

# Quarry Rehabilitation – Asbestos Management Technical Input

## **UN-Habitat Mandate**

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Since 2006, the agency has been present in Lebanon, first involved in recovery and reconstruction efforts in South Lebanon, Beirut, and Northern Lebanon (particularly in the Nahr el Bared Camp crisis response in 2007), and in efforts to improve the living conditions in the 43 Palestinian out-of-camp concentrations. Since 2013, UN-Habitat has been involved in responding to the Syrian refugee crisis, and since 4 August 2020 to the Beirut blast. UN-Habitat, as part of the United Nations in Lebanon, is also part of the concerted effort to support the country navigate the ongoing protracted socio-economic crisis. This is being done through directed and tangible support at the local authority and community level, while maintaining efforts towards establishing principles of good urbanization at the national level, as a key enabler of sustainable development.

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## **Rubble to Mountains Initiative**

To address and prevent some of the foreseeable environmental hazards that would be caused by disposing of rubble left by the Beirut Port explosions into landfills, UN-Habitat in coordination with several partners established the Rubble to Mountains initiative. Through its three-pronged approach, the initiative aims to transform rubble and glass into a biodegradable, sand-like material that will be used to fill holes left by mining in Lebanon's mountains, build furniture for Beirut's public spaces and establish a permanent site for processing waste left by construction and demolition.

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## Credits and Acknowledgments

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*Original Image: Karapiru / Adobe Stock*

# 1. Introduction

Under the guidance of UN-Habitat Lebanon, and as part of the emergency response to the massive explosion at the Port of Beirut on August 4, 2020, IBI Group was commissioned to provide technical oversight and testing services for the Rubble to Mountains initiative, a project aimed at reusing construction and demolition waste (CDW) in environmentally sustainable urban-restoration developments. In line with the goals of this project, and since there are currently no landfills in Lebanon that accept hazardous materials, a quarry in Ras Nhach was carefully selected for use as a disposal site. The rehabilitated quarry, which is located in the Batroun District of the North Governorate of Lebanon, will receive both hazardous materials and treated and crushed CDW.

The purpose of this document is twofold:

- to ensure that proper environmental and health safeguards are put in place during quarry rehabilitation to protect both the workers and the environment, and
- to provide guidance for the management and handling of asbestos-containing waste received by the quarry.

## 1.1. About the Ras Nhach Site

Four features of the site were important factors in its selection:

- It is close to Beirut.
- It is located on a highway that accommodates truck traffic. It also has a truck-accessible entrance, thus facilitating both unloading and backfilling.
- It has a limestone base and is located on a rocky site with solid geology.
- It is situated on public land and the municipality has expressed its willingness to be part of the Rubble to Mountains initiative.

The total area of the quarry, which was measured using Google Earth Pro, is estimated to be 8,000 m<sup>2</sup>.

On August 30, 2021, Mr. Hassan Ktaech of IBI Group, an international asbestos management expert, visited the quarry to gather information to inform this technical input report. During that visit, Mr. Ktaech determined there are large volumes of municipal solid waste at the site, the vast majority of which is recoverable. Furthermore, hazardous waste in the form of non-friable asbestos was also identified, including cement-related products such as asbestos cement roofing panels and pipes.

Figure 1. Municipal Solid Waste at Ras Nhach Quarry / UN-Habitat © 2021





Figure 2. Asbestos-Containing Materials Identified at Ras Nhach Quarry (left) / UN-Habitat © 2021

Figure 3. Satellite Imagery of Quarry Location (Bottom) / Imagery © 2021 TerraMetrics, Map data © 2021



Figure 4. Drone Image of Ras Nhach Quarry / UN-Habitat © 2021







*Original Image: Giuseppe Anello / Adobe Stock*

## 2. Site Preparation Works



Ras Nhach Quarry /  
UN-Habitat © 2021

Because asbestos-containing materials were identified at the quarry, proper health and safety measures must be put in place prior to commencing the rehabilitation process.

