Funding coming in from such a facility could encourage the municipal authorities to remove a number of on-street parking spots — as we also propose should be done — and free parking could be negotiated for local residents if possible. The local mukhtar could use proof of rent/home ownership or proof of business in the area to provide a car bumper that would validate an individual's status as a local who is eligible for free parking. This could be conducted for free or for a small yearly fee.
- **Privately owned plots of land:** The incentives needed to convince private landowners to transform their plot of land from a vacant plot or an existing parking lot into a multi-story parking facility would need to compensate for their inability to develop the land in the future and their inability to profit from parking cars during the time that the facility is being built. For that purpose, the following incentives are to be considered.
 - **For all options:** The municipality will pay the landowner a monthly income equal to a small percentage of the land's total value (if it is a vacant lot), or to the average monthly profits the landowner makes from parking cars in the plot (if it is a parking area). This sum could be paid

from the already existing municipal tax system which the municipality enforces on residents and businesses, but an audit and financial plan would need to be conducted to assess the feasibility of such a funding plan. Another strategy to ensure that funding could derive from the multi-story parking lots that would be developed by the municipality itself.

- **Option 1:** Develop a private-public partnership between the municipality and the private landowner whereby both parties share the profits made from the multi-story parking facility (at an agreed percentage). Ownership of the parking facility post-construction would be the landowner's but he/she would be excluded from taxes related to the establishment. The area would be listed as a parking facility indefinitely, or until car ownership decreases dramatically, at which point the landowner (having negotiated the change with the municipality) may convert one floor or more (depending on car dependency decrease) for other functions.
- **Option 2:** Once completed, the parking facility is owned by the municipality which will then pay

rent to the private landowner for using his/her plot. The sum could be equal to his/her monthly income from the plot before construction, or equal to a slightly higher percentage of that sum, or a percentage of the land's value if it is a vacant plot.

- **Option 3:** Develop a private-public partnership whereby the owner receives a floor of the facility every five to seven years for his/her own use. He/she could choose to keep it as a parking lot for select membership or turn it into another functional space (apartment, offices, etc.). Eventually, the whole building would be returned to the private owner as his/her property. This option may be considered too generous to the landowner.
- **Option 4:** If options 2 or 4 are followed, there is room to negotiate an agreement in which the municipality gains ownership of the plot equal to the percentage being paid every month. In that case, once the municipality has paid the full cost of the land's value at the time of construction, then the monthly installments and/or the tax incentives are stopped.

- **Option 5:** If options 2 or 4 are followed, there is room to negotiate that the municipality gains ownership of the plot equal to the percentage being paid every month. In that case, once the municipality has paid the full cost of the land's value at time of construction, then both the monthly installments and/or the tax incentives are stopped.
- **Option 6:** A combination of any of the options could also show potential.

3. Develop a "Park & Ride" scheme for easy access and circulation to, from, and through affected areas

Having examined the potential dangers and delays caused by excessive street parking and congestion from private vehicle users, the development of an efficient bus access and circulation scheme for incoming visitors, volunteers, and long-standing residents ("Park & Ride") would further minimize unintentional congestion. This would help organize proactive citizens and experts, whose supportive abilities need to be properly harnessed, and takes into consideration local stakeholders, whose transportation needs are considered a priority.

The designation of external and internal collection nodes for both pick-up and drop-off needs to be assessed, and efficient cyclical internal routes need to be formulated to minimize delay times. By designating consistent routes and key points across the region, human dispersal across the affected areas could also be minimized optimally, as it could create secondary delays for other emergency and aid vehicles.

4. Enlarge and plant all sidewalks in the study area

Once on-street parking capacity is analyzed and minimized to its optimal degree, it becomes possible to enlarge and more adequately furnish and plant local sidewalks. The neighborhoods of North East Beirut, especially Gemmayzeh and Mar Mikhael, lack wide and comfortable sidewalks because, in the course of their organic historical development, transportation designs were introduced after the neighborhoods themselves were built.

Therefore, widening sidewalks would make pedestrian flow and accessibility more comfortable. Adding bins and benches would help enhance that further and emphasize cleanliness. Meanwhile, designing larger planted areas and introducing multi-functional trees

would add shade and additionally help with rainwater filtration and waste, while adding a multi-sensory experience to the whole, perhaps through aromas or street-side fruit harvesting.

By enlarging the sidewalks, extra room, including that previously used for on-street parking, can be allocated to streetscape greening through trees, generous planters, and even bioswales (vegetated channels designed to redirect and concentrate rainwater runoff). Establishing a green road network wherever possible – for example in exposed roads, wide roads, and streets differentiated by their traditional character – would add to the pedestrian experience, increase comfort, and finally touch on the benefits of rainwater filtration for flood mitigation and groundwater recharge. Floods in the neighborhoods of North East Beirut are not severe but have been reported to cause major inconveniences to residents and businesses occupying street level spaces or real estate below street level. Complaints of rainwater rising quickly and entering people's homes and workspaces have been reported in the field. A green road network may potentially alleviate such issues. It should also be noted that each street typology in the area would have its own unique approach to public greening. This approach need not be restricted to greening wider streets or roads of commercial value alone. Even smaller residential roads could have a minimum green standard.

Meanwhile, rainwater harvesting (RWH) structures can also be added to the road network as drilled filtration pits. It is important to note that Beirut was previously celebrated for its groundwater reservoirs that have historically served residents. Over the course of the past century, however, overuse, pollution, seawater invasion, and decreased filtration have all eroded the groundwater's quality and depleted the carrying capacity of the city's aquifers. Using RWH structures would allow rainwater run-off to filter directly into the soil, beginning the very necessary process of local aquifer rejuvenation and replenishment.

In order to determine the feasibility of such an endeavor, further study is required to assess the level of seawater intrusion in the shallowest groundwater reservoirs. Deep water aquifers could potentially be recharged directly through deeper injection channels. For such a purpose, it would be interesting to study the presence and condition of deepwater wells/aquifers in North East Beirut.

Streetscape elements within a shared street should be organized in a way that facilitates navigation by pedestrians with vision disabilities. The defining feature of a shared street is a shared zone where pedestrians, bicyclists, and motor vehicles can safely interact in the same space. If there is sufficient right-of-way, shared streets may also have a pedestrian-only comfort zone.



Frontage Zone Varies	Comfort Zone minimum 0.3m, more preferred	Furniture Zone	Shared Zone
Landscaping, front stoops, door swings, awnings, cafe seating, retail signage and displays	Pedestrian access route (Note: if there is insufficient right-of-way for a comfort zone of at least 0.3 m wide)	Lights, signs, utility poles and boxes, trees, bicycle racks, parking meters, transit stops, benches, stormwater facilities and snow storage	Shared circulation for pedestrians, bicycles, vehicles

Figure 1.3. Example Template for a Comfortable Pedestrian/Shared Street
Source: Accessible Shared Streets, Published by US Department of Transport

