



CALCULATING THE QUARRYING SECTOR'S DUES TO THE NATIONAL TREASURY IN LEBANON

2022

مقدمة وزارة البيئة

انفاذاً لما التزمنا به في الشق المتعلق بالبيئة من البيان الوزاري لحكومة "معاً للإنقاذ"، وتحديداً ما يتعلّق بـ"وضع استراتيجية متكاملة لإدارة ملف المقالع والكسارات والمرامل وتعزيز النزاهة في هذا القطاع"، كان لا بدّ، بدايةً، من استكمال التشخيص التحليلي لهذا القطاع كما ورد في التقرير الصادر عن وزارة البيئة في العام ٢٠٢١ حول "واقع البيئة في لبنان والتوقّعات المستقبلية: تحويل الأزمات إلى فرص (٢٠٢٠)"، بالشراكة مع برنامج الأمم المتحدة الإنمائي والمفوضية السامية للأمم المتحدة لشؤون اللاجئين واليونسيف في لبنان، لا سيّما مستحقّات قطاع المقالع للخزينة من رسوم وضرائب، وكلفة تدهور البيئة، وكلفة التأهيل البيئي وغيره.

لذلك، بادرنّا في العام ٢٠٢٢، بالشراكة مع برنامج الأمم المتحدة الإنمائي، إلى اجراء الدراسة المالية-البيئية اللازمة لاحتساب هذه المستحقّات، وذلك استناداً إلى المسح الميداني والجوي الذي قامت به مديرية الشؤون الجغرافية في الجيش، تطبيقاً للمرسوم رقم ٦٥٦٩ تاريخ ٣ تموز ٢٠٢٠ حول "تحديد دقائق تطبيق المادة ٦١ من قانون موازنة العام ٢٠١٩ المتعلقة بإجراء المسح الميداني للمقالع والكسارات"، وذلك تحقيقاً لأهداف ثلاث:

١- انفاذاً للقانون، وتحديد المرسوم ٢٠٢٠/٦٥٦٩ المشار إليه أعلاه، بالإضافة إلى المرسوم الذي ينظّم قطاع المقالع والكسارات (المرسوم رقم ٢٠٠٢/٨٨٠٣ وتعديلاته) وسياسة الإدارة المتكاملة للقطاع التي أقرّها مجلس الوزراء بموجب القرار رقم ٤٥ تاريخ ٢٠١٩/٣/٢١.

٢- إرساء لمبدأ استيعاب العوامل الخارجية في احتساب الكلف، بدءاً بقطاع محافر الرمل والمقالع والكسارات الذي لطالما كان من أكبر القطاعات المؤثرة على البيئة، ان لم يكن الأكبر.

٣- تفادياً لمزيد من التدهور البيئي المتأني من هذا القطاع، من خلال العودة إلى قاعدة المعلومات التي وضعتها هذه الدراسة عند الترخيص لمقاع جديد أو الرقابة على المقالع القائمة أو تأهيلاً غيرها.

أظهرت الدراسة ان الحد الأدنى للمستحقّات هو ٢,٤ مليار دولار أميركي، وهذه النتيجة، والمبيّنة تفاصيلها والمنهجية التي تمّ اعتمادها في متنها، جد متحفّظة نظراً للعوامل الثلاث أدناه التي أثّرت في احتساب هذه المستحقّات كما ورد في الدراسة:

١- إنّ الأحجام المستخرجة، والتي بنت عليها الدراسة، تعود إلى العام ٢٠٠٤ فقط (أي الفترة الممتدة منذ حينه دون العودة إلى الفترة التي سبقتها)، وذلك كما جاء في المادة ٦١ من قانون موازنة العام ٢٠١٩.

٢- إنّ دائرة التأثير المعتمدة في احتساب الضرر من تلوث الهواء هي ١,٠٠٠ متر فقط، والتلوّث البصري ٥٠٠ متر فقط، فيما تشير المراجع العلمية إلى إمكانية احتساب دائرة تأثير أكبر في بعض الحالات.

٣- لم يتمّ احتساب التعويض عن الألم والمعاناة، والجزاء، في الدراسة المذكورة، كون التعويض عن الألم والمعاناة يفترض أن يطالب به الأشخاص المتضرّرون من خلال دعاوى قضائية؛ أمّا الجزاء فتعود صلاحية تقديره إلى القضاء.

هذا وقد باشرت وزارة البيئة، بالتعاون مع وزارتي العدل والمالية، بدراسة الطرق القانونية الأنسب للحصول، كونها خطوة أساسية لتوقيف الممارسات السابقة في هذا القطاع وبالتالي إصلاحه، خدمة للبيئة والمجتمع والاقتصاد على حد سواء.

ان هذه الدراسة ليست تقريراً عن مستحقّات الخزينة من قطاع المقالع فحسب، وان يكن الأول من نوعه في تاريخ وزارة البيئة، بل هي خطوة اصلاحية حقيقية لتحصيل اموال عامة لطالما اهدرت في مزاريب الفساد والاثراء غير المشروع على حساب الناس وبيئتهم.

د. ناصر ياسين
وزير البيئة

UNDP Foreword

In 2021, the Ministry of Environment published “The State of the Environment and Future Outlook: Turning the Crises into Opportunities” (SOER2020), prepared with support from the United Nations Development Programme (UNDP), the UN Refugee Agency (UNHCR) and the United Nations Children’s Fund (UNICEF). This report highlights the severity of land degradation in Lebanon, due, among others, to the poorly managed quarrying sector.

Lebanon’s beautiful mountains are being eroded for quarrying, uncontrolled construction and cement production since many years. The Lebanese Armed Forces surveyed more than 1,230 quarries representing extreme cases of environmental degradation, characterized by profound landform disfigurements, ecosystem damage, water resource pollution, let alone toxic pollution and non-regenerative resource extraction.

This is why in his foreword to the SOER2020, the Minister of Environment called for “collecting the quarrying sector’s dues to the National Treasury as per Decree 6569/2020, including fees, payment delays’ penalties as well as punitive claims related to environmental damage, and implement appropriate monitoring systems”.

UNDP has accordingly provided the needed support to the Ministry of Environment to monetarily quantify this damage, estimated at a minimum of 2.4 billion USD as per the findings of this study. This is an essential step for the green and sustainable recovery which the Lebanese people are aspiring for.

In this context, the construction sector is a key pillar. It is therefore critical to account for externalities in calculating its costs. Monetizing such externalities will help to safeguard natural heritage and preserve public health, as well as sustainably boosting the economy during this time of crisis.

We hope that this study will contribute to a better understanding of these challenges. Within these challenges, lay opportunities for a renewed commitment by decision makers to put in place and implement sustainable plans for the quarrying sector which benefit all people in Lebanon.

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Exchange Rate

Four of the numerous exchange rates are mentioned with June 5, 2022 rate

1 United States of America dollar (US\$) 1 = Lebanese pounds (LP) 1,507.5 (Customs and Taxes)

US\$1 = LP8,000 (BDL Intermediate Circular 601 of 9/12/2021 for withdrawal from bank account in US\$)

US\$1 = LP24,400 (BDL Exchange Rate Currency Platform or Sayrafa Circular 157's Basic Decision 13324)

US\$1 = LP28,075 (Market Price)

Source: OANDA website: www.oanda.com; Banque du Liban (BDL) Circulars; Platform exchange daily rate; and market exchange daily rate.

Definitions

Parcel

A cadastered or uncadastered land where total or partial quarrying activities took/are taking place.

Illegal Quarrying

Operator(s) extracting materials without a permit although this is not reported in the LAF survey but inferred in few cases where LAF was not able to collect operators' names and contacts.

Sub-parcel

Several operators extract materials from one parcel that is subdivided by the number of operators.

Infringement Quarrying

Some illegal use of and extraction occurs by the operator(s) of a certain cluster at adjacent parcels (not owned by him or rented to him) next to his/their clusters in certain areas.

Cluster

One operator or several operators extract materials from several parcels, one parcel, or sub-parcels. The cluster is based on the LAF volume extraction surveyed per area, as for instance, LAF sometimes reported one extracted volume figure for one parcel although several operators were extracting materials from sub-parcels; conversely, LAF sometimes reported one extracted volume figure for a number of parcels although one or several operators were extracting materials from these parcels.

Clustering Typology based on LAF Survey Reporting

Typology	Cluster for Cadastered or Uncadastered Parcel(s)			Infringement Quarrying
One Operator with or without permit	Several Parcels	One Parcel		Possible Infringement on and/or Extraction from Neighboring Parcels
Several Operators with or without permits	Several Parcels	One Parcel	Sub-Parcels (notably public land)	

Note: A parcel could be broken down in Sub-Parcels where several operators extracted quarrying material. The LAF provided either aggregate figures for the entire parcel (so all the operators were aggregated in one cluster) or disaggregated figures for the sub-parcels for each operator (so each sub-parcel is considered a cluster).

Acronyms

BDL	Banque du Liban
CAS	Central Administration of Statistics
CNRS	Conseil National de la Recherche Scientifique
CO ₂	Carbon Dioxide
COED	Cost of Environmental Degradation
CVM	Contingent Valuation Method
DALY	Disability-Adjusted Life Year
EC	European Commission
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GIS	Geographical Information System
GOL	Government of Lebanon
IHME	Institute for Health Metrics and Evaluation
LAF	Lebanese Armed Forces
LP	Lebanese Pound
MOE	Ministry of Environment
MOEW	Ministry of Energy and Water
MOF	Ministry of Finance
MOIM	Ministry of Interior and Municipalities
MOJ	Ministry of Justice
MOPWT	Ministry of Public Works and Transport
N/A	Not Available
NGO	Non-Governmental Organization
OECD	Organization for Economic Co-operation and Development
PM _x	Particulate Matter
TEV	Total Economic Value
TOR	Terms of Reference
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
US\$	United States Dollar
VAT	Value-added Tax
VSL	Value of Statistical Life
WDI	World Development Indicators published by the World Bank
WHO	World Health Organization
WTP	Willingness-to-pay

Executive Summary

Objective

To calculate the compensations owed to the Government of Lebanon due to the quarry sector mismanagement, fulfilling part 2 of Decree 6569/2020 regarding the estimation of the dues owed to Lebanon's National Treasury from the quarrying sector based on the survey undertaken by the Lebanese Armed Forces (LAF) as per part 1 of the Decree, where LAF carried out a national diagnostic.

LAF dataset

LAF, who carried out the quarry survey on the Lebanese Territories between 2020 and 2022, provided six (6) batches of 661 files containing 1,235 parcels, where the total area surveyed where quarrying activities took place is 15.1 km², and the extracted volume is 196.9 million m³.

Legal Compensations usually include

- Monetary Damages (penalties and built-in late fees according to the Law, and non-compliance): in this study, monetary damages include Regulatory and Fiscal, Cost of Environmental Degradation (COED), and Rehabilitation compensations.
- Non-Monetary Damages (pain and suffering): not included in this study as they are usually filed by the plaintiff.
- Punitive Damages (usually awarded based on the defendant's assets and/or profits, awarded when a defendant is found guilty of malicious acts or fraud): these are not included in this study as the judges need to rule on the punitive damages based on assets and/or profits.