Before it can receive and dispose of asbestos-containing and other hazardous materials, the grounds of the site must first undergo a comprehensive clean-up. This task will require workers to manually sort through the current stockpiles to identify and capture glass, plastics, metals, and other general household waste for off-site transfer. Any hazardous materials identified will be managed on-site using proper procedures.

Heavy machinery will be used to redesign the site layout. More about this work and its health and safety implications can be found later in this report.

At the time of the visit by IBI Group, informal waste pickers were present on-site sorting through stockpiles. While this may have a positive impact on waste diversion, it poses serious health and safety risks to these individuals. Informal waste pickers are exposed to contaminants and other hazards, from fecal matter and medical waste to asbestos and toxic fumes. Some informal waste pickers take the collected waste home to sort or store, introducing dangers to the home and environment. To tackle this concern, no further municipal solid waste will be accepted at the site, and it will be barricaded with gated access. Only those contracted to work at the site will be permitted inside.



*Original Image: MetsikGarden / Pixabay*

## 3. Health and Safety Measures

### 3.1. Worker Protection

Health and safety measures are at the core of how this quarry will be managed now, during the transitional phase, and once it is fully operational.

Three types of groups are expected to access the site:

- UN-contracted workers, affiliated partners, and officials from government and international authorities
- contractors and consultants
- individuals employed in the waste management industry

All of these individuals must take proper precautions to protect themselves. They will also play an important role in eliminating potential exposure or cross-contamination of any hazards that are currently present or entering the site. Two levels of training will be provided on-site:

- Asbestos awareness training. This is intended to help workers understand the hazards associated with asbestos and ensure they know how to safeguard themselves and their surroundings.
- Training on respirator use and equipment maintenance. In conjunction with this training, a respirator fit test will be conducted by IBI Group.

In addition, daily "toolbox talks" will be conducted with all site personnel to remind them of the precautionary measures that must be followed on-site and to ensure that site personnel are using the correct respiratory and personal protective equipment.

Those working in the dirty zone who are involved in sorting and segregation activities (or oversight of these activities) must conform with the following requirements regarding the use of respiratory and other personal protective equipment:

- Everyone involved in or overseeing sorting activities or operating heavy machinery must, at a minimum, wear a half-face respirator equipped with P100 filters to capture particles that are 0.3 microns or greater in size.
- All site personnel wearing a respirator must be fit-tested and trained by a qualified person on the use and maintenance of their respirator.
- All personnel must wear the following:
  - » Disposable coveralls (category 3, type 5/6) that are made of a microporous material that provides a barrier against harmful particles and chemicals. The coveralls should be equipped with a hood and elastic bands around the wrists and ankles (ISO 13982).
  - » Gloves that comply with the European Standard for Protective Gloves Against Mechanical Risks (EN 388).
  - » Laceless safety footwear (e.g., steel toe-capped wellington or rigger boots) to protect against burns, cuts, punctures, and impact.
  - » Safety hat, vest, and glasses.

Those entering the site but remaining in the clean zone must wear the following:

- A new N95 respirator (replaced after 8 hours, if applicable).
- Laceless safety footwear (e.g., steel toe-capped wellington or rigger boots) to protect against burns, cuts, punctures, and impact.
- Safety hat, vest, and glasses.
- Those who drive into the site to dispose of waste must take the following precautions:
  - They must wear a new N95 respirator (replaced after 8 hours, if applicable) or two separate three-layer surgical masks. (During frequent visits to review current site operations, it was noted that those who drive into the site to dispose of waste are typically equipped with one three-layer surgical mask.)
  - They must remain in their vehicle, keep the windows closed, and not deviate from the pathway at any time while on-site.