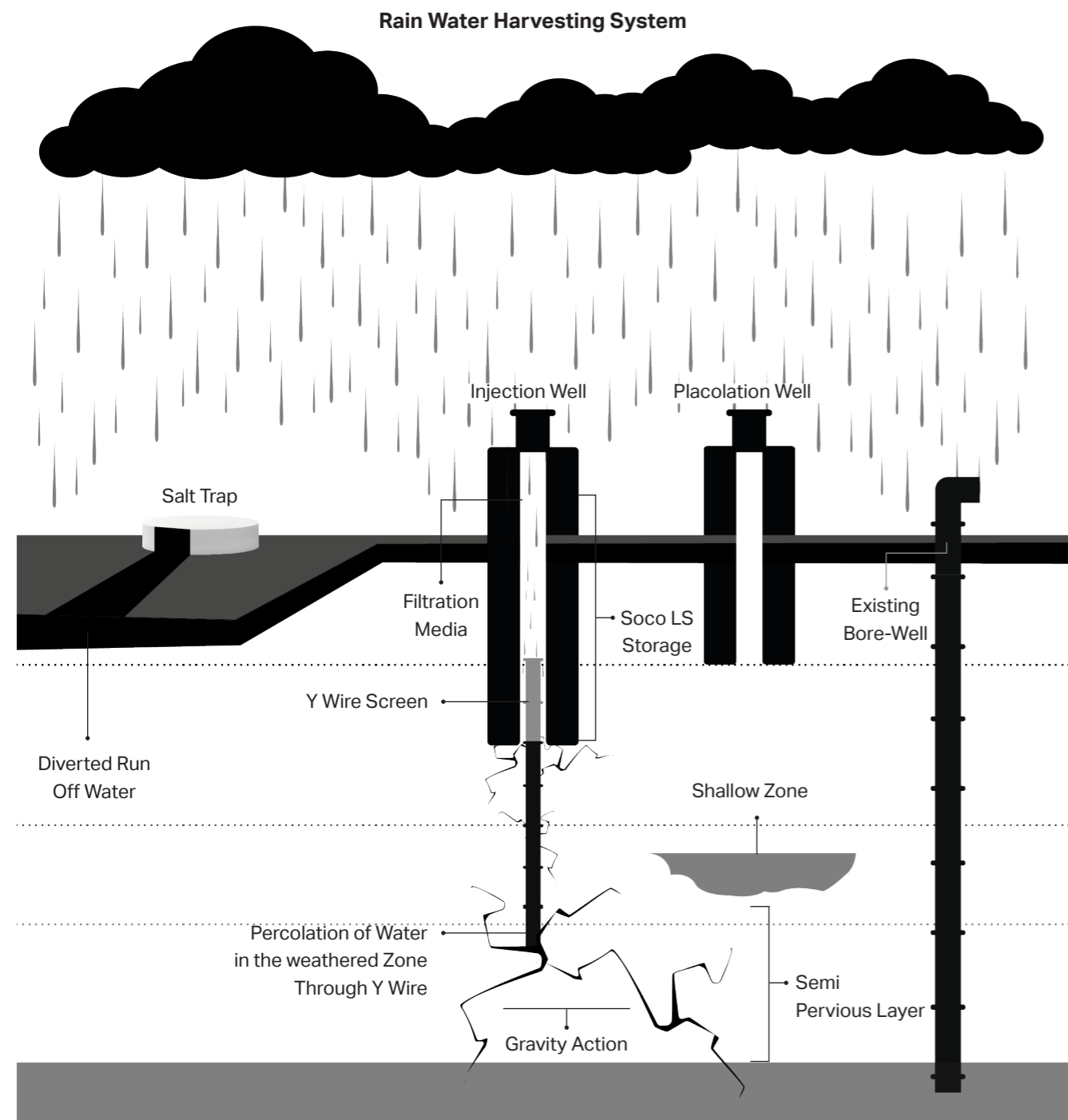


Figure 1.4. Rainwater Filtration Through Injection Wells

Source: Hitech Drilling Engineers

INFRASTRUCTURE

1. Repair and modernize the underground utility network

Amongst Beirut's myriad issues in its streetscape and infrastructure is the mesh of cables that streak from rooftop to rooftop as well as the sewage network that drains to the Beirut River and the Mediterranean Sea. The connections of many houses and buildings in the area to both the electric grid and the WASH (water, sanitation and hygiene) network have also been severed because of the blast. The fifth report provided by the Order of Architects and Engineers following the blast has shown that 57 out of 1,575 surveyed buildings have been completely disconnected from the utility network.

Considering the opportunity presented by the removal of on-street parking, it is heavily recommended that all utilities – especially the electricity grid – be moved underground. Current underground utilities must also be modernized and encompassed within concrete or metal culverts that would centralize the networks and localize maintenance at key points. Such a move can also create safer streetscapes, free of loose cables overhead and cable poles and streetlamps that block pedestrian flow on already narrow sidewalks.

2. Provide new water tanks and rain harvesting apparatuses

Water is an essential right and amenity for the sustained survival and hygiene of all members of a community. In Lebanon, the estimated water demand for domestic use in 2020, as valued by Fanack Water in 2015, was 427 million cubic meters, and each household should have access to 180 liters of water per capita per day (180 lcd). (Al Amine, 2016). The damage from the explosion created a need to repair and replace a number of water tanks so that people may regain the ability to access municipal water and meet their water needs.

Affected residences that have damaged or destroyed water pumps could rely on manual refilling from water provision trucks. Temporary financial support for such households could be provided, to guarantee their access to municipal or private water. This could be either in the form of cash handouts or, preferably, guardianship contracts.

We additionally propose that rain collection units, or cisterns, be provided to supplement households as winter approaches. This will provide households with a secondary and free source of water for cooking, cleaning, and bathing. The attachment of potential

filtration/treatment units to those cisterns and even to individual faucets in the household could also supply people with clean potable water if applicable, as many may have physical or financial difficulty accessing municipal water or drinking water, which is privately provided. Such a proposition would need to be urgently implemented for homes in which people experience such difficulties, but it can also be considered a regional strategy through a mid- or long-term objective. More study is required to understand whether establishing a large-scale shared cistern would be more feasible than providing smaller tanks for each household.

If a shared cistern/rain pond were determined to be a feasible consideration, exploring the potential for such a space's public, interactive, or educational value may be of interest. Another option worth exploring is the diversion of rainwater (either collected by rainwater harvesting tanks or through root channels) directly into the wells of buildings. Many buildings in Beirut relied on shallow wells and aquifers for their domestic water use. Their current state, however, is unusable due to seawater filtration, low recharge ability, or potential pollutants. Rainwater would directly tackle the issue of recharge, though further study would be needed to assess the state of domestic wells (study of potential fractures or fissures, assessment of their safety for use, etc.).

Potential policies to explore and stakeholders to consider (for development of community cisterns):

- Religious institutions owning inalienable plots of land (known colloquially as 'Waqf lands'):**
 The Maronite Archdiocese owns one plot of land in the area that was assessed to be suitable for a community cistern (refer to Figure 1.10). The establishment of such a space for the religious institution would provide a necessary good to the community in the hands of an establishment well regarded for its welfare programs and provisions. Two other plots of land belonging to the Archdiocese would also be suitable for such a purpose, though more study is required to assess their feasibility.
- Plots of land owned by the Beirut Municipality:**
 Other than the sites listed above under the ownership of the Maronite Archdiocese, the municipality owns three large plots of land in the area that could also be considered for that function: the large plot of land that includes the Mar Mikhael train station and two plots of land in Karantina (refer to Figure 1.10). Small portions of those lands could be considered for that purpose.

- **Privately owned plots of land:** The incentives needed to convince private landowners to transform their plot of land from a vacant plot or an existing parking lot into a community cistern would need to compensate for their inability to develop the land in the future and their inability to profit from parking cars or other functions during the time that the facility is being built and afterwards. For that purpose, the following incentives are to be considered:
- **For all options:** The municipality will pay the landowner a monthly income equal to a small percentage of the land's total value (if it is a vacant lot), or to the average monthly profits the landowner makes from parking cars in the plot (if it is a parking area).
- **Option 1:** The cisterns, once complete, are considered the property of the municipality, which will then pay rent to the private landowner for using his/her plot. The sum could be equal to his/her monthly income from the plot before construction, or a slightly higher percentage of that sum, or a percentage of the land's value.
- **Option 2:** Once the facility is complete and if the landowner owns multiple plots of land, the municipality may provide him/her with tax incentives in the form of decreased property tax in exchange for permission to maintain the cistern on his/her land.
- **Option 3:** A combination of options 1 and 2 could also be explored.
- **Option 4:** If options 1 and/or 2 are followed, there is room to negotiate an agreement in which the municipality gains ownership of the plot equal to the percentage being paid every month. In that case, once the municipality has paid the full cost of the land's value at time of construction, then the monthly installments and/or the tax incentives are stopped.