Sample Quarry Dataset Obtained from the LAF

- Owner(s) & contact information
- Operator(s) and contact information
- Location: Mohafaza, Caza
- Quarry location name and coordinates
- Parcel(s) cadaster #
- Extraction type: Rock, Gravel, Sand, Mosaic, Limestone, or Unknown
- Total area: m² (not always provided)
- Area exploited: m²
- Volume extracted: m³
- Extraction period: <1970-2021 or 2007-2021
- Quarried stock available: m³
- Infringements on other parcels (some with parcel #, areas and/or volumes)

Damages Considered

Regulatory and Fiscal

- MOF Quarrying Permit Renewal (LP2.5 million introduced in 2004)
- MOF Quarry Stamps (LP1,000 per m³ extracted introduced in 2004)

- Municipality Permit Fee (\approx LP15,000/m² introduced in 2010 and used across the board)
- Financial Warranty (LP9,000/m³ introduced in 2010 and used across the board)
- Interest on Warranty (Average Treasury Bill (TB) yield/year)
- Penalty for Mismanagement (LP100 million; upper bound used)
- Penalty for working without a permit which should be ruled by the Judge in addition to the dues calculated under this assignment
- Estimated Corporate Income Tax (15% until 2016 and 17% onward: Avg. TB yield/year)
- Cumulative Corporate Income Tax Late Fee (MOF penalty rates)
- Estimated VAT (10% VAT starting February 1, 2002, and 11% since January 1, 2018)
- Cumulative VAT Late Fee (MOF penalty rates)
- EIA (US\$40,000 one-off for the permit renewal starting 2012 but does not include the guarantee deposited with the MoE corresponding to 0.05% of the value of the project in accordance with the value indicated by the contracting authority, as no information is readily available and therefore should be ruled by the Judge in addition to the dues calculated under this assignment)
- EMP Implementation (10% of EIA/year starting 2012)
- EMP Supervision (60 men-day/year, third parties)

Cost of Environmental Degradation

- Air pollution (Dose-response function and Disability-adjusted Life Year; Value of Statistical Life and GDP/capita)
- Sight Pollution (Hedonic pricing of residences around the quarry)
- Water, Erosion, and Ecological services disruption (0.1%/GDP/Capita)

Rehabilitation

- Hardscape Rehabilitation (US\$70/m²) to be re-adjusted based on a feasibility study
- Green Cover Rehabilitation (US\$4/m²) to be re-adjusted based on a feasibility study
- Landslide risk Not Included (to be calculated on a case-by-case basis)

LAF Mapping Fee (separate from the compensation)

- LP1,000,000 per parcel

Main Assumptions

- Calculation from 2007 to 2018 across the board as most data provided by LAF starts in 2007; in certain cases, LAF provided data from <1970 based on existing old maps: in that particular case, only half the volume extracted (but the same area) were considered in the calculation
- Total volume and area were annualized over 2007-2018
- Compensation results are in actual market value and not in 2018 constant terms
- One parcel could be quarried by several operators
- Several parcels could be quarried by one operator, therefore, clustering is needed: parcels were aggregated in 372 clusters
- Radius considered for Air Pollution: 1,000 m from the quarry limits based on international literature, which is very conservative as dispersion models show that some people could be affected beyond 1,000 m radius

- Radius considered for Sight and Noise Pollution: 500 m from the quarry limits although some people could be affected by sight and noise pollution beyond the 500 m radius
- Air Pollution is calculated yearly (6.5% reduction of yearly Lebanon’s annual average PM2.5 as no annual average data by region is currently available)
- Sight pollution, Ecosystem disruption, and Rehabilitation values are one-offs and considered for the year 2018 only
- The exchange rate used is LP1,507.5 to the US dollar as the analysis covers the 2007-2018 period

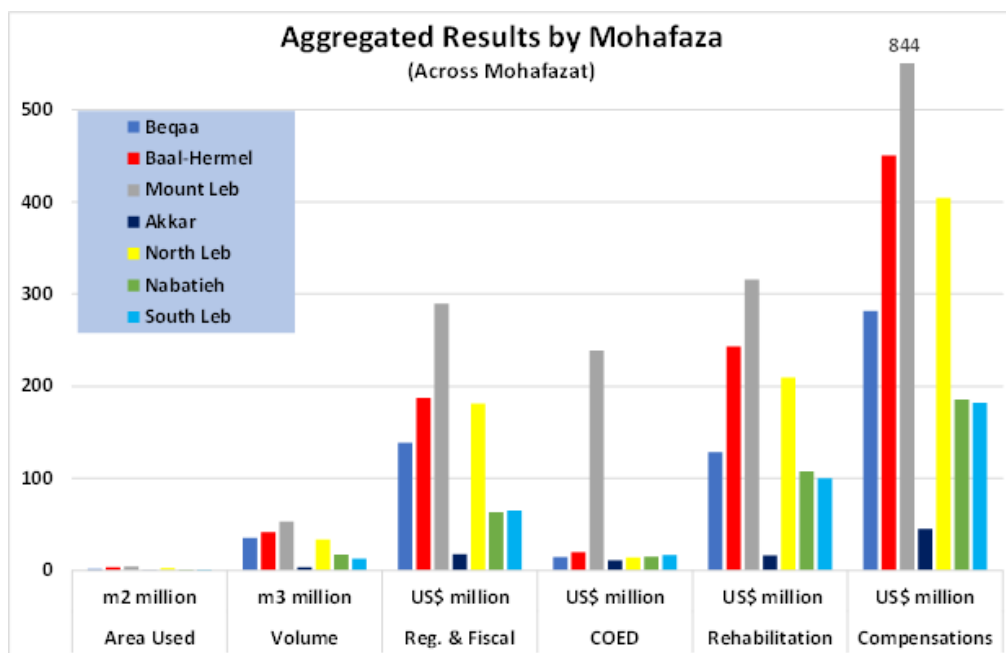
Compensation results:

Area exploited of 15.15 million of m²; Volume extracted of 196.87 million of m³; Monetary Damage Compensations of US\$2.39 billion; Infringements by operators on other parcels (26% of all clusters); LAF Mapping Dues and Volume over Area ratio of 13 (provides the average excavation depth and possibly a proxy indicator on hardscape degradation and scars) by Mohafaza are illustrated in the following Table and Figure.

Table 0.1: Quarry Areas, Extraction, and Monetary Damages by Mohafaza

Mohafaza	Quarry		Area Used	Volume Extracted 2007-2018	Regulatory & Fiscal	COED	Rehabilitation	Compensations	Infringement	LAF Dues	Volume / Area Ratio
	Parcel	Cluster									
	#	#									
Beqaa	130	34	1,736,682	35,346,733	138	15	129	282	12	0.09	20.4
Baal-Herm.	367	124	3,286,229	41,369,099	187	20	243	450	36	0.24	12.6
Mount Leb	416	102	4,275,833	52,998,594	290	239	316	845	19	0.28	12.4
Akkar	72	15	222,390	3,655,189	18	11	16	45	7	0.05	16.4
North Leb	129	35	2,828,175	33,823,070	181	14	209	405	13	0.09	12.0
Nabatieh	52	23	1,450,609	17,020,299	63	15	107	186	6	0.03	11.7
South Leb	69	39	1,352,844	12,668,579	65	17	100	182	3	0.05	9.4
Total	1,235	372	15,152,762	196,871,923	943	330	1,121	2,394	96	0.82	13.0

Figure 0.1: Compensation Results by Mohafaza



Issues and Recommendations

Government ownership land

Some operators are quarrying on Government land: 126 parcels or 1,198 sub-parcels. Contractual concessions should be reviewed to check their legitimacy and take the necessary judicial and enforcement actions to stop the infringement on government land.

Unknown ownership land

Some operators are quarrying on land whose ownership is unknown, where 149 parcels are uncadastered or not registered (daw'aer ikarieh), and 1,161 are A'lem wa Khabar (i.e. unregistered parcels where individuals are trying to claim and register the parcel title in their names). Contractual concessions should be reviewed to check their legitimacy and take the necessary judicial and enforcement actions to stop the infringement on government land.

Infringement

Some operators use adjacent parcels (which are not owned or rented by them) for quarrying (96 clusters comprising 201 parcels, few with data: the exploited area is 378,192 m² and the extracted volume 7.5 million m³).

Quarry operator(s)

The LAF dataset reports the name and information of the current operator(s). This does not mean that the current operator has been around since the base years, as there may have been possible successive operators. Those operators, who were not identified in the survey, still need to be identified.

Lawlessness

Unavailable land ownership and operator disinformation, mainly in the Kesrewan (Mayrouba and Hrajel), requires immediate attention to sort out these issues and stop the severe hardscape degradation.

Regulatory and Fiscal

All regulatory and fiscal hypothetical dues in terms of charges, fees, penalties, interest rates, etc., will initially be applied to all quarries. COED. COED should be recalculated for clusters in areas where hardscapes and people have suffered the most by considering: health assessments, dispersion models, satellite imagery, actual depreciation of land/house/commerce prices based on a survey using the hedonic method, assessment of water disruption and ecological services' functions, land risk assessment, etc.

Rehabilitation

In this study, a fixed rate was used across the board; more precise figures would require to carry out a feasibility study for each cluster

Compensations

- Monetary Damages can be initiated immediately, first targeting unpermitted, unlawful, and infringement-prone operators;
- Non-Monetary Damages could be filed by plaintiffs regarding pain and suffering; and
- Punitive Damages are to be ruled by Judges based on operators' assets and profits.

الملف التنفيذي

مستحقات قطاع المقالع للخزينة

الملخص التنفيذي للدراسة الصادرة عن وزارة البيئة وبرنامج الأمم المتحدة الإنمائي في العام ٢٠٢٢

الهدف

احتساب التعويضات المستحقة للحكومة اللبنانية بسبب سوء إدارة قطاع المقالع، التزاماً بالقسم الثاني من المرسوم ٢٠٢٠/٦٥٦٩ في ما يتعلق بتقدير المستحقات المترتبة على قطاع المقالع لصالح الخزينة اللبنانية، وذلك استناداً إلى المسح الذي نفذته الجيش اللبناني وفق ما ينص عليه القسم الأول من المرسوم.

مجموعة البيانات الصادرة عن الجيش اللبناني

قدّم الجيش اللبناني ست دفعات مؤلفة من ٦٦١ ملفاً تضمّن ١,٢٣٥ مقلعاً، وبلغت المساحة الإجمالية الممسوحة التي حصلت فيها النشاطات المرتبطة بالمقالع ١٥,١ كيلومتراً مربعاً فيما وصلت الكميات المستخرجة إلى ١٩٦,٩ مليون متر مكعب.

تتضمن المستحقات القانونية عادةً:

- التعويضات المالية (الغرامات والرسوم الضمنية المتأخرة بموجب القانون وعدم الالتزام): في هذه الدراسة، تشمل التعويضات المالية التكاليف التنظيمية والضريبية، وكلفة التدهور البيئي، وكلفة إعادة التأهيل.
- التعويضات غير المالية (الألم والمعاناة): لا تدرج في هذه الدراسة بما أن المستدعي هو من يتقدّم بها عادةً.
- التعويضات الجزائية (يتم منحها عادةً استناداً إلى أصول و/أو أرباح المدعى عليه، وذلك حين يُدان بارتكابه أعمالاً كيدية أو عند قيامه بالتزوير): لا تدرج هذه التعويضات في هذه الدراسة بما أنه يجب على القضاة أن يحكموا بشأن التعويضات الجزائية استناداً إلى الأصول و/أو الأرباح.