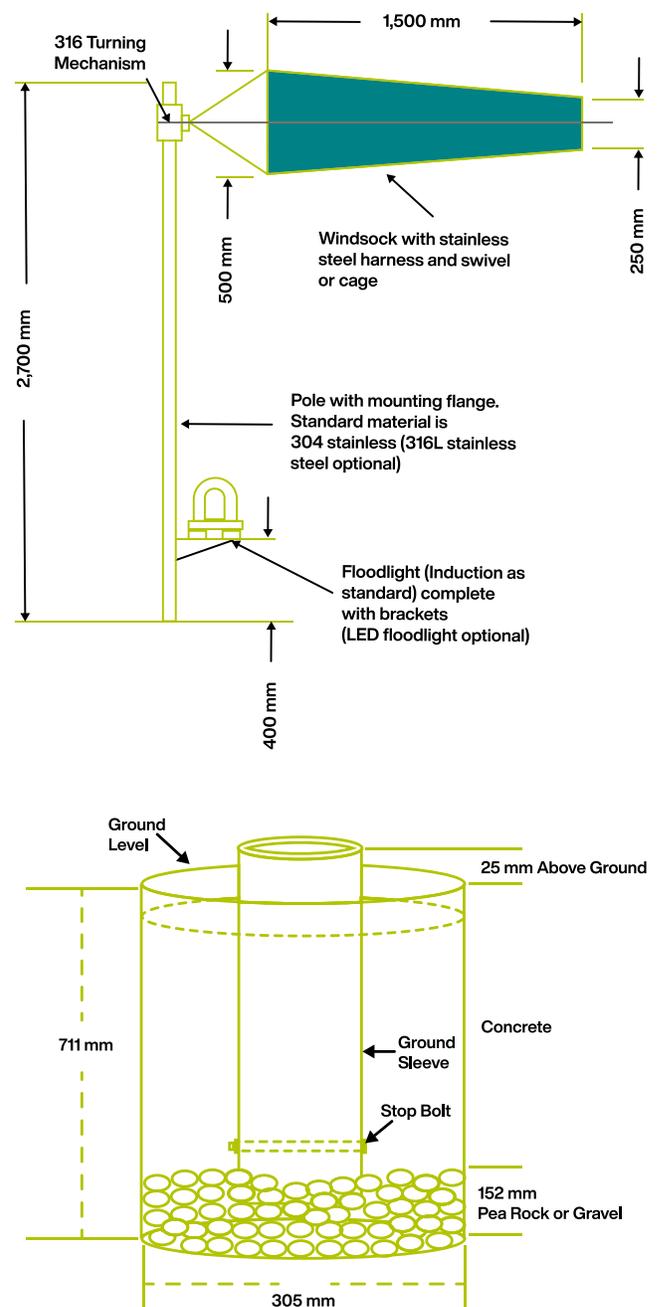
### 3.2. Environmental Protection

The following should be considered when planning dust-suppression activities:

- wetting and maintaining appropriate wetness of the ground and the asbestos waste at the point of excavation during all phases of the operation to eliminate visible dust emissions
- preventing surface water run-off
- wetting and maintaining appropriate wetness of all roadways and tracks at the quarry
- using acceptable commercially available dust suppressants on roadways within the quarry
- maintaining a speed limit of 15 km/hr for on-site traffic

- suspending work if a high level of dust is generated that cannot be controlled due to high winds (i.e., winds exceeding 48.3 km/hr); a windsock will be installed at the quarry to provide basic guidance on wind direction and speed (refer to Figure 5 for windsock and pole specifications).

Figure 5. Windsock and Pole Specifications



Due to the presence of asbestos and the nature of the operations that will be taking place, on-site signage must warn all personnel about the hazards in the work area. An adequate number of signs in both English and Arabic are to be posted in strategic locations.

To support on-site operations and protect both workers and the local community, daily air sampling will be required to test for the concentration of airborne asbestos in and around strategic locations. For ambient outdoor air quality, as per Occupational Safety and Health Administration (OSHA) standards on permissible exposure limits, an eight-hour, time-weighted average of 0.1 fibre/cm<sup>2</sup> air will be used to signify asbestos contamination.