3. Provide and install solar water heating units to support household heating

As the winter season approaches its peak, it becomes clear that access to warm water and warm homes is an urgent priority. Many of the residences in the

area rely on generators due to the inconsistency of the government electricity grid. As stated earlier when recounting Lebanon's and Beirut's pre-disaster condition, EDL only supplies 55-64% of the country's energy needs, and the rest is supplied by private generator providers who also use fossil fuels (Raydan, 2020). All energy needs are 100% imported (IRENA, 2020). The explosion, however, has damaged people's access to both sources of energy. Additionally, generators in particular have a high environmental cost due to their reliance on diesel fuel, one of the city's main pollutants. Instead, we propose that solar water heating units for residences be installed on private roofs, not to substitute electrical consumption entirely but to provide energy for heating purposes.

Solar water heating units can substitute standard boilers and cut costs on gas and electricity consumption for local residences. Such a systemic shift in energy use can save a household between 50% and 80% of its utility costs (US Department of Energy). Locally, such investments have shown a 25% return on investment cost (LCEC, 2020). More ambitiously, having access to such renewable energy opens the door to installing hot water radiators in consenting households that would then use the same hot water for residential heating, which would cut electricity and generator costs even further.

It is recommended that this measure be urgently applied for households that no longer have electricity, especially if these households do not have access to generators that can power heating units. The Order of Engineers and Architects in Lebanon, following the 5th issue of its post-blast survey, has found that 57 of 1,575 surveyed buildings, equaling 3.6% of surveyed buildings, have been cut off from such infrastructure. If that percentage is to be considered representative of the region, then 111 lots out of 3,200 are in need of alternative modes of heating. More ambitiously, this strategy can target the regional scale on a sustainable basis by providing this technology wherever possible, thus significantly decreasing total heating costs in the area and creating another tool for regional sustainability.

Harnessing Heat from the Sun: Active Solar Heat

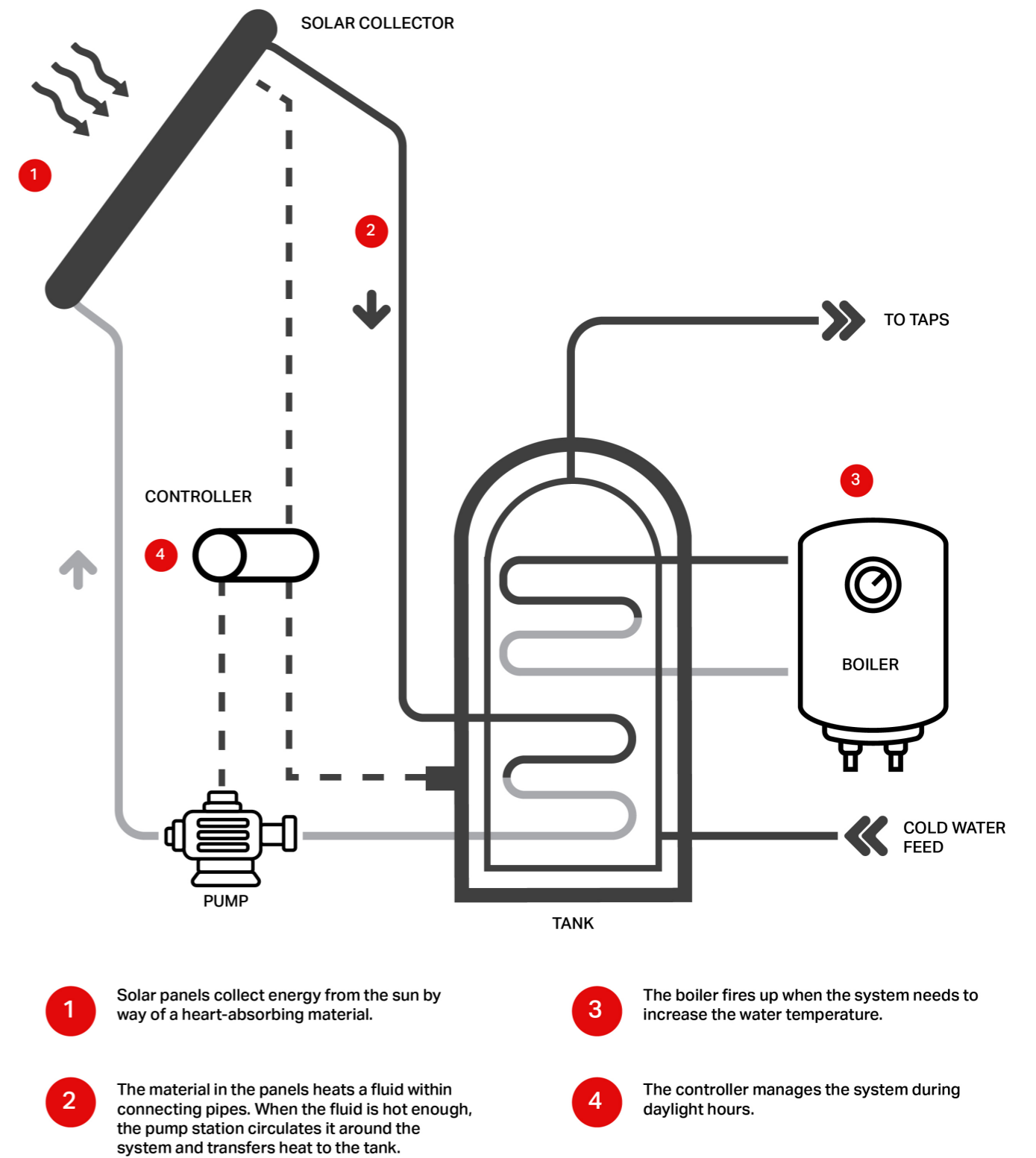


Figure 1.5. Solar Water Heating System
Source: Fix.com Article Entitled "Greener Winter Options"