نموذج مجموعة البيانات الخاصة بالمقالع التي تمّ الحصول عليها من الجيش اللبناني:

- المالك (المالكون) ومعلومات الاتصال
- المستثمر (المستثمرون) ومعلومات الاتصال
- الموقع: المحافظة والقضاء
- موقع المقلع (منطقة) والإحداثيات
- رقم السجل العقاري للمقلع (المقالع)
- نوع المستخرجات: صخر أو بحص أو رمل أو موزاييك أو حجر كلسي أو نوع مجهول

- المساحة الإجمالية: بالمتر المربع (غير متوافرة أحياناً)
- المساحة المستثمرة: بالمتر المربع
- الكميات المستخرجة: بالمتر المكعب
- فترة الاستخراج: ما قبل ١٩٧٠ إلى ٢٠٢١ أو من ٢٠٠٧ إلى ٢٠٢١
- مخزون المقالع المتوافر: بالمتر المكعب
- التعديلات على أراضٍ أخرى (يتضمن البعض منها رقم قطعة الأرض والمساحات و/أو الكميات)

التعويضات المأخوذة بعين الاعتبار:

التكاليف التنظيمية والمالية

- تجديد رخصة المقالع لدى وزارة المالية (٢,٥ مليون ل.ل.، وهو رسم تمّ إدخاله في العام ٢٠٠٤)
- طابع وزارة المالية الخاصة بالمقالع (١,٠٠٠ ليرة ل.ل. لكل متر مكعب مستخرج، وهو رسم تمّ إدخاله في العام ٢٠٠٤)
- رسم الرخصة البلدية (ما يوازي ١٥,٠٠٠ ل.ل. للمتر المربع الواحد، وهو رسم تمّ إدخاله في العام ٢٠١٠ وجرى استخدامه لكل السنوات)
- الضمانة المالية (٩,٠٠٠ ل.ل. للمتر المكعب الواحد، وهو رسم تمّ إدخاله في العام ٢٠١٠ وجرى استخدامه لكل السنوات)
- الفائدة على الكفالة (متوسط عائد سند الخزينة في السنة)
- الغرامة الناجمة عن سوء الإدارة (١٠٠ مليون ل.ل.، تمّ اعتماد الحد الأعلى)
- الغرامة الناجمة عن العمل بدون ترخيص، والتي يجب أن تصدر بموجب حكم عن القاضي، بالإضافة إلى المستحقات المحتسبة بموجب هذه الدراسة
- ضريبة الدخل على الشركات المقدّرة (١٥٪ حتى العام ٢٠١٦ و١٧٪ فصاعداً: متوسط عائد سند الخزينة في السنة)
- الرسوم المتأخرة المتراكمة لضريبة الدخل على الشركات (أسعار الغرامات المحددة من قبل وزارة المالية)
- الضريبة على القيمة المضافة المقدّرة (الضريبة على القيمة المضافة بما نسبته ١٠٪ ابتداءً من شهر شباط ٢٠٠٢ و١١٪ ابتداءً من كانون الثاني ٢٠١٨)
- الرسوم المتأخرة المتراكمة للضريبة على القيمة المضافة (أسعار الغرامات المحددة من قبل وزارة المالية)
- تقييم الأثر البيئي (تكلفة لمرة واحدة بقيمة ٤٠,٠٠٠ دولار أميركي في ما يتعلق بتجديد الرخصة ابتداءً من العام ٢٠١٢، لكن بما لا يشمل الكفالة المودعة لدى وزارة البيئة والتي توازي ٠,٠٥٪ من قيمة المشروع بما يتوافق مع القيمة المشار إليها من قبل الجهة المتعاقدة، حيث أنه لا معلومات متاحة بسهولة، وبالتالي يجب أن يصدر فيها حكم من القاضي، بالإضافة إلى المستحقات المحتسبة بموجب هذه الدراسة)
- تنفيذ خطة الإدارة البيئية (١٠٪ من تقييم الأثر البيئي في السنة ابتداءً من العام ٢٠١٢)
- الإشراف على خطة الإدارة البيئية (٦٠ يوم عمل في السنة، أطراف ثالثة)

كلفة التدهور البيئي

- التلوث الهوائي (دالة الاستجابة للجرعة وسنوات العمر المعدلة حسب الإعاقة؛ قيمة الحياة الإحصائية وحصّة الفرد من إجمالي الناتج المحلي)

- التلوث البصري (التسعير القائم على الحاجات للمساكن المحيطة بالمقلع)
- المياه والتآكل واختلال الخدمات البيئية (١,٠٪ من حصة الفرد من إجمالي الناتج المحلي)

إعادة التأهيل

- إعادة تأهيل المناظر الطبيعية الصلبة (٧٠ دولاراً أميركياً للمتر المربع الواحد) على أن يعاد تعديل هذه الكلفة استناداً إلى دراسة جدوى
- إعادة تأهيل الغطاء الأخضر (٤ دولارات أميركية للمتر المربع الواحد) على أن يعاد تعديل هذه الكلفة استناداً إلى دراسة جدوى
- لم يتم إدراج خطر الانهيارات الأرضية (على أن تُحتسب كلفته بحسب كل حالة على حدة)

رسوم التخطيط الخاصة بالجيش اللبناني (هذه الرسوم منفصلة عن التعويضات)

- ١,٠٠٠,٠٠٠ ل.ل للمقلع الواحد

التخمينات الرئيسية

- تمت العمليات الحسابية في الفترة الممتدة بين العامين ٢٠٠٧ و ٢٠١٨ عموماً بما أن معظم البيانات التي قدمها الجيش اللبناني تبدأ في العام ٢٠٠٧؛ وفي بعض الحالات، قدم الجيش اللبناني بيانات تعود إلى ما قبل العام ١٩٧٠ استناداً إلى خرائط قديمة موجودة: في هذه الحالة تحديداً، لم يؤخذ بعين الاعتبار عند القيام بالحساب إلا نصف الكميات المستخرجة (إنما المساحة ذاتها)
- تمّ احتساب إجمالي الكمية والمساحة في الفترة الممتدة بين العامين ٢٠٠٧ و ٢٠١٨
- تمّ احتساب النتائج المتعلقة بالتعويضات بحسب القيمة السوقية الحالية وليس على أساس القيمة الثابتة لعام ٢٠١٨
- يمكن لمقلع واحد أن يكون مستثمراً من قبل عدة مشغلين
- يمكن لعدة مقالع أن تكون مستثمرة من قبل مشغل واحد، وبالتالي، من الضروري اعتماد سياسة التجميع، وقد تم تجميع المقالع في ٣٧٢ مجموعة
- تبلغ دائرة التأثير المأخوذة بعين الاعتبار للتلوث الهوائي ١,٠٠٠ متر من حدود المقلع استناداً إلى المعايير الدولية، وهي مسافة متحفظة جداً بما أن نماذج التشتت أظهرت أنه يمكن أن يلحق الضرر ببعض الناس على دائرة تتجاوز ١,٠٠٠ متر
- تبلغ دائرة التأثير المأخوذة بعين الاعتبار للتلوث البصري والسمعي ٥٠٠ متر من حدود المقلع بالرغم من أن بعض الناس يمكن أن يلحق بهم الضرر بفعل التلوث البصري والسمعي على دائرة تتجاوز ٥٠٠ متر
- يتم احتساب التلوث الهوائي سنوياً (انخفاض بنسبة ٦,٥٪ عن المتوسط السنوي للجسيمات الدقيقة ٢,٥ في لبنان سنوياً بما أنه لا يتوافر حالياً متوسط بيانات سنوي بحسب المنطقة)
- تمّ احتساب قيم التلوث البصري واضطراب النظام البيئي وإعادة التأهيل لمرة واحدة وجرى أخذها بعين الاعتبار للعام ٢٠١٨ فقط
- إن سعر الصرف المستخدم هو ١,٥٠٧,٥ ليرة اللبنانية مقابل الدولار الأميركي الواحد بما أن التحليلات تغطي الفترة الممتدة بين العامين ٢٠٠٧ و ٢٠١٨

النتائج المتعلقة بالتعويضات

المساحة المستثمرة ١٥,١٥ مليون متر مربع؛ الكميات المستخرجة ١٩٦,٨٧ مليون متر مكعب؛ التعويضات المالية ٢,٣٩ مليار دولار أمريكي؛ التعديلات المرتكبة من قبل المستثمرين على قطع أرض أخرى (٢٦٪ من إجمالي المجموعات)؛ ويتم استعراض مستحقات المسح العائدة للجيش اللبناني، ونسبة الكمية إلى المساحة بمعدل يصل إلى ١٣ (يبين هذا المعدل متوسط عمق الحفر ويشكل على الأرجح مؤشراً بديلاً بشأن تدهور المناظر الطبيعية الصلبة)، وذلك بحسب المحافظة في الجدول أدناه.

الجدول ١٠,١: مساحات المقالع والكميات المستخرجة والتعويضات المالية بحسب المحافظة

المحافظة	المقلاع		المساحة المستثمرة	الكميات المستخرجة ٢٠١٨-٢٠٠٧	التكاليف التنظيمية والضريبة	كلفة التدهور البيئي	كلفة إعادة التأهيل	التعويضات	التعديلات	مستحقات الجيش	الكمية/ المساحة
	مجموعة	قطعة									
	عدد	عدد	م	م	مليون \$	مليون \$	مليون \$	مليون \$	المجموعات #	مليون \$	م/م
البقاع	٣٤	١٣٠	١,٧٣٦,٦٨٢	٣٥,٣٤٦,٧٣٣	١٣٨	١٥	١٢٩	٢٨٢	١٢	٠,٠٩	٢٠,٤
بعلبك-هرمل	١٢٤	٣٦٧	٣,٢٨٦,٢٢٩	٤١,٣٦٩,٠٩٩	١٨٧	٢٠	٢٤٣	٤٥٠	٣٦	٠,٢٤	١٢,٦
جبل لبنان	١٠٢	٤١٦	٤,٢٧٥,٨٣٣	٥٢,٩٩٨,٥٩٤	٢٩٠	٢٣٩	٣١٦	٨٤٥	١٩	٠,٢٨	١٢,٤
عكار	١٥	٧٢	٢٢٢,٣٩٠	٣,٦٥٥,١٨٩	١٨	١١	١٦	٤٥	٧	٠,٠٥	١٦,٤
الشمال	٣٥	١٢٩	٢,٨٢٨,١٧٥	٣٣,٨٢٣,٠٧٠	١٨١	١٤	٢٠٩	٤٠٥	١٣	٠,٠٩	١٢,٠
النبطية	٢٣	٥٢	١,٤٥٠,٦٠٩	١٧,٠٢٠,٢٩٩	٦٣	١٥	١٠٧	١٨٦	٦	٠,٠٣	١١,٧
الجنوب	٣٩	٦٩	١,٣٥٢,٨٤٤	١٢,٦٦٨,٥٧٩	٦٥	١٧	١٠٠	١٨٢	٣	٠,٠٥	٩,٤
المجموع	٣٧٢	١,٢٣٥	١٥,١٥٢,٧٦٢	١٩٦,٨٧١,٩٢٣	٩٤٣	٣٣٠	١,١٢١	٢,٣٩٤	٩٦	٠,٨٢	١٣,٠

قضايا وتوصيات

أملك الدولة

يقوم بعض المستثمرين باستثمار المقالع في أراضٍ عامة ملك الدولة اللبنانية: ١٢٦ مقلعاً أو ١,١٩٨ مقلعاً فرعياً. وينبغي إعادة النظر في الامتيازات التعاقدية للتحقق من شرعيتها واتخاذ الإجراءات القضائية والتطبيقية الضرورية لوقف التعديلات على أملك الدولة.

الأراضي المجهولة الملكية

يقوم بعض المشغلين باستثمار المقالع في أراضٍ مجهولة الملكية، إذ أن ١٤٩ مقلعاً غير مقيد في السجل العقاري أو غير مسجل (في الدوائر العقارية)، فيما يخضع ١,١٦١ مقلعاً للعلم والخبر (أي مقالع غير مسجلة حيث يحاول الأفراد تقديم طلب وتسجيل سند المقلع باسمهم). وينبغي إعادة النظر في الامتيازات التعاقدية للتحقق من شرعيتها واتخاذ الإجراءات القضائية والتطبيقية الضرورية لوقف التعديلات على أملك الدولة.

التعدي

يستخدم بعض المستثمرين قطع أرض متلاصقة (لا يملكونها أو لا يستأجرونها) بهدف الاستثمار في المقالع (٩٦ مجموعة تتضمن ٢٠١ قطعة أرض، فيما القليل منها لديه بيانات: تبلغ المساحة المستثمرة ٣٧٨,١٩٢ متراً مربعاً والكميات المستخرجة ٧,٥ ملايين متر مكعب).