In addition, the wastewater collected and filtered following ground-washing activities and showering within the decontamination facility will be analyzed for asbestos fibres using scanning electron microscopy (in compliance with NEN-ISO 14966: Ambient Air – Determination of Numerical Concentration of Inorganic Fibrous Particles – Scanning Electron Microscopy Method).

Figure 6. Examples of signs in the work area



### 3.2.1. SITE OPERATION REQUIREMENTS

#### TRANSPORTATION

The transport of asbestos waste must occur in such a way as to prevent the release of airborne asbestos fibres. All contractors commissioned to transport asbestos waste must adhere to the following requirements:

1. Any person transporting or handling asbestos waste for transport must have completed some form of training in the transportation of dangerous goods.
2. No person shall cause or permit asbestos waste to leave the location at which it is generated (in this case, the Bakalian waste disposal site) except for the purpose of transporting it to the Ras Nhach quarry. The quarry operator must have agreed to accept it and been advised of its anticipated time of arrival.
3. Asbestos waste transported to the Ras Nhach quarry must be in a rigid, impermeable, enclosed container of sufficient strength to accommodate the weight and nature of the waste.
4. The external surfaces of every container of every vehicle or vessel used for the transport of asbestos waste must be free of asbestos waste.
5. Asbestos waste is to be transported only in vehicles equipped with emergency spill clean-up equipment, including a shovel, a broom, a wetting agent, protective clothing, a supply of 6 mil polyethylene bags and bag closures, and personal respiratory equipment.
6. Both sides of every vehicle used for the transportation of asbestos waste and every container must display thereon, in large and easily legible letters that contrast in colour with the background, the word "CAUTION" in letters that are at least 10 cm tall and the following words:

**CONTAINS ASBESTOS FIBRES**

Avoid Creating Dust and Spillage  
Asbestos May be Harmful to Your Health  
Wear Approved Protective Equipment

7. All asbestos waste is to be securely packaged in 6 mil polyethylene sheeting and labelled containers. Every container must be free of punctures, tears, and leaks.
8. The unloading of asbestos waste at the quarry must follow procedures that prevent the tearing of the polyethylene lining.
9. Any packaging that is damaged must be replaced or repaired prior to disposal.
10. Vehicles must pass through the washdown area and be carefully cleaned after transporting asbestos waste.

### 3.2.2. MANAGEMENT OF INCOMING ASBESTOS WASTE

The handling and containment (covering) of asbestos waste at the quarry must be done in a way that ensures no dust is generated.

Procedures for the landfilling of asbestos typically involve digging a hole, depositing the asbestos, and immediately covering it with soil. The following landfilling practices are recommended for disposing of asbestos waste at the site:

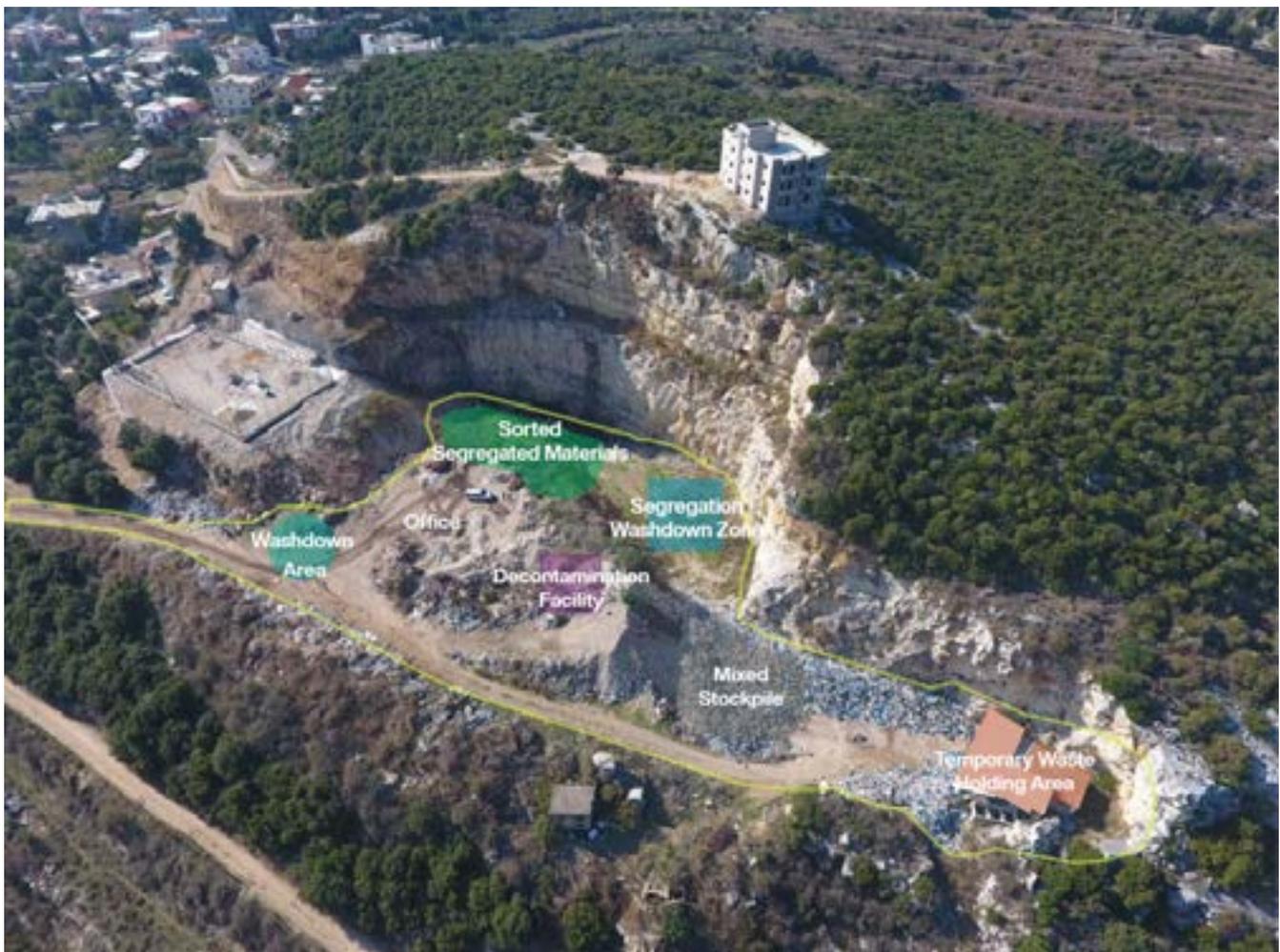
1. To ensure an adequate disposal pit is prepared, the quarry operator must be given advance notice of the approximate volume of the incoming asbestos waste and when it will arrive. This is to ensure the material received can be buried immediately upon arrival.
2. When excavating the pit, workers must allow for a clearance of 0.5 m at the top of the trench for subsequent backfilling with clean soil.
3. Upon arrival at the quarry, all vehicles must provide a shipping document that includes:
  - » the name and address of the site where the material is coming from (waste generator)
  - » the name and address or location of the receiver (i.e., the Ras Nhach quarry)
  - » the name of the carrier (transportation company).
4. The gatehouse operator must record the total mass of the asbestos waste by weighing the vehicle upon entry and exit.
5. Asbestos waste must not be stockpiled at the quarry for burial at a later date.
6. The depositing of waste at the site can be done only while the process is supervised by the site operator or their designate. During this process, the person who is supervising must not operate any machinery or the truck that is depositing the waste.
7. When asbestos waste is deposited, at least 250 mm of cover material must be placed immediately over the deposit in such a manner that compaction equipment or other equipment operating at the site does not come into contact with the waste.
8. The final cover should be at least 1,250 mm thick. It should be clean material, preferably a layer of soil.
9. The depositing of asbestos waste is not permitted in windy conditions (i.e., winds exceeding 48.3 km/hr).
10. Details of the location of every deposit must be recorded and indicated on a map. These records must be kept up to date to minimize the risk of asbestos waste being exposed (uncovered) during future activities at the quarry.