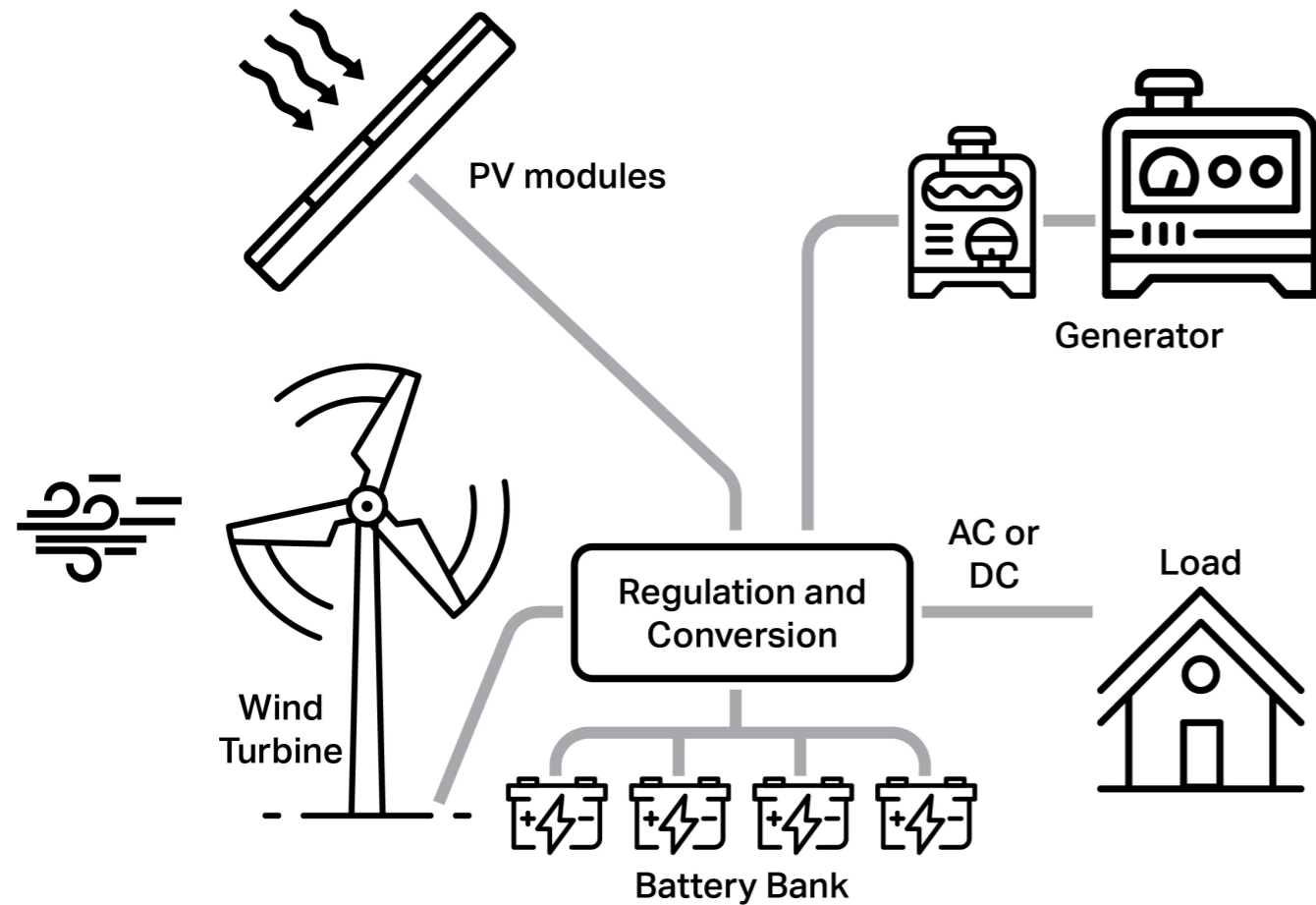


Figure 1.6. Hybrid Solar and Wind Energy System
Source: windexchange.energy.gov

4. Provide and install renewable energy power generators (dual power solar and wind)

Solar power and wind power, if assessed separately, may not be enough to supply the energy needs of multi-story residential buildings, but there is definitely a need in Beirut and Lebanon as a whole to seriously begin considering renewable energy production for domestic use.

This is where dual systems can come in handy. By installing dual system renewable energy units that convert both solar and wind power into electricity, a household can take advantage of the windier, less

sunny days of the winter, as well as the sunnier yet more stagnant aired days of the summer. There is definitely a case to be made for the provision of such renewable energy generators, especially in the short term, as access to municipal power may be cut and in need of extensive repair.

As stated earlier, 3.6% of all buildings surveyed by the OEA are in need of alternative energy access. A study of buildings in the area (their height, number of apartments, exposure to winds or the sun, their footprint) would allow for an assessment of renewable energy potential on a building-by-building basis.

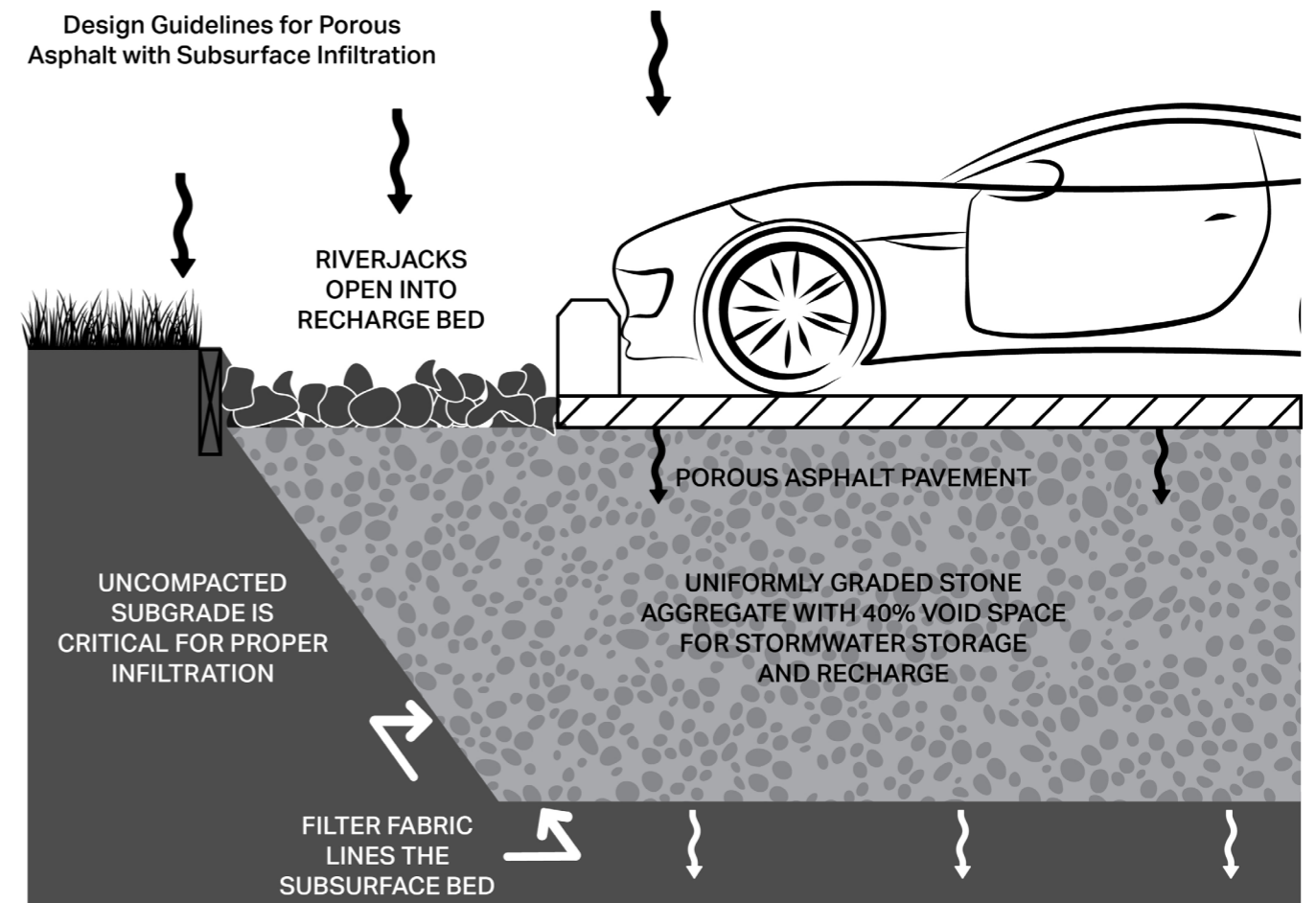


Figure 1.7. Permeable Driveway Cross-Section
Source: University of Maryland Extension

Alternatively, it would be interesting to explore the feasibility of a large solar farm or a wind farm in a sufficiently large plot. On a smaller scale, the World Bank Group in 2020, following the explosion, has found that 34 schools and 4 hospitals in the area have been affected by the blast. These facilities are much larger than residential buildings and would therefore have a larger footprint potentially more suited to localized renewable energy generation. It could be more practical in the short-term to establish hybrid renewable energy systems for such establishments, cutting their costs and allowing them to acting as regional emblems of sustainable education and awareness.