مستثمر (مستثمر) المقالع

تبين مجموعة البيانات الصادرة عن الجيش اللبناني اسم المستثمر الحالي/المستثمرين الحاليين والمعلومات ذات الصلة. لكن ذلك لا يعني أن المستثمر الحالي موجود منذ السنوات المرجعية، بما أنه قد يكون ثمة مستثمرين متعاقبين محتملين. ولا يزال من الضروري تحديد هوية هؤلاء المستثمرين الذين لم يتم تحديد هويتهم في المسح.

انعدام القانون

يتطلب عدم توافر ملكية الأراضي والمعلومات المضللة بشأن المستثمرين، خصوصاً في كسروان (ميروبا وحراجل)، اهتماماً فورياً من أجل تسوية هذه القضايا ووقف التدهور الحاد للمناظر الطبيعية الصلبة.

الكلفة التنظيمية والضريبة

سيتم في بادئ الأمر تطبيق كل المستحقات التنظيمية والضريبة المفترضة في ما يتعلق بالأعباء والرسوم والغرامات وأسعار الفائدة وما عدا ذلك على كل المقالع.

كلفة التدهور البيئي

ينبغي إعادة احتساب كلفة التدهور البيئي للمجموعات في المساحات التي كانت فيها المناظر الطبيعية الصلبة والناس الأكثر تضرراً مع الأخذ في عين الاعتبار للتالي: التقييمات الصحية ونماذج التشتت وصور الأقمار الصناعية والتدهور الحالي لأسعار الأراضي/المنازل/التجارة على أساس مسح يستخدم طريقة تسعير الحاجة وتقييم انقطاع المياه ووظائف الخدمات البيئية وتقييم مخاطر الأراضي، إلخ...

إعادة التأهيل

في هذه الدراسة، تمّ استخدام سعر ثابت عموماً؛ ويتطلب توفير المزيد من الأرقام الدقيقة تنفيذ دراسة جدوى لكل مجموعة من المجموعات.

التعويضات

- يمكن المباشرة بدفع التعويضات المالية على الفور، والتي تستهدف أولاً المستثمرين غير الحائزين على تراخيص وغير القانونيين والميالين إلى ارتكاب التعديات؛
- يمكن التقدم بطلب التعويضات غير المالية من قبل مستدعين في ما يتعلق بالألم والمعاناة؛
- تستوجب التعويضات الجزائية أحكاماً صادرة عن القضاة استناداً إلى أصول المشغلين وأرباحهم.

01

INTRODUCTION

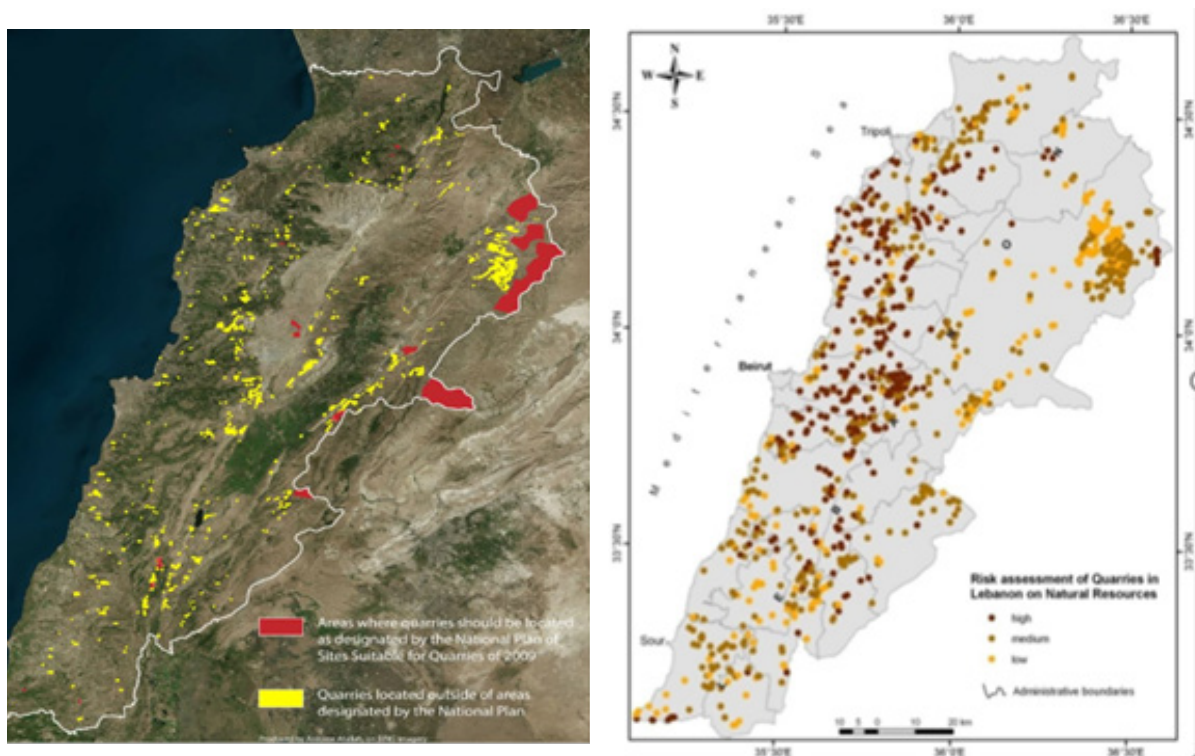
1.1 Construction and Reconstruction Cycles

With the absence of public sector oversight and good governance, Lebanon's formal and informal quarrying sector has benefitted from the destruction and reconstruction cycles for the last 45 years marked by the 1975-1990 Civil War construction and reconstruction, the 1992-2005 reconstruction boom, the post-2006 Israeli Lebanese War reconstruction stance, the 2011-2019 construction boom and the post-August 4, 2020, Beirut Port double-explosion timid reconstruction.

1.2 Environmental Impact

Considered a necessary bad for construction and reconstruction, rock and sand quarries represent extreme cases of environmental degradation characterized by profound landform modifications and disfigurements, complete removal of vegetation cover, non-regenerative resources extraction, different levels of toxic pollution depending on extraction practices and mineral types, ecosystem services disruption, and water resources pollution and flow alteration.

Figure 1: Lebanon Quarry Landscape Scars in 2018 and Suitability for Quarry Rehabilitation in 2008



Note: Red Patches in Atallah, 2018 map indicate the 15 designated quarries and stone cracker areas under Decree 1735/2009.

Source: Atallah (2018); and Darwish et al. (2008).

1.3 Geographical Scope

By 2018, about 1,330 active and passive as well as formal and informal rock gravel and sand quarries were geo-referenced by Attallah, 2018 through Earth Observation over the Lebanese territories with an aggregated area estimated at 56.2 km² or 0.6 percent of Lebanon's land area. However, these figures were not validated by ground truthing and seemed over-reported. In 2013, the General Staff – Information Division of the General Directorate of Internal Security Forces (Ministry of Interior and Municipalities) surveyed active and passive quarrying activities where about 147 sand blockers, 189 quarries and Gravel crushers, and 219 ornamental stone quarries were reported and distributed throughout the country. Conversely, about 1,278 active and passive rock gravel and sand quarries covering an

area of 52.67 km² were geo-referenced by Darwish et al., 2008 through Earth Observation over the Lebanese territories. A suitability analysis was conducted based on remote sensing to determine an alternative purpose for rehabilitation, such as lakes, landfills, or green cover (Figure 1.1). Comparing both Atallah, 2018 and Darwish et al., 2008 maps reveals overlaps and discrepancies in quarry location and density. Further to Decree 6569/2020, the Lebanese Army Forces (LAF) Army Command carried out between 2020 and 2022 a field survey for most quarries over the national territories, where the results were used to derive the “Quarrying Sector’s Dues to the National Treasury in Lebanon.”

1.4 Policy and Regulations

Vested interests and a complex political economy prevented any decisive government policy regulation and governance of the sector from being enforced till 2019. Before 2019, Decree 1735/2009, amending Decree 8803/2002 and its amendments regulating stone quarries and stone crackers, formed the basis of legislation regulating quarries and crushers and mentioned the obligation of rehabilitation. Conversely, through Decree 2366/2009, the National Physical Master Plan of the Lebanese Territory (NPMPLT) identified land use options, including quarrying, and was intended to supersede all previous quarry regulations but failed to be fully implemented, particularly in what relates to quarrying. In 2019, the Council of Ministers adopted Decision 45 (March 21, 2019), as the first integrated policy for the quarrying sector that sets the pillars to curb the poorly regulated and enforced sector. The policy emphasizes, among others, the need for a modern law and a new masterplan (decree) to organize the sector (currently organized under Decree 8803/2002 and its amendments) as well as the need for strict enforcement starting with a detailed volumetric survey of the existing sites – the procedural details of which, along with related punitive claims and damages including environmental damage (Cost of Environmental Degradation COED) and rehabilitation, were issued in Decree 6569/2020. Moreover, Decision 45/2019 provided a 3-month grace period for the quarries operating without a permit.

1.5 The objective of the Assignment

The objective of this assignment is to carry out part 2 of Decree 6569/2020 regarding the estimation of the dues owed to Lebanon’s National Treasury from the quarrying sector based on the survey undertaken by LAF as per part 1 of the Decree, where LAF carried out a national diagnostic.

1.6 The report includes 6 sections

(i) The Introduction provides an overview of the quarrying sector in Lebanon and the objective of the report; (ii) The Assignment is detailed; (iii) The Quarry data acquisition is briefly described; (iv) The methodological process is spelled out for the damage calculation; (v) The assumptions underlying the assumptions are spelled out; (vi) The results of the quarried areas, the volume extracted and damage costs are described; and (vi) The legal and fiduciary options for moving forward are analyzed. Moreover, Annexes 1 and 2 provide details on the COED methodology. Annex 3 provides the dataset template that allowed the data aggregation to perform the analysis. Annex 4 includes further information regarding the regulatory and fiscal costs. Annex 5 provides the monetary damage breakdown by cluster and by Mohafaza. Annex 6 provides an edited legal warning template (based on a version provided by the MOE). Annex 7 reviews Lebanon Laws and Regulations governing the quarry sector. Annex 8 reviews French Laws and Regulations governing the quarry sector.

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02

ASSIGNMENT

2.1 The assignment includes the following tasks and deliverables as reported in 10 Points in the Terms of Reference (TOR):

1. Get familiarized and extensively analyze the survey results from the LAF (maps, volumes, and owners).
2. Develop a methodology for assessing the Cost of Environmental Degradation (COED) at the quarry level and estimate the COED for each site.
3. Calculate the cost of implementing the most appropriate rehabilitation technique for each site.
4. Calculate the fees due to the Ministry of Finance (MOF), including VAT.
5. Calculate the dues to the respective Municipalities [or a Mohafaza if the quarry is located in a hamlet that is not under municipal jurisdiction].
6. Determine the penalty/punitive claim due for each site considering all the below parameters (as well as others if determined based on existing legislation):
 - a. working without a permit (as a function of the number of years of operating without a permit)
 - b. working with an illegitimate permit (i.e., an administrative authorization not issued by the competent authority) – also a function of the years of operating with an illegitimate permit;
 - c. delay (yr-based) in paying the COED;
 - d. delay (yr-based) in rehabilitation;
 - e. delay (yr-based) in paying the dues to MOF;
 - f. delay (yr-based) in paying the dues to the municipalities;
 - g. violating environmental conditions set in the permit, etc.
7. Based on the above, calculate the total dues for each site.
8. Review the draft template legal warning (previously prepared) to the site owner/operator and provide comments, if any.
9. Provide recommendations on the following:
 - a. The most suitable entity to send the warning on behalf of the Government of Lebanon (GOL).
 - b. The fund to which the dues should be transferred while considering each option's operational capacity and legal maturity (e.g., link to the National Environment Fund foreseen under law 444/2002 after issuing its bylaws on a private or public-private basis; Lebanon Green Investment Facility; others).
10. Summarize the above methodology in a concise report, with a summary table of the results related to all sites and detailed data for each site in an Annex.