### 3.3. Site Layouts

The site will have two different layouts during the rehabilitation process. The core elements of the first layout will remain intact as other measures are introduced in the second layout. At the core of both layouts is ensuring that health and safety procedures are always followed. It is also critical that assigned areas are maintained in their designated locations to prevent cross-contamination.

Before making any changes to the site layout, all municipal solid waste currently on-site must first be gathered and merged into a single stockpile to optimize the space and to avoid hindering the movement and maneuverability of both sorters and on-site machinery. Stage 1 (site preparation) will begin the process of rehabilitating the site as it is transformed into a hazardous disposal site. Figure 7 shows the concept layout for this first layout.

Figure 7. Stage 1 Site Layout for Ras Nhach Quarry / UN-Habitat © 2021



A clear demarcation must be established between the clean and dirty zones at the site.

Although not shown in Figure 7, the plot of land housing both the office and the decontamination facility will be elevated from the other areas in the second layout. This will create additional separation between the clean and dirty zones and reduce congestion.

Also not shown in the figure is an entry pathway that leads to the central part of the quarry. This unpaved pathway is approximately 50 m long. The entry point to this pathway must be secured and equipped with a scale for weighing trucks as they enter and exit. Also, the length of the path must be paved using a hard-surface material to control dust. Other elements of the layout are explained below.

<b>Gatehouse (not shown)</b>	The gatehouse will be the first point of interaction with incoming vehicles and is essential to the management of the site. The gatehouse operator must be made aware of all incoming volumes and must inspect arriving loads to ensure that specific transport requirements have been met prior to entry.
<b>Washdown area</b>	The tires of the vehicles exiting the site must be washed down prior to exit to avoid contaminating exterior grounds. This wastewater is to be collected, filtered, and reused on-site.
<b>Office</b>	The office will be a portacabin fitted with a washroom for use by the administration team.
<b>Decontamination facility</b>	This is a facility containing chambers for workers exiting the dirty zone to safely cleanse before they enter the clean zone.
<b>Mixed stockpile</b>	Collected material from the site will be gathered into a single stockpile.
<b>Segregation washdown zone</b>	This is where recycled material will be extracted and washed for reuse. The wastewater is to be collected, filtered, and reused on-site.
<b>Sorted segregated materials</b>	This is where clean recycled material will be placed until transferred off-site.
<b>Temporary waste holding area</b>	Asbestos-containing waste extracted from the on-site materials will be kept here until they can be buried (i.e., upon completion of the rehabilitation).

After all of the municipal solid waste has been sorted and transferred out and all asbestos-containing waste has been extracted and handled using appropriate health and safety measures, the transformation of the site to the second layout can begin.

The following elements from the first layout can remain intact: the gatehouse, office, and washdown area. The fixed structure on the ground being used for holding asbestos-containing waste is to remain on-site until the area is prepared to receive and bury hazardous waste. Once hazardous waste is being properly disposed of on-site, this structure can be demolished.

In addition, the land will need to be graded to increase the size of the disposal area. To achieve this, the washdown area and the area around the portacabin (as displayed in Figure 8) will need to be elevated with a slope leading toward the lower level where trucks will deposit the waste and equipment will backfill the deposit pit.

Figure 8. Stage 2 Site Layout for Ras Nhach Quarry / UN-Habitat © 2021