5. Replace current road materials with permeable materials for improved filtration

The damages to the road network allow us to finally tackle a major issue in Beirut: rainwater runoff and urban flooding. This becomes especially necessary to address as the city approaches the rainy season. The replacement of bituminous surfaces and asphalt with permeable materials – such as permeable pavers (concrete or stone laid on sand), cobblestones, or permeable concrete/asphalt – would greatly improve rainwater filtration and mitigate flooding risk in the area. Such a measure would complement the previously mentioned implementation of rainwater harvesting (RWH) structures along the sidewalks.

PUBLIC SPACES AND STREETSCAPES

1. Develop a disaster management scheme that organizes empty lots, public spaces, and semi-public spaces as aid and support sites for any future potential disasters

An effective disaster management plan relies on the ability of people and authorities to organize themselves in ways that are not detrimental to other supportive groups or regular citizens. Public spaces and suitably large open lots of land, be they undeveloped plots or parking lots, can act as efficient and localized collection spaces, aid and support nodes, as well as emergency vehicle waystations. The streetscape design and redevelopment could consider this function as well, highlighting the new network through different elements, such as wayfinding, material choice, and street side infographics.

A study of such spaces as well as their present/ needed equipment, their spatial capacity, and their suitable emergency functions needs to be conducted for the development of such a plan that can then be disseminated to the public through guides, brochures, workshops, or highly visible public infographic panels.

2. Open, repair, and enhance existing public spaces in affected areas (both formal and informal)

Dealing with the trauma of the explosion and its incurred losses necessitates psychosocial support that we can provide spatially by reopening, repairing, and enhancing the spatial and programmatic functions of existing public spaces. Formal public spaces, such as parks, gardens and public staircases, as well as informal spaces, like shared atriums between buildings, can become major spaces of communal exchange and recreation.

Moreover, they can be better equipped and organized to double as effective emergency response spaces, where aid and support kiosks and tents can be set up more efficiently far from the dangers of vehicular roads or the geographic disparity.

3. Appropriate newly and previously vacant land for the design and development of new public space

Developable spaces in Beirut, and especially in the east side of the city, are dwindling, but patches of unclaimed and undeveloped land still exist, most notably around Gemmayzeh, Mar Mikhael, and Karantina. The appropriation of such plots and other plots that may be opened to development following the explosion would allow for the creation of the

open space network that the city lacks at present. Pocket parks and gardens, when added to the existing network of parks and public steps, would expand a sense of publicness that already characterized the neighborhood and its users.

New functions – such as sensory gardens, children's grounds, and perhaps open-air exhibition spaces and workshop areas – would cater to the existing residents and businesses in the area, providing a green infrastructure that is both aesthetic and interactive. Such developments could act as positive healing spaces for individuals and families to cope with and grow from the trauma of the incident.

Depending on the needs and the demographics of each neighborhood, different functions and programs can be implemented. For example, public spaces in Geitawi, a predominantly residential neighborhood with long-standing senior residents and a family-oriented sense of place, could be designed as playgrounds for local children or as meditative parks with comfortable seating for the elderly. On the other hand, new spaces along Armenia and Gouraud Streets, now characterized for their nightlife and the influx of liberal youths, could prioritize programs of creative exchange and artistic generation, as well as flexible forms that would allow concerts, workshops, or public lectures to take place.

In total, 28 spaces have been identified as suitable for such programs. Collectively, these spaces would guarantee that any given user or resident in the area would be within a comfortable walking distance of a green space (refer to Figure 4.9). Four of the identified plots would be especially large and could be considered regional green spaces or even urban spaces for the scale of the city as a whole.

Potential policies to explore and stakeholders to consider:

- **Religious institutions owning inalienable plots of land (known colloquially as 'Waqf lands'):** The Maronite Archdiocese, though none of its lands were considered within the 28 suggested sites, owns three plots of land that could potentially be developed as pocket gardens (Refer to Figure 1.10). These gardens could create platforms for donation boxes as well. Moreover, if the archdiocese agrees to the development of multi-story parking facilities on its waqf lands, those same profits from parking could go to maintaining and developing the gardens. These lands in particular could be interesting to develop as community orchards to provide alternative sources of produce for the community.

- **Plots of land owned by the Beirut Municipality:** The Beirut Municipality owns one of the largest plots of land in the area that is considered suitable for not only a regional park but also for a multi-story parking facility (refer to Figure 1.10). This land, located in Karantina, adjacent to the highway, could easily satisfy both functions, and a portion of the profits gained from the parking facility could go to the maintenance of the park.
- **Privately owned plots of land:** The incentives needed to convince private landowners to transform their plot of land from a vacant plot or an existing parking lot into a park, garden, or public space would have to compensate for their inability to develop the land in the future and/or their inability to profit from parking cars or other functions during the time that the public park/garden is being developed. For that purpose, the following incentives are to be considered.
 - **For all options:** The municipality will pay the landowner a monthly income equal to a small percentage of the land's total value (if it is a vacant lot), or to the average monthly profits the landowner makes from parking cars in the plot (if it is a parking area).
 - **Option 1:** Once complete, the parks are considered the property of the municipality which will then pay rent to the private landowner for using his/her plot. The sum could be equal to his/her monthly income from the plot before construction, or a slightly higher percentage of that sum, or a percentage of the land's value.
 - **Option 2:** Once the garden/park is complete and if the landowner owns multiple plots of land, the municipality may provide him/her with tax incentives in the form of decreased property tax in exchange for permission to maintain the garden/park on his/her land.
 - **Options 3:** If options 1 and/or 2 are applied, the municipality could add the condition that they gain ownership of the plot equal to the percentage being paid every month. In that case, once the municipality has paid the full cost of the land's value at time of construction, then the monthly installments and/or the tax incentives are stopped.
 - **Option 4:** The completed park is kept under the landowner's ownership, and he/she is provided with special privileges to accept rental costs for anyone who wishes to use the land for special purposes (workshops, lectures,

concerts, etc.). The only condition would be that the park needs to be kept free for full unlimited public access at least 50% of its daily opening time. The land is classified as a public space indefinitely and cannot be rezoned or developed. Any infringement on that condition will result in the appropriation of the land by the municipal authorities.

- **Option 5:** A combination of any of these options could also be explored.

4. Establish community orchards and herb gardens that are accessible and productive

A more specialized form of public space activity, one that already exists in the outskirts of Mar Mikhael and Karantina, would be the development of productive orchards and herb gardens as a secondary source of fresh produce. Due to the instability of the Lebanese currency, the cost of living has increased beyond many people's financial capabilities. Productive community orchards and gardens would provide shared spaces of cultivation that can strengthen social ties and cut expenses for many.

A fraction of the spaces being considered for public space reclamation (as discussed in the preceding strategy) can be reserved for such a purpose. The plots, if large enough, could be divided into allotments that residents can rent to establish their own productive orchards, or they can be communally owned and left in the care and ownership of local leaders, residents, municipal authorities, or a combination of the three. Recent survey works by the old train tracks have shown that informal orchards have already been established by residents who live close to the unused railway, so there is not only a need for such spaces but also a long-standing pattern that sets the stage for this spatial configuration.

MID-TERM AND LONG-TERM STRATEGIES:

MOBILITY

1. Develop a two-phase pedestrianization scheme for North East Beirut

- 1.1. Develop a temporary pedestrianization plan for Gemmayzeh, Mar Mikhael, and Karantina.