03

QUARRY PHYSICAL
DATASET

3.1 Quarry Data Acquisition

3.1 The application Decree for article 61 of the 2019 Budget Law concerning the field survey of quarries and crushers (Decree 6569/2020) was carried out by LAF Army Command between 2020 and 2022. The LAF carried out a national diagnostic of all active and passive quarries where each quarry was assessed topographically, providing the quarry ownership (when available), operator, area, and volume extracted over the years, and other information as detailed in Section 3.2.

3.2 Quarry Topographic Characteristics, Exploitation Duration, and Extraction Volume

3.2 LAF assessed each quarry topographically by providing the following information when available:

- Private, government, or corporate owner(s) and contact information where lands are broken down along these categories: private, "علم وخبر" or "a'lem wa khabar" (notification that the process of registering unclaimed land in the name of the seeker was initiated), "مشاع" or macha' (government tiers' public land), wakf (religious trust) or unavailable
- Private, municipal, or corporate operator(s) and contact information where operator information is sometimes unavailable
- Location: Mohafaza (Governorate) and Caza (District)
- Quarry location name and coordinates
- Parcel(s) cadaster number, including uncadastered parcels
- Extraction type: Rock, Gravel, Sand, Mosaic, Limestone, or Unknown
- Total area: m² (not always provided as the area exploited is sometimes a sub-area of the Total area or parcel)
- Area exploited: m²
- Volume extracted: m³
- Extraction period extracted over the years with two major brackets: <1970-2021 and 2007/2008-2021 (see paragraph 3.4)
- Quarried stock available: m³ (sometimes parcels are used to stock extracted materials)
- Infringements on other parcels with parcel numbers, areas and/or volumes (the areas and volumes extracted are not always reported)

3.3 Clustering Quarry Data Provided by LAF

LAF provided files with data where clustering of several parcels or operators was needed for the analysis and included the following clustering categories:

- One parcel operated by one operator, i.e., one cluster;
- One parcel operated by several operators, i.e., several clusters (clustered by each operator);
- One parcel operated by several operators, but the extracted volume data is aggregated for one parcel, i.e., one cluster;
- Several adjacent parcels operated by one operator, i.e., one cluster; and
- Several adjacent parcels operated by several operators, but the extracted volume data is aggregated for all parcels, i.e., one cluster.

3.4 Start and end year for the calculations

As stated in Decree 6569/2020, the owner or the operator is subject to taxes and fees based on the quantities extracted from the site

operated from 2004² until the date of the investigation. However, the closest reliable provided by LAF dates back to 2007, for most of the country except the border areas. For quarries located in the border areas, the LAF relied on the earliest (and only) available data based on old areal maps for these regions and which date back to the 1970s and sometimes earlier and are referred as “<1970”. The end date of 2018 is used as it is the peak of Lebanon’s boom construction that ended with the crisis faced by Lebanon since October 2019. So, quarrying activities have subsided since 2019.

3.5 Time Scaling Quarry Data Provided by LAF

As mentioned above, the data provided by LAF covered two main periods: before 1970 to $\pm 2020/2021$; and 2007/2008 to $\pm 2020/2021$. Hence, the two periods needed to be adjusted based on these constraints: (i) 2007 to 2018 where any infringement quarrying is included in the volume extracted between 2007/2008 and $\pm 2020/2021$; and (ii) when the period was from before 1970 to $\pm 2020/2021$, a professional judgment had to be made where only half of the volume and its associated area were considered in the analysis.

3.3 Quarry Surroundings

3.6 The time-series of the evolution of the population density and residences surrounding the quarries is estimated and based on the Central Administration of Statistics (CAS 2004, 2007, 2009, and 2020). The various Casa densities will be considered for both areas over the years allowed to derive the population and residences surrounding the Quarry. However, refugees and displaced people will not be considered in the analysis. For the sight and noise pollution, a conservative radius of 500 meters around the quarry (Campbell, 2015) was considered to determine environmental risk in terms of sight and noise pollution around the quarry. Conversely, for air pollution, a radius of 1,000 meters around the quarry is considered and is a lower bound based on the US EPA Revisions to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter. The latter suggests a land use circumscribed by a 3,000-meter radius circle about the source as mining operations are significantly more important in terms of areas, intensity and volumes than those in Lebanon. Yet, the quarry’s environmental impact could extend beyond these areas and affect some people, but a conservative stance was adopted.

² It is to be noted that, legally, the oldest available data should be the reference (i.e., < 1970 as indicated in the paragraph) since Law 444/2002 is retroactive and could go back in time till the Law of 1932 on Classified Establishments (مؤسسات مصنفة).

04

METHODOLOGICAL
PROCESS

4.1 Compensatory damages seek to reimburse or compensate a party that suffered from some harm done. Usually, they include:

- Monetary compensations due to any tangible bads sustained by the people, the economy, and the environment caused by quarry exploitation and mismanagement and based on 3 sources: (i) regulatory and fiscal; (ii) cost of environmental degradation (COED); and (iii) rehabilitation.
- Pain and suffering compensations: these are not covered in this case as private individuals should file a lawsuit to claim pain and suffering sustained from the exploitation of the quarry; and
- Punitive damages are awarded when a defendant is found guilty of malicious acts or of fraud. Punitive damages are not tied to the type of harm that has been suffered but is awarded to punish the wrongdoer for certain types of reprehensible behavior. Punitive damages are usually awarded based on the defendant's assets and/or profits, where for instance, the punitive damages could be based on a percentage of one or several years' profits. At the same time, the incurred legal fees could also be claimed (further detailed in Section 8).
- The exchange rate used is LP1,507.5 to the US dollar as the analysis covers the 2007-2018 period.

4.2 The following process will be followed to calculate the amount of dues to the National Treasury.

4.1 Regulatory and Fiscal

4.3 The methodology for assessing the regulatory and fiscal dues is developed below. The dataset template is attached in Annex 3. Further information is appended in Annex 4 and in Annex 7.

4.4 Central Government Permits

Quarry permits (LP2,500,000 for every renewal over four years on average) and stamps (LP1,000 per m³) are based on 2004 fees (MOF Decision 11854 of 2004) that should be collected by MOF monthly. The stamp is collected at the end of the year and is based on a topographic report. However, the MOF may have a list of certified topographers from their syndicate that they can contract to verify the annual volumes, but the latter is usually not verified. A draft Decree update was prepared to increase the quarry permit (LP50,000,000 for every renewal) and the stamp (LP1,500 per m³), which is still not considered in the budgetary law.

4.5 Local Government Permits

Quarry permit (range between LP15,000 to LP30,000 per m² extracted annually) is based on 2010 fees (MOF Decision 1/1113 of 2010) that MOF should collect on behalf of municipalities or Mohafazat. Yet, "owner of the quarry" does not mean "operator of the quarry", and the LAF survey includes both owner(s) and operator(s).

4.6 Financial Warranty

An LP9,000 per m³ extracted financial warranty was introduced under Decree 8803/2002 and implemented starting 2011, as it has since been applied annually. Lebanon's annual Treasury Bill yield will be applied annually as an interest rate on the unpaid financial warranty since no quarry has been rehabilitated at the end of the exploitation, irrespective of whether the warranty was (legally or illegally) released or not.

4.7 Penalties

According to Article 24 of Decree 8803/2002, up to LP100 million penalty could be collected from the quarry owner/operator in case of mismanagement. As most quarries were not rehabilitated after exploitation ended, the full amount of the penalty could be applied (Annex 7).

4.8 Personal Income Tax

As there is no information on the quarries' turnover and income, Lebanon's annual Treasury Bill yield will be considered the lower-cost opportunity cost of funds. The total sale value per year of quarrying material is considered net taxable without deducting any eligible expenses. Personal income tax brackets for the progressive payroll tax rates range between 2% and 20% according to the Income Tax Law (Article 58 of the Income Tax Law 64/2017); the rate was increased to 4% and 25%, respectively, according to Article 23 of Budget Law 2019. After a two-month notice, a 15% penalty for delayed payments on the income corporate tax and interest dues will be considered. The penalty interest rate will be compounded monthly as Law (MOF website) dictates.

4.9 Corporate Income Tax

As there is no information on the quarries' turnover and income, Lebanon's annual Treasury Bill yield will be considered the lower-cost opportunity cost of funds. The total sale value per year of quarrying material is taxable without accounting for any operation and maintenance cost deduction. Corporate income tax increased from 15% to 17% (Law 64/2017), where 15% will be used before 2017, and 17% will be used from 2017 onward. After a two-month notice, a 15% penalty for delayed payments on the income corporate tax and interest dues will be considered. The penalty interest rate will be compounded monthly as Law (MOF website) dictates.

4.10 Value Added Tax (VAT)

Lebanon introduced the 10% VAT on February 1, 2002 (Law 379/2001 and Article 8 of Decree 7365/2002) and increased it to 11% on Jan 1, 2018 (Decision 1101/2017 increasing the VAT). After a one-month notice, a 3% penalty for delayed payments on VAT and interest dues will be considered. The penalty interest rate is compounded monthly as Law (MOF website) dictates.

4.11 Environmental Impact Assessment (EIA)

The EIA (Decree 8633/2012) is mandatory for quarry permits or renewals where mitigating measures should be implemented, especially in the increase of landslide risks (see para. Below on landslide risk). The EIA fee ranges between LP250,000 and LP500,000 paid to MOE for its review and acceptance and a guarantee of 0.05% of the project value. However, the latter percentage will not be considered in the calculations as the project costs are unavailable (they were not part of the LAF work scope and were not collected). The EIA cost, which the owner/operator bears, is based on the current market price (about US\$45,000) that includes a dispersion model.

4.12 Moreover, an [Environmental Management Plan \(EMP\)](#) is required (about 10% annually of the EIA cost) as well as a third-party supervisor is needed with about 60 men/days per year required (equivalent to about US\$300 per man/day). The transportation of the rocks/sand/gravel bought from the quarry has an environmental impact (pollution, traffic delays, increased risk of accidents, etc.). Still, it will not be considered in the calculation as third parties usually assume transportation.

4.13 LAF mapping fee

The LAF fee for generating the quarry information was set at LP1,000,000 per parcel and is calculated separately.

4.14 Not included

The profits of dividends distributed to SAL and SARL shareholders are taxed by MOF but are not included in the calculation. Moreover, any contractual agreement between the operator and landowner is not considered in the calculation, although the landowner should pay income taxes on the land lease. Yet, these contract amounts are difficult to estimate and are not always legalized. Moreover, as mentioned above, the EIA of 0.05% of the project is not included. Finally, the Administrative Law and the Penal Code have some articles related to working without a permit in general but will be left to the discretionary powers of the Judges to take the necessary judicial and enforcement actions (see Box 7.2).

4.2 Cost of Environmental Degradation

4.15 Herein developed, the methodology for assessing the Cost of Environmental Degradation (COED) at the quarry level and estimating the COED for each site.

4.16 Total Economic Value (TEV)

The TEV of a resource usually includes use value (direct and indirect), option value, bequest value, and existence value. In the calculation of the COED, only some aspects of the resource in terms of direct (e.g., the impact of the resource extraction) use and indirect (ecosystem services disruption) use values will be considered (Spurgeon, 1998).

4.17 Ambient air pollution

The Global Burden of Disease (GDB) derived the most recent dose-response function (Stanaway et al., 2018) establishing the diseases associated with various levels of air pollution from PM_{2.5}, which are used for the quantification of premature death and morbidity in the 1,000 meter radius around the quarry site. The valuation (MOE-UNDP, 2020) relies on the Value of Statistical Life (Navrud, 2009; OCDE, 2015) for premature death and the Gross Domestic Product (WDI, 2022) for morbidity based on the Disability Adjusted Life Years (Murray and Lopez, 1996) method. The COED for air pollution will be calculated from 2007 till 2018. One pollutant, PM_{2.5}, with an ambient level of about 30.6 µg/m³ (6 times the WHO limit) for the entire country in 2017 according to WHO, has the strongest empirical evidence of affecting public health. In Lebanon, more than 99.5 percent of the population is exposed to these levels (MOE/UNDP, 2021; State of the Environment Report 2020, 2021). Also, it is important to note that a small share of ambient pollution (coarse and fine particulates) is attributable to the Arabian Peninsula and Saharan Desert seasonal storms that affect Lebanon (Lovett et al., 2018). Yet, pollution levels before 2012 are not readily available to perform such complex calculations. The marginal level of PM_{2.5} attributable to mining will be considered at the upper margin (highest points on the curve), and the source attribution is derived from national and international scientific literature and is estimated at 6.5% based on: Hwang et al. 2008; El-Fadel et al., 2009; Ghannam and El-Fadel. 2013; Mari et al., 2016; and Zhang et al., 2021 (see Annex 1 for methodological details). Incidentally, WHO PM_{2.5} threshold was decreased from 10 to 5 µg/m³ in 2021 but did not affect the results as we consider that the dust emanating from quarrying is located on the highest points of the PM_{2.5} pollution curve (www.who.int).

4.18 Global air pollution

Additional ambient pollutants and heavy equipment used for extraction emit both greenhouse gases and black carbon. Although these are acknowledged, they will not be calculated due to the lack of robust data.

4.19 Sight pollution

A hedonic pricing method meta-analysis (Campbell, 2015) demonstrates that proximity to the operational quarry lowered nearby property values. The percentage change in the log-linear function of the price of a residence was 0.12229 as distance increased. A single coefficient, -0.006715, is transferred from the study and will be applied to all residence values in (average residence areas will use available data and will be considered controlled for all residence amenities) quarry area, as it represents a weighted average of the impact of the radius of 500 meters around the quarry where residence values are affected by the quarry (see Annex 2 for methodological details).

4.20 Noise pollution

The impact of noise pollution around the quarries is more of a nuisance and is captured under the hedonic prices calculated under Sight pollution.

4.21 Water pollution, Erosion, and Ecosystem services

The Ministry of Energy and Water- Directorate General for Exploitation needs to be notified in case a quarry is next to water bodies or electricity lines, as quarrying could have probable and direct effects or consequences to ground and surface water to electricity lines. Yet, it is difficult to derive the surface and underground water pollution, the land erosion, and the ecosystem services that were impacted by the quarry extraction. Mining karst mountains could destroy caves and disrupt waterways leading to flooding and landslide (Arany et al., 2018). Ecosystem services are usually divided into three categories: (i) provisioning services, such as products provided by ecosystems; (ii) regulating services, such as providing stable and safe living conditions; and (iii) cultural services in terms of quasi-immaterial services, such as spiritual enrichment and cultural heritage. A Willingness to Pay (WTP) derived from the OECD (OECD, 2015), equivalent to 0.1% of GDP per capita for Lebanon to restore water flow, land erosion, and damaged ecosystem services, is considered COED. In this case, the population living in the quarry radius area will be considered.

4.22 Rocks and Sand Resource Use

Valuing resource use usually includes, for instance, the opportunity cost of rocks and sand extracted, which is the value of the next best alternative foregone or, in other words, the difference of the value added generated by using the rocks and sand for construction and artificialization on the one hand and the value added or valuation of amenities, ecosystem services, averted pollution, GHG sequestration, etc. generated by not exploiting the quarry on the other hand.

4.23 Not included

The various constituents of the TEV, notably the non-use values were not considered in the analysis. Moreover, the black carbon and carbon emissions were not included in the analysis.

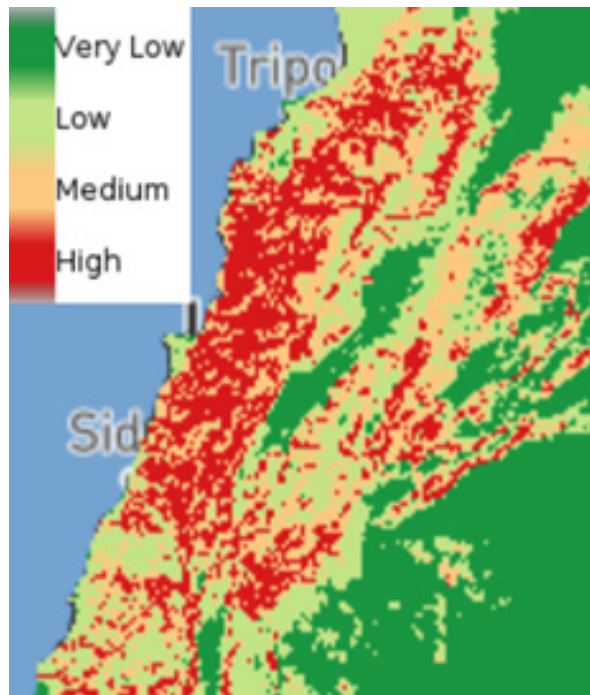
4.3 Rehabilitation and Landslide Risks

4.24 Quarry rehabilitation and risk mitigation should be a common practice for quarry operators as they are mandated by law. However, the land risk is not included in the calculations. Still, it needs to be calculated at a later stage if the quarry happens to have increased the risk of landslides and fragilized surrounding buildings. It is common international practice to manage biodiversity as part of responsible and proactive risk management under the broader scope of the natural environment and land stewardship, including landslide risks.

4.25 Rehabilitation

The quarry owner/operator is liable and responsible for rehabilitating the quarry at the end of the extraction period. Both quarry hardscape (foundation to reconstitute the quarry) and green cover (top green cover after finalizing the foundation) costs of rehabilitation should be carefully considered in the rehabilitation feasibility study. A preliminary cost of hardscape was derived from the cost assessments of ABQUAR, 2007; UNDP, 2011; and UNDP, 2018. Moreover, the CNRS (Khater et al. <Carla Khater - Google Scholar>) has been involved in green quarry rehabilitation, and this literature was used to derive the green cover cost. For the calculation, hardscape rehabilitation costs used in the calculations range between US\$40 to US\$100 per square meter for hardscapes (US\$70/m² middle bound used). Moreover, the green cover costs used in the calculations range between US\$3 to US\$5 per m² (US\$4/m² middle bound used) and could exceed these values depending on the complexity of the site. Incidentally and as mentioned in Section 1.3, Darwish et al. (2008) came up with an un-costed typology to determine the best rehabilitation alternative that should urgently be updated: hill lakes, landfill, and/or green cover to revitalize the carrying capacity of the rehabilitated quarries. These options require detailed technical feasibility that will come up with higher costs of transformation/rehabilitation that are outside the purview of this study.

Figure 4.1: Lebanon Landslide Hazards



Source: Think Hazard website: <<https://thinkhazard.org/en/report/141-lebanon/LS>>

4.26 Not included

Lebanon's overall landslide susceptibility is classified as high as rainfall patterns, terrain slope, geomorphology, soil, land cover, and (potentially) earthquakes, making localized landslides a frequent hazard phenomenon. Landslide risk assessment around the quarries should usually be done under the EIA, where siting and extraction must take into account the potential for landslides and their effects on the geomorphology, surface and underground water resources, fauna, and flora surrounding the quarry sites so that effective mitigation measures be designed and implemented. Still, in the absence of quarry EIA until now, the structural fragilization of buildings has been noticed in various areas (mainly Metn) in Lebanon, and landslide risk will not be reported in the database and will not be calculated. The landslide risk map prepared under the NPMPLT (2009) and numerous CNRS scientific articles (notably by the late Rania Kheir and Chadi Abdallah <Chadi Abdallah - Google Scholar>) were updated and put online by the Global Facility for Disaster Reduction and Recovery (Figure 4.1) that shows that most quarries are located in medium to high landslide risk areas. Still, the rehabilitation feasibility study will have to assess landslide risk and building fragilization next to quarry sites so that mitigation measures are properly crafted to increase the resiliency of structures, whether public or private infrastructure or built-up areas. These amounts should be added to the monetary damages after the rehabilitation feasibility study is carried out.

05

ASSUMPTIONS

5.1 Several assumptions were considered for calculating the monetary damages:

- All regulatory and fiscal hypothetical dues in terms of charges, fees, penalties, interest rates, etc., will initially be applied to all quarries.
- Timeline: all volumes extracted are annualized from 2007 till 2018 (Decree 8803/2002) across the board.
- The damages are calculated from 2007 to 2018 and are denominated in US\$.
- In certain cases, LAF had to provide data from 1970 based on existing old maps: in that particular case, half the volume extracted, but the same area was considered in the calculation
- Total quarry volume extracted is annualized over 2007-2018
- The total quarry area is used in 2018 to derive the residence depreciation
- Compensation results are not in 2018 constant terms
- Several operators could quarry one parcel while several parcels could be quarried by one operator, and clustering is therefore needed: parcels are clustered by 372 operators
- Radius considered for air pollution around the quarry: 1,000 m from the quarry limits based on international literature, which is very conservative as dispersion models show that some people could be affected beyond 1,000 m radius as derived from the international literature (Annex 1)
- Radius considered for sight and possible noise pollution around the quarry: 500 m from the quarry limits as derived from the international literature although some people could be affected beyond 500 m radius (Annex 2)
- Air pollution is calculated yearly (6.5% reduction of yearly Lebanon's annual average PM2.5 as no annual average data by region is currently available) from 2007 to 2018
- Sight pollution, ecosystem disruption, and rehabilitation values are one-offs and considered for the year 2018 only
- Rehabilitation amounts are estimated and will be firmed up as operators are bound by law to rehabilitate the end-of-life quarry after carrying out a rehabilitation and land risk feasibility study.



06

RESULTS OF THE
MONETARY
DAMAGES

6.1 Overview

6.1 Six batches with 661 files of single or multiple parcel entries were received from LAF. The data provided includes: (i) name of the quarry area; (ii) governorate; (iii) caza; (iv) parcel number of the quarry; (v) owner of the parcel with owner information; (vi) operator(s) on the parcel with operator(s) information; (vii) type of quarrying; (viii) total area of the parcel(s); (ix) area of the parcel(s) where quarrying occurred; (x) volume extracted; (xi) infringement on other parcels during extraction in terms of usage (illegal easement) and/or extraction from adjacent parcels (areas and volumes are sometimes mentioned); (xii) extracted volume available; (xiii) stock of extracted material stored; and (xiv) and period of extraction (before 1970 to 2021).

6.2 Work done by LAF needs to be commended as the process is thorough and the data collection is robust. Information, such as the infringement on other parcels, is very valuable as these operations should be a priority for further investigations to target operators infringing on public or private property.

6.2 Results

6.3 The aggregate results by Mohafaza are illustrated in Table 6.1, Figure 6.1, and Figure 6.2. Table 6.1 provides the compilation results (372 quarry clusters and 1,235 parcels) regarding regulatory and fiscal, COED, and quarry rehabilitation costs. The total exploited or quarrying area amounts to 15.15 km², while the volume extracted reaches 196.9 million m³. Infringements by operators on other parcels reached 26% of all clusters with Akkar (47%) being the highest followed by North Lebanon (37%), the Beqaa (35%) and Baalbeck-Hermel (29%). The monetary damage amounts to US\$2.39 billion (Figure 6.2 provides the relative distribution across Mohafazat). Mount Lebanon is the Mohafaza the most affected by quarrying as it ranks first in terms of dues (US\$845 million) and in terms of quarried area (4.27 Km²) as the density and land prices are the highest in Lebanon, and second in terms of extracted volume after Baalbeck-Hermel (53 million m³). LAF Mapping Dues (US\$0.82 million) and Volume over Area ratio with an average of 13 meters of depth (provides the average excavation depth and possibly a proxy indicator on hardscape degradation and scars with the Beqaa scoring the highest ratio: 20.4 meters of depth) by Mohafaza are illustrated in Table 6.1 and Figure 6.1.