The actions accomplished in the immediate- and short-term strategies for the improvement of mobility in North East Beirut lead us to the following:

the development of a daily or weekly schedule for the pedestrianization of Gouraud Street in Gemmayzeh and segments of Armenia Street in Mar Mikhael. Karantina is a residential area that has been understudied compared to the other two neighborhoods, but the exploration of the potential pedestrianization option in Karantina would be interesting in that it can create safe leisurely spaces for residents.

The suggestion is to either pedestrianize these streets from Friday afternoon to Monday morning every week, or to develop a daily plan that sees these streets deny car access every afternoon after 5 pm to 6 am. This would introduce pedestrianization strongly but progressively to the area and to car users more generally.

Such a step would also allow restaurants, bars, and cafes to expand their seating allocation outside, which is especially relevant with the current pandemic and the need to implement safe social distancing policies. It would also increase pedestrian user presence and add touristic value, which would give local merchants and business owners more opportunities to expand their clientele through random passersby.

- 1.2. The full pedestrianization of Gouraud Street and segments of Armenia Street, and the design of a potential corniche bordering the Port in Karantina

Now that a temporary pedestrianization plan for these areas has been activated and sustained for a period of time, it is time to follow through with the complete pedestrianization of Gouraud Street and key segments of Armenia Street. A new vehicular circulation plan would need to be put in place so as to minimize expected congestion while guaranteeing a healthy pedestrian experience. This would only add the areas' perceived safety and communal welfare and their economic value.

An interesting case can be made to develop a corniche in Karantina overlooking the cliff that borders the Beirut Port. This would allow citizens and visitors a safe space in the area for recreational purposes and would create a visually interactive space between corniche users and the space of the port.

2. Establish the East Beirut Cable Car, foreshadowing the potential return of Beirut's tramway system

San Francisco is recognized for its iconic tramway system, an active and functioning local landmark that not only provides citizens with a mobility-based sense of belonging but also brings in a significant amount

of tourist money to the authorities. The memory of the Beirut Tramway, which no longer exists, is still very alive in people's consciousness. If done correctly, the development of an East Beirut Cable Car that runs from the beginning of Gemmayzeh to the end of Armenia Street and perhaps through the Mar Mikhael Train Station, could similarly add sentimental and touristic value to the area.

Laying down the infrastructure for a light frequency linear tramline could also be the cornerstone to the development of a city-wide tramway network that would integrate the East Beirut Cable Car. It would also provide an efficient alternative for pedestrians, the disabled, and car dependent users who are open to exploring new modes of transportation.

INFRASTRUCTURE

1. Set a sustainable sewage management and treatment plan

Before delving into the potentiality of establishing a North East Beirut wastewater treatment facility, it should be noted that such an endeavor is only to be considered if the following three conditions are met:

- A survey establishes the residents' approval for such an establishment. Covered lagoons for wastewater collection and treatment would be an interesting wastewater management strategy to explore. This method of wastewater treatment controls odor and has the added benefit of creating storable biogas. Biogas could become an alternative and sustainable source of gas energy for local residents and business owners. Yet, such a substance could also pose potential dangers and hazards. This could lead residents to reject the establishment of such facilities, especially after the trauma of the explosion.
- The operation and maintenance of such an establishment would require the expertise of trained professionals, preferably following a private-public partnership, which places the responsibility of operation onto a private agent, while funding can come at the municipal or governmental level. That said, appropriate political reform and budgeting would be required, which the current political class has not seriously considered.
- It is also advisable that a private third party be tasked with monitoring and assessing the facility's operation and maintenance and that this third party be granted the ability to penalize the agent in charge of operation and maintenance.

- 1.1. Expand the underground culvert network for connection to a new sewage and water provision network

The new culverts and wastewater infrastructure, expanded upon earlier as an immediate/short-term strategy, could be developed in such a way that the wastewater network will lead to closed lagoons in a designated site that filter and treat sewage water (grey water and/or black water) through biotic or chemical processes. Closed lagoons have an added bonus in that their scent is contained, and they produce storable methane that can act as an alternative to natural gas consumption. This venture would require a site large enough to contain the wastewater of North East Beirut.

The establishment of such lagoons, however, would require appropriate odor management plans; pest management plans (for mosquitoes and other vectors of disease); and a large, well maintained, and well operated biogas collector. The sludge created in the lagoons in the process of anaerobic treatment can be composted into soil conditioning agents, so an adequate composting facility would be required as well.

- 1.2. Establish a permanent small-scale water treatment plant or equip treatment ponds with distribution technology for North East Beirut

As a continuation to the closed sewage treatment lagoons pitched earlier as a near-future action, the same plot can be expanded and developed into a full-time small-scale water treatment facility and distribution plant, guaranteeing public access to clean renewable water in North East Beirut. The plant can be further expanded to a full-time methane storage and distribution facility, expanding the second function to the area designated earlier as a centralized source of alternative gas provision.

Water that is being treated can also be sold, at full cost or a subsidized rate, or freely provided to other agents in need of treated non-potable water, such as for industrial or agricultural uses.

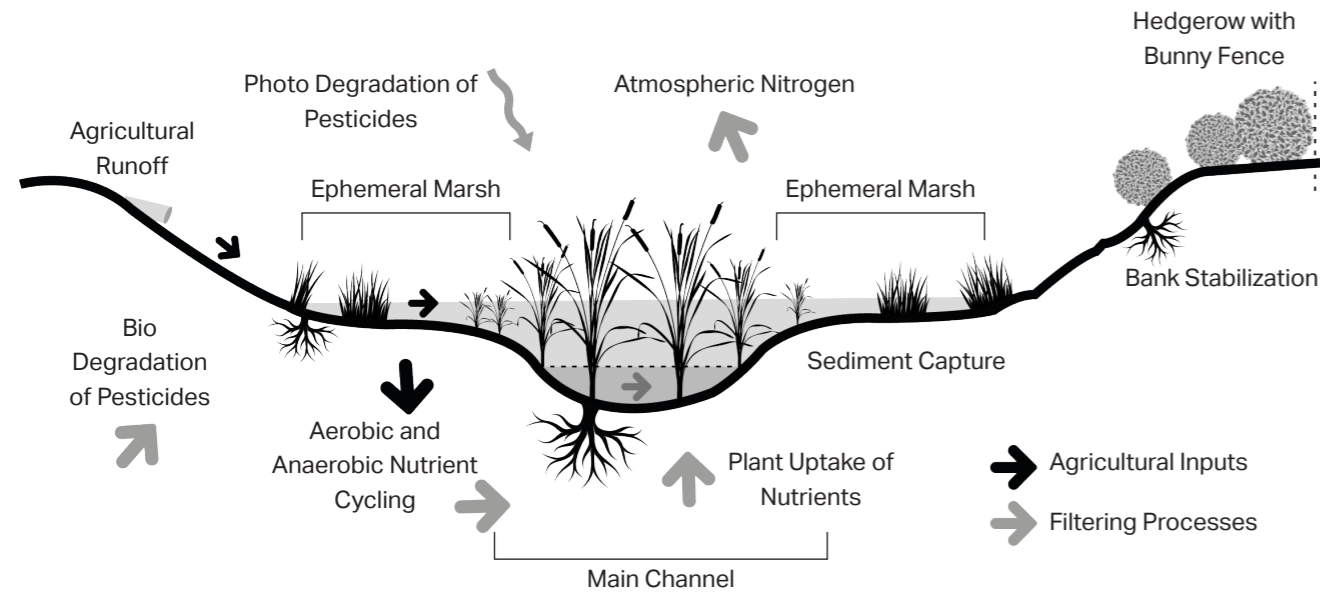
2. Set a river and sea purification plan: transform the urban channel of the Beirut River into a wetland park and design any empty plots along the mouth of the Beirut River into the sea as salt marshes

If the feasibility assessment of a wastewater treatment facility is deemed costly or ineffective, and the safe establishment of such a space improbable, an alternative mode of wastewater treatment can be found in man-made wetlands and salt marshes. Wastewater can be channeled through established wetlands and marshes along the Beirut River and selected plots on the eastern end of Karantina (almost 1 square kilometer of empty land at the shore adjacent to the river on the eastern bank can be appropriated) for the purpose of biological treatment through wetland/marsh plants and trees. That same water can be then channeled into the sea or stored separately for the sake of distribution to agents in need of treated non-potable water, such as agricultural and industrial agents.