Table 6.1: Quarry Areas, Extraction, and Monetary Damages by Mohafaza

Mohafaza	Quarry		Area Used	Volume Extracted 2007-2018	Regulatory & Fiscal	COED	Rehabilitation	Compensations	Infringement	LAF Dues	Volume / Area Ratio
	Parcel	Cluster									
	#	#	m ²	m ³	US\$ million	US\$ million	US\$ million	US\$ million	# of Clusters	US\$ million	m ³ /m ²
Beqaa	130	34	1,736,682	35,346,733	138	15	129	282	12	0.09	20.4
Hermel	367	124	3,286,229	41,369,099	187	20	243	450	36	0.24	12.6
Mount Leb	416	102	4,275,833	52,998,594	290	239	316	845	19	0.28	12.4
Akkar	72	15	222,390	3,655,189	18	11	16	45	7	0.05	16.4
North Leb	129	35	2,828,175	33,823,070	181	14	209	405	13	0.09	12.0
Nabatieh	52	23	1,450,609	17,020,299	63	15	107	186	6	0.03	11.7
South Leb	69	39	1,352,844	12,668,579	65	17	100	182	3	0.05	9.4
Total	1,235	372	15,152,762	196,871,923	943	330	1,121	2,394	96	0.82	13.0

Figure 6.1: Quarry Areas, Extraction, and Monetary Damages by Mohafaza

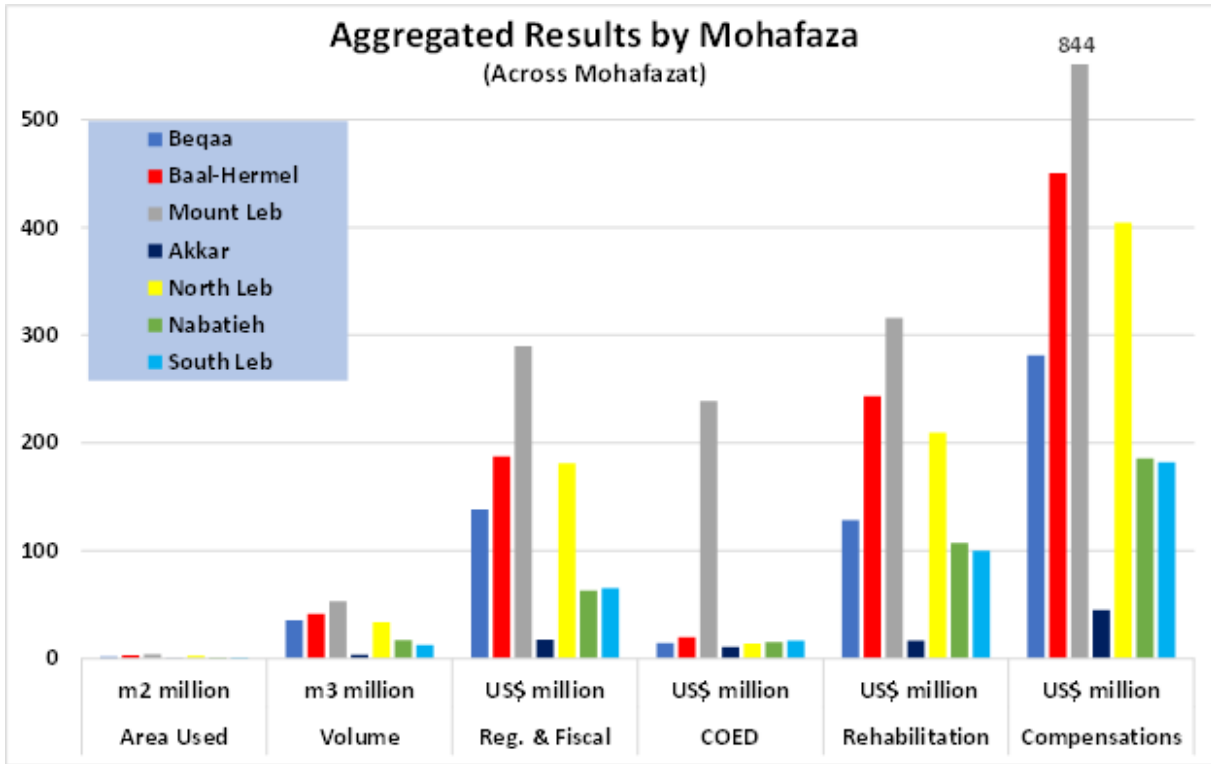
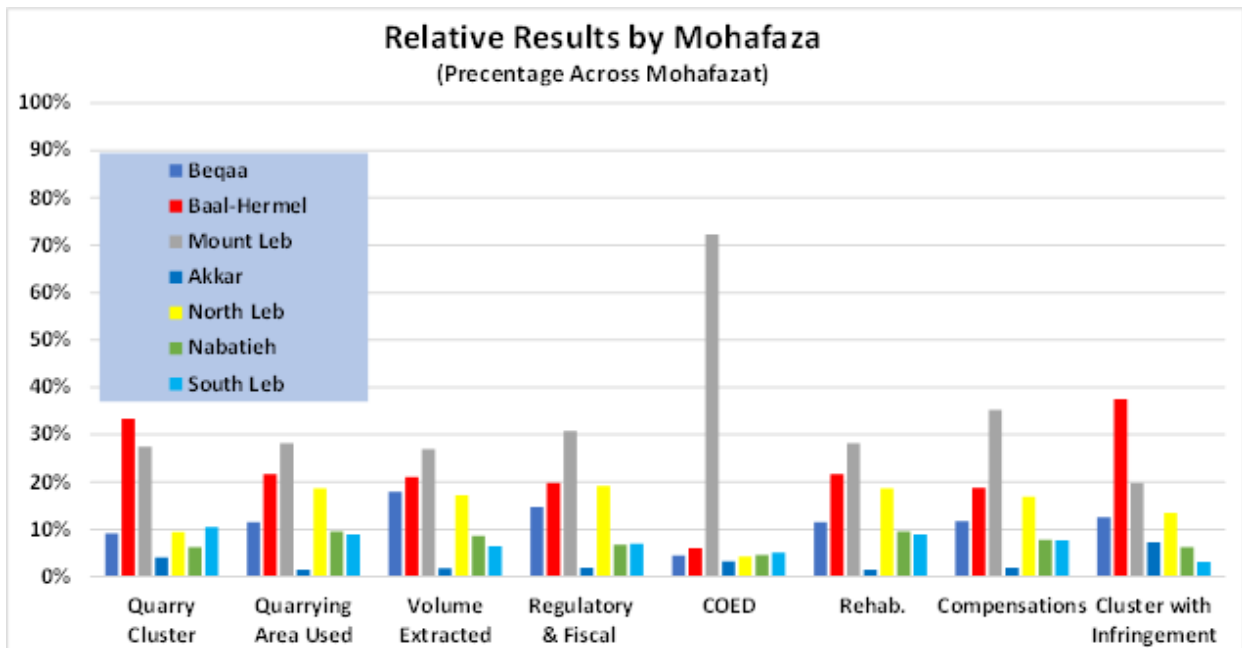


Figure 6.2: Quarry Areas, Extraction, and Monetary Damages within each Mohafaza



6.4 Government land

Some operators are legally and possibly illegally quarrying on Government (126 parcels). Contractual concessions should be reviewed to check their legitimacy and take the necessary judicial and enforcement actions to stop the infringement on government land.

6.5 Unknown ownership

Some operators are quarrying on 149 un-cadastered parcels (parcels are not registered in the cadaster), and some are seeking to register parcels where they are reverting to the A'lem wa Khabar by possibly providing some sort of ambiguous proof of ownership via usually the Mukhtar. This process needs to be particularly scrutinized by the municipality, the Ministry of Interior and Municipalities (MoIM) and MOF.

6.6 Infringement

Some operators are illegally using adjacent parcels or quarrying on neighboring parcels: The dataset includes 201 infringements on other parcels aggregated in 96 clusters in terms of use (parcel(s) illegally used for logistics and storage) and/or extraction (infringing on other parcels) with few parcels with data: exploited area is 378,192 m² and extracted volume 7.5 million m³. These infringements are not accounted for in the current regulatory and fiscal, COED and rehabilitation analysis as additional information is needed.

6.7 Lawlessness

Unavailable land ownership and operator disinformation mainly in the Kesrewan (Mayrouba and Hrajel) is reported in the LAF survey and requires immediate attention and investigation to resolve these issues, stop the severe hardscape degradation and put an end to this lawlessness

6.8 LAF Mapping Fee

The LAF mapping fee was calculated by parcel or group of parcel entries as reported in the LAF Survey. The total amounts to about US\$820,343.



07

CLAIMING NATIONAL TREASURY DUES AND FIDUCIARY OPTIONS

7.1. While legal recourse is needed to address these dues retroactively, GOL's legal options and instruments, as well as fiduciary options, were reviewed, starting with a note on Punitive Damages and how these can be addressed in the legal recourse.

7.1 Wrongdoing and Infringements Legal Recourse (including Punitive Damages)

7.2 Punitive Damages.

Punitive damages are usually considered in the Common Law (Anglo-Saxon Law) and not in the Civil Law (Roman Law and Napoleonic Code). Punitive damages, which are not tied to the type of harm that has been suffered but is awarded to punish the wrongdoer for certain reprehensible behavior, are awarded when a defendant is found guilty of malicious acts or fraud and based on the defendant's assets and/or profits. Although punitive damages are still not officially recognized in the Lebanese legal systems as the Lebanese law continues to be governed by the principle of full reparation with compensatory damages based on Roman Law, they are often applied in a covert manner. Examples include penalty clauses in contracts and coercive fines provided for in legislation (see Annex 7). Hence, punitive damages are usually set by the judicial system, whereas the built-in penalties for late payments and judicially recommended interest rates on unpaid dues, which exist in Lebanon for certain points mentioned in Section Regulatory and Fiscal, are dictated by law and have already been introduced in the calculation, the latter are considered monetary damages.

7.3 Hence, the Judge should decide the punitive damages, and the ruling should be based on the defendant's assets and/or profits made in one or several years. This information is not public and needs to be compiled in Lebanon through rulings. However, the banking secrecy law, assets registered to third parties, foreign assets, etc., could make this wealth assessment either impossible or quasi-incomplete. Still, punitive damages ruling should be differentiated by illegal and legal quarrying on parcels with or without (illegitimate or falsified permits also include a motion of fraud) permits. Incidentally, the French judiciary is considering using punitive damage in a ruling which is reviewed Box 7.1 while a Draft Amendment of article 1371 of the French Civil Code is being considered (see Annex 8).

Box 7.1: French Court of Cassation Overruling French Court

The North American courts ordered a French boat manufacturer to pay American buyers US\$1.39 million in compensatory damages and US\$1.46 million in punitive damages. The French courts had to decide whether a conviction involving punitive damages could be enforced in France, with the North American decision to be enforced in that country. The Court of Appeal of Poitiers decided that the amount of compensation is disproportionate and that it constitutes a source of unjust enrichment.

The Court of Cassation, ruling on the Poitiers judgment, refused to quash the decision of the trial judges (thus dismissing the appeal) but indicated that "if the principle of an order for punitive damages, is not, in itself, contrary to public order, it is different when the amount awarded is disproportionate to the damage suffered and the breaches of the contractual obligations of the debt." Thus, the Court of Cassation decided that punitive damages are not contrary to French public policy.

Source: Yazbeck (2022).

7.4 According to Article 51 of Law No. 444/2002, it is up to the Minister of the Environment to prosecute the case legally since it constitutes damage to the environment. This article states the following "Taking into account the provisions of the Code of Obligations and Contracts and the Penal Code, the person responsible for any violation of the environment causing damage to persons or the environment, shall have the required compensation for reparation. The State, represented by MOE, may claim special compensation for environmental damage." Similarly, the Ministry of the Interior and Municipalities (MoIM)/Mouhafez also has the right to initiate legal proceedings since it is the MoIM/Mouhafez that grants the permits. NGOs and any Lebanese citizen may lodge a complaint with the Advocate General pursuant to article 3 of Law No. 444/2002: "Everyone has the right to a healthy and stable environment and it is the responsibility of every citizen to guarantee the protection of the environment and the needs of present generations without

infringing on the rights of future generation,” and article 4 paragraph F-2: “Any natural or legal person, public or private, shall ensure the safety of the environment, contribute to its protection and report any danger that may threaten it.” It should not be forgotten that administrative measures that may be taken, apart from criminal sanctions pursuant to Article 57 of the Environmental Protection Act No. 444/2002. “The application of criminal sanctions shall not impede the competence of the competent services and authorities, after written warning informing the offender administratively, to take all or part of the following administrative measures against him:

1. Impose special conditions to allow the monitoring of the implementation of a certain activity, as well as preventive measures, self-monitoring and environmental auditing, on an ongoing basis, and suspend the license related to this activity until the conditions and special measures mentioned are respected.
2. Prohibit a certain activity because of the serious risks it may cause to the environment, revoke the licence granted to it and close the establishment.
3. Establish repair work such as decontamination, reforestation and maintenance of the premises, at the expense of the offender.
4. Impose obligations and fines.
5. Any other measure aimed at preventing or limiting any damage to the environment.”

7.5 The most effective way forward is for the MOE to work collaboratively with the MOF and the MOIM and mandate the Ministry of Justice (MOJ) to prosecute the guilty parties in case of non-payment. It is suggested to follow a two-track approach where: (i) a warning will be sent to make the monetary payment dues to the National Treasury; and (ii) failing to comply after 30 days, the Ministries will mandate the Ministry of Justice to prosecute the defendant (being a legal or illegal operator, offender, infringer, criminal, etc.) to the full extent of the law based on the Code of Civil Procedure (Legislative Decree 90/83) and all existing legal and amended regulations of the quarrying sector (Decree 8803/2002 and amendments). The judicial system will be the recourse to collect all the dues, and the prosecutor could also consider the punitive damages in the ruling. First, the Ministries should decide whether all the damages would be collected by one entity mandated by the others of each entity would want to claim their shares of the monetary damages, e.g., MOE with EIA fines, COED dues, and initial rehabilitation cost. If the first option is retained, the Ministries should decide whom to mandate and the modus operandi to claim the monetary damages. In both cases, the Ministries should decide on the recourse in case the defendant is not responsive.

7.6 The proposed text of the legal warning in Arabic in Annex 6 is based on an initial version provided by MOE and updated within the context of this study (see Box 7.2)

7.7 An ad hoc technical inter-ministerial committee, which could be set up under the tutelage of the existing National Quarry Council, will have the responsibility of revising any responses received as per the functional responsibility matrix presented in Annex 4.

7.8 Law 189/2020 on Financial Disclosure, Conflicts of Interest, and Illicit Enrichment could be used to penalize offenders whose financial assets could be tracked down locally and internationally by pursuing the “دين ممتاز” or “Dayn Moomtaz” avenue.

Box 7.2: Concerning Sanctions for Activities Without a Permit or Infringing on Private Property

Environmental Protection Act number 444/2002, Article 51: Compensation required and special compensation regarding environmental damage claimed by the MOE (The person responsible for any violation of the environment causing damage to persons or to the environment).

Environmental Protection Act No. 444/2002, Article 52 paragraphs 1 and 2: Take all measures leading to the elimination of damage, at their expense. Resulting expenses: Measures taken by the competent authorities to prevent any damage to the environment shall be borne by the person responsible for such damage.

Environmental Protection Act No. 444/2002, Article 58 provides for a fine of LP15 to 200 million. In case of recidivism the penalty is doubled (there is also a prison sentence): in the case where the operator implements a project without an environmental impact study or without an initial environmental review.

Environmental Protection Act No. 444/2002, Article 60 provides for a fine of LP2 to 10 million. In the event of a repeat offence, the penalty is doubled (in the event that the operator violates the provisions of Act No. 444/2002 and its implementing regulations relating to classified installations).

Decree No. 8803/2002, Article 25 paragraph 1 provides for a fine of LP10 to 20 million. The penalty will be doubled in Cases of recidivism.

Penal Code Article 733 provides for a fine of LP20,000 for working without a permit.

Penal Code Article 737 provides for a fine ranging from LP200,000 to LP1 million and a prison sentence from 1 month to 1 year for anyone who does not hold official title or disposition and takes possession of property.

Penal Code Article 738 provides for a fine ranging from LP200,000 to LP1 million and a prison sentence from 1 month to 1 year for anyone who seizes land or part of land without legal justification with the intention of habitation, works, exploitation or use.

Source: Annex 7.

7.2 Fiduciary Options to Transfer the National Treasury Dues

7.9 MOE has been exploring conduits to set up a National Environmental Fund (as foreseen under Law 444/2002) or a Green Investment Facility, i.e., a green platform or a “green” account that will be provisioned by: (i) charges, dues, taxes, penalties, etc. collected on behalf of MOE; and (ii) development partners’ green loans, green bonds (as a guaranty to leverage immigrant, private and institutional investor monies), grants, green climate funds, Debt for Nature/Climate Swap, etc. The financial mechanism is meant to finance planned green investments so that their implementation could improve the environment in Lebanon. These investments could be used to reverse Lebanon’s environmental degradation and mitigate climate impacts. Carrying out well-defined environmental and climate-proof plans and programs in the future could also help attain the environment and climate-related sustainable development goals (SDGs) and achieve Nationally determined Contributions (NDCs).

7.10 Fiduciary Options. The scope of work calls for gauging the fiduciary options where the monetary and punitive damage funds obtained through negotiation or ruling could be deposited. Whereas a policy is needed to govern the disbursement of these funds, the pros and cons of different options will be gauged, such as (i) the sovereign fund to be set up to park the revenues from oil and gas in the future; (ii) the National Environment Fund foreseen under law 444/2002 after issuing its bylaws on a private or public-private basis; (iii) Lebanon Green Investment Facility that is considered with the help of UNDP and the World Bank; (iv) other financial options that could leverage the monies; and (v) the most realistic option in these circumstances is to have a special account opened abroad or in Lebanon (BDL or private bank) where the funds will be deposited and where fund disbursements will be governed by clear collegial prerogatives to use the funds and a mechanism of check and balance that could be available online for every citizen and development partner to access

Sovereign Wealth Fund Definition

7.11 A Sovereign Wealth Fund (SWF) is a state-owned investment fund to manage financial assets such as stocks, bonds, property, or other financial instruments. SWF inflows usually come from the following resources:^{2,3}

- Government surplus stemming from the balance of payments, official foreign currency operations, proceeds of privatizations, fiscal, etc.

² The Sovereign Wealth Fund Institute website: < www.swfinstitute.org/ >

³ Bankrate website: <www.bankrate.com>

- Government asset management such as property.
- Traditional Commodities, such as exporting commodities, where revenue flows vary with the quantity exported and the international price of the commodity(ies).
- Traditional non-commodity includes long-term government regular or “green” bonds, equities, and foreign direct investments.
- Riskier non-commodity includes hedge funds and private equity investments.

7.12 SWF typology usually covers the following objectives⁴:

- Stabilization funds are set up to insulate the budget and economy from commodity price volatility and external shocks.
- Savings funds intend to share wealth across generations by transforming nonrenewable assets into diversified financial assets.
- Development funds are established to allocate resources to priority socio-economic projects, usually infrastructure.
- Pension reserve funds are set up to meet future additional pension spending.
- Reserve investment corporations intended to reduce the negative carry costs of holding reserves or earning higher returns on ample reserves. Usually, they pursue riskier investments. At the same time, the assets in the funds are still counted as reserves.

Environmental or Carbon Fund Definition

7.13 An environmental or carbon fund is a specific type of state-owned or private-owned investment thematic fund. The environmental fund’s thematic could have two different entry points: (i) primarily invest in environmental remediation that will possibly generate co-benefits, e.g., landscape and hardscape rehabilitation, waste management, lake remediation, averting mountain erosion; or (ii) primarily invest in carbon reduction, capture and offset, e.g., alternative energy, energy efficiency, ecosystem restoration, reforestation, that will also have a positive impact on the state of the local environment.

7.14 The environmental fund can be structured financially in three ways:

- Endowments which invest their capital and use only income from those investments to finance activities;
- Sinking funds are designed to disburse their entire principal and investment income over the environmental fund time life; or
- Revolving funds that receive new resources regularly, e.g., proceeds of special taxes, fees or levies designated to pay for conservation programs, replenishing or augmenting the environmental fund’s original capital, and providing a continuing source of money for specific activities. The environmental fund could also receive funding to carry out specific projects, while the environmental fund could also combine these features as part of its overall financial structure.

7.15 Still, there are important factors for establishing an environmental fund developed in Box 7.3. The first four factors are considered essential, while a critical mass of the remaining conditions should also be present. The absence of more than a few greatly increases the risk that the environmental fund will not be successful.

7.16 Usually, Green Investment Facilities focus on global externalities and tend to reduce the carbon footprint while increasing the country’s resilience. Hence, these facilities will favor climate-proofing investments to the detriment of investments meant to mitigate environmental degradation with an immediate impact on the population and the commons by abating local pollution, reducing environmental damages, and preventing the disruption of ecosystem services. Until recently, the Lebanese economy was using more than it was producing as it was eroding its natural and productive assets as the adjusted net savings had reached minus US\$11.8 billion in 2019 (WDI, 2022) while Lebanon’s COED is steadily increasing and is equivalent to 4.4% of GDP in 2018 (against 3.2% in 2005) net of the climate change affects which would add a degradation equivalent to 2.8% of GDP in 2018 (MOF/UNDP, 2019). With Lebanon’s growing crisis, the COED could marginally decrease in absolute terms due to the lower economic activity. Still, it will remain relatively significant compared to the contracting GDP. Therefore, any dues collected due to the quarries’

⁴ International Monetary Fund website: <PDP-Working Paper (imf.org)>

mismanagement should be made available through a designated account opened at Banque du Liban for immediate disbursement towards priority local environmental investments and cannot wait for the setup and operationalization of the National Environment Fund, which has been continually delayed since 2002.

Box 7.3: Important Factors for Establishing an Environmental Fund

1. The environmental issue to be addressed is significant, and appropriate actions to respond are long-term and can be met with the resource flows an Environment Fund could produce.
2. There is active and broad-based government support for creating a mixed, public-private sector mechanism that will function beyond direct government control.
3. There is a critical mass of people from diverse sectors—government, NGOs, the academic and private sector, and donor agencies—who can work together despite different conservation and sustainable development approaches.
4. Most people have confidence in a basic fabric of legal and financial practices and supporting institutions (including banking, auditing, and contracting).
5. A legal framework permits establishing the fund and tax laws that allow it to be exempt from taxes.
6. There are mechanisms to involve a broad set of stakeholders in the design process and a willingness by these stakeholders to use them.
7. One or more “mentors” (e.g., another more experienced fund, an international NGO) are available to provide moral and technical support to the new fund.
8. There are realistic prospects for attracting a sufficient capital level for the fund to support an effective program while keeping operating costs to a reasonable percentage.
9. There is an “effective demand” for the fund’s products, i.e., a client community interested in and capable of carrying out environmental activities on the scale envisioned.

Source: Bayon, Ricardo, Carolyn Deere, Ruth Norris, and Scott E. Smith. 2000. Environmental Funds: Lessons Learned and Future Prospects. IUCN. Geneva.

7.17 Consequently, due to the urgency of the environmental state, this designated account option could be a temporary solution and is the most effective and timely way to deal with the most pressing issues: setting up a designated account at the Banque du Liban to receive the dues owed to the Treasury and the redistribution of the funds to dedicated subaccounts belonging to the MOF (central regulatory and fiscal dues), the MOIM (local permitting and penalty dues), MOE (EIA, warranty