Such spaces would also be able to tackle the issue of long-standing seawater pollution, by purifying both the seawater itself and the waters channeled to it through the river and the current sewage infrastructure of Bourj Hammoud and Eastern Beirut that spills directly into the river channel.

The country is already characterized by its diverse microclimate and ecologies. Salt marshes were highly common before urbanization took over the coastline's landscape. Wetlands and reed fields around river banks were also common environmental occurrences. A variety of local plants and trees -- such as capers, sea fennel, giant reeds and carob trees -- have been applauded for their salt and pollution tolerance as well as their ability to absorb pollutants and excess nutrients from soils and waterbodies.

We also advocate that these new green spaces be equipped with the necessary amenities to further transform them into public interactive spaces in addition to their productive functions.



The Physical, Chemical, and Biological Processes that Occur in Wetlands Help Filter Out Pollutants

Figure 1.8. Wetland Water Treatment Process
Source: Central Coast Wetland Group

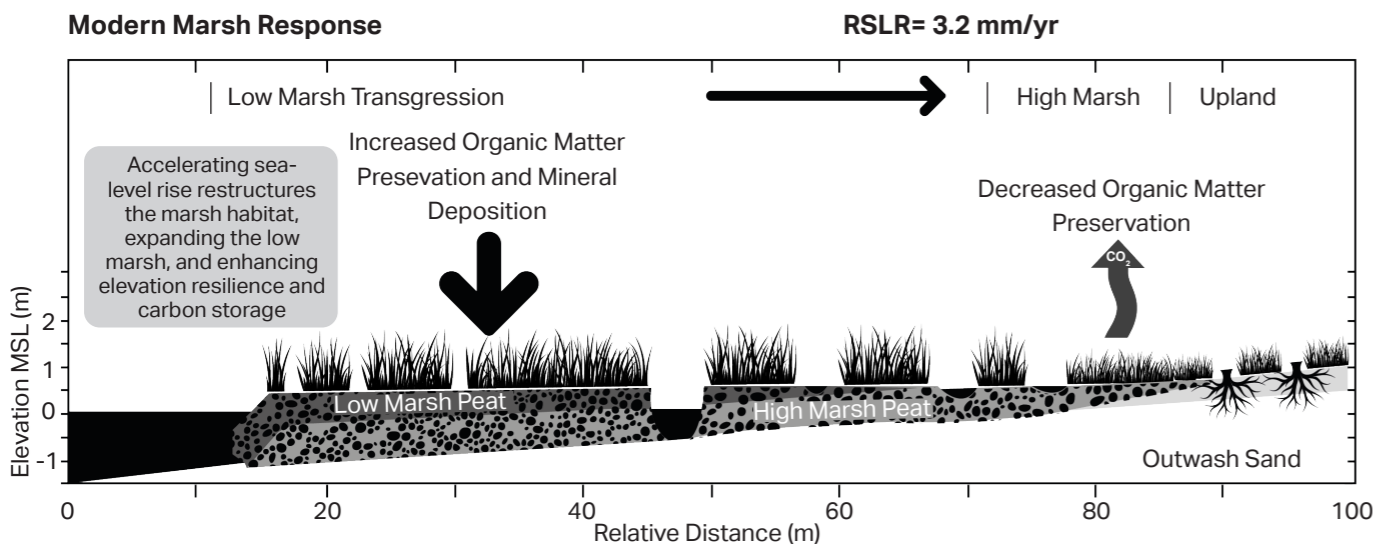


Figure 1.9. Salt Marshes Water Treatment Process
Source: Meagan Eagle Gonnea, Salt Marsh Ecosystem Restructuring Enhances Elevation Resilience and Carbon Storage During Accelerating Relative Sea-Level Rise

PUBLIC SPACES AND STREETSCAPES

1. Encourage local creative agents to participate in the cultural and economic rejuvenation of the area through the public realm

An added psychosocial support program can be the encouragement of artists, residents, and other stakeholders to participate in the activation and beautification of the neighborhoods. This can be achieved through street art, an already existing trend in the city, or through festivals, open markets, and exhibitions, a prominent feature of Gemmayzeh and Mar Mikhael.

2. Develop the public space network further with the integration of Mar Mikhael Train Station and Electricite du Liban

The final step to achieving an advanced and enriched open space network in North East Beirut includes the integration of Electricite du Liban (EDL) and the Mar Mikhael Train Station. Both are landmarks in the city that represent significant historical wealth and struggle; allowing for enhanced accessibility and interactivity would only add to civilians' sense of belonging in the city and to visitors' recreational potential. Both have also been severely damaged by the Beirut Blast and need to be tended to creatively, sustainably, and in such a way as to increase their special value.

The EDL building and surrounding landscape was designed by Pierre Neema and Jacques Aractingi as a testament to the harmony between modern technologies and vernacular practices. It was also intended to be an urban park and square that would be open to members of the public, affording them the potential to create a personal relationship with the newly established EDL authority. Reviving EDL's public interactive dimension would bring back the original architects' wishes for the space to life.

The train station, on the other hand, is much older. It was designed and built by the Ottomans at the turn of the century, and remained active until its closure in the 1970s. The station could be activated as a museum for the history of transportation in Lebanon or as a different kind of public space. It can be revived as a transportation node through the East Beirut Cable Car, another strategy suggested below.

3. Develop streetscape and open space design guidelines to be implemented for any future private or private-public development

On a long-term basis, it would be beneficial to develop an aesthetic vision for the city and a series of

standards to be applied for the further development of public and semi-public space in Beirut. Considerations for the proper provision of comfort, safety, and interactivity in streetscapes and public spaces by secondary agents (before, during, and after the development process) in the future should be highlighted and enforced as regional codes. Such a guidebook, however, should also enable room for flexibility at the benefit of local agents such as tenants, businesses owners, and users, prioritizing their potential use and interpretation of the space, not that of the developer. Flexibility in program development and spatial design is highly recommended so that future streetscape and public space developments function as public goods, not as private wiggle room for developers and building/plot owners.

4. Join the Beirut Port socially and economically to the rest of the city by injecting sustainable and public programs

It is not uncommon for modern ports to be in one way or another dislodged from urban social consciousness. That said, it is important to recognize the historical significance of ports as very dynamic economic and social spaces marked by a strong and expressive public presence. It was not until the mid-20th century that ports were transformed from engaging spaces of exchange and commerce to isolated spaces that bar public entry. The Beirut Port is no different in this regard but, considering the trauma of the incident, it would be a great opportunity to envision a new strategy for the port that could reintegrate it into the social consciousness of the populace in a positive manner. Therefore, it is recommended that innovative social and economic programs be injected into the port's space for the sake of providing people with a means to reclaim the area as a dynamic economic and infrastructural zone.

A good contemporary example of such an endeavor can be found in the new development and innovative schemes being implemented for the Rotterdam Port. The plans cover redirecting the port's energy consumption to renewable and sustainable sources and integrating a series of commercial and public uses into its space (Port of Rotterdam, n.d.).

First and foremost, however, it is necessary to note the following factors, which could be considered obstacles to the development of such a vision. If these factors still hold true in the future, then such a strategy should not be considered for study.

- The central government's overwhelmingly isolationist policy when it comes to the port: Both the army and the police have a strong presence

in the port and at its gateways. Such authoritative presence would discourage people from considering engagement with the port.

- The unclear system of ownership, accountability, and decision-making that the port is subjected to: Three stakeholders can be identified when it comes to the port - the central government, the Beirut governor, and the port authority. It is unclear what role each agent has in regards to the port's operation, its accessibility, and its maintenance.

If these issues are resolved in a way that prioritizes public safety, prosperity, and psychosocial welfare, then it would be possible and suitable to explore a public vision for the port that is both engaging and prototypical of a greater sense of change and welfare. The following strategies are recommended:

- **Rebuilding the storage warehouses of the Western segment of the port with solar panels and wind turbines if feasible:** The area allocated to the warehouses in the port is both large and well-exposed to the elements, with no tall buildings or obstacles in the immediate vicinity. Such an area would be highly suitable for renewable energy farming. The warehouses would provide height for wind access, and the roof inclines could be redesigned to suit solar farming.

- **Integrating public programs that can tie the port's function to social engagement:** The Beirut Port is already characterized by a few public areas, most notably the fish market at its eastern gateway. The area that surrounds the eastern zone of the port (the eastern end of Karantina) is also an up-and-coming region for culture and arts (notable spaces include Sfeir-Semler Gallery and KED, a multi-use cultural space). The side of the port also houses an abandoned tourism center, purportedly from when the port received cruise ships. In light of all this, it would be interesting to reactivate the spaces that already exist within the port and to include new public functions such as an industrial park, a marketplace, exhibition areas, etc.
- **Create a Port Corniche to enhance the public interface of the port:** This was already alluded to earlier through the recommendation of creating a pedestrian walkway along the boundary of the port to Karantina. This strategy can be expanded to include the whole perimeter of the port, which would then be joined with the Karantina pedestrianization proposal and the recommended wetlands adjacent to the port on the eastern bank of the Beirut River.

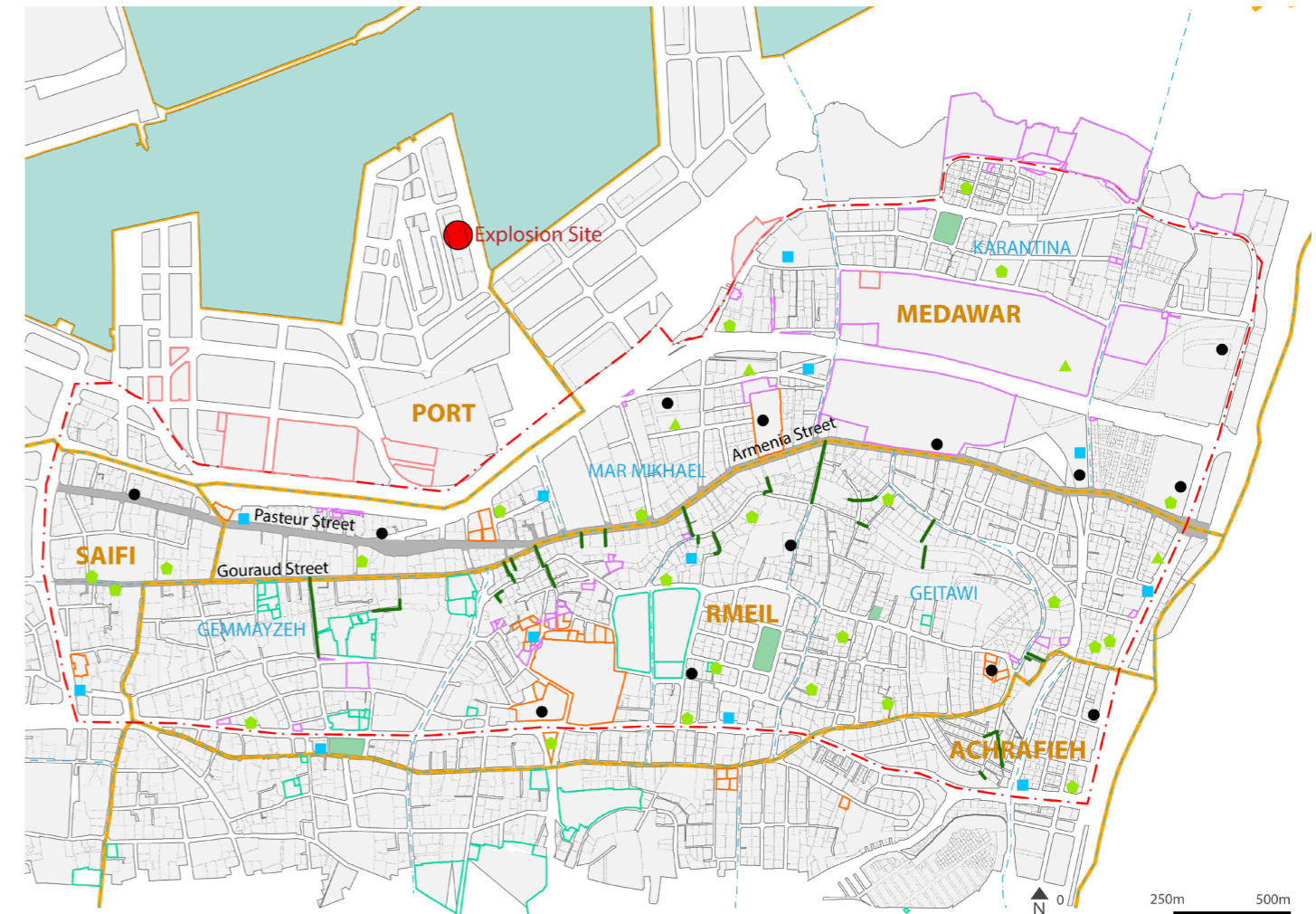
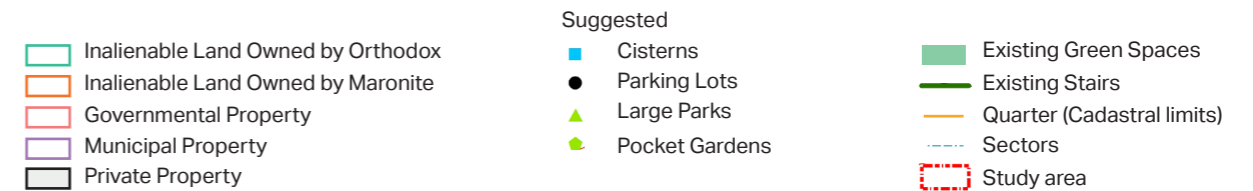


Figure 1.10. Proposed Tentative Location of Large Parks, Pocket Gardens, Parking Lots, and Cisterns



CONCLUSION

Having stated the recommendations above, it is important to highlight that we are tackling three different layers simultaneously: mobility, infrastructure, and urban fabric (open spaces and streetscapes). The aim is not only to enhance citizens' comfort but also to re-provide them with basic social and psychological amenities, either through the improvement of the public network or through different privately-owned systems, which will positively impact the daily livelihood and well-being of the community.

The strategies are also based on an action plan that tackles both the short and the long term by proposing

a comprehensive approach of several steps that complement one another. The process is based on a long-term vision being put into consideration where sustainability, user comfort, and post-traumatic recovery and growth are at the essence of the proposal.

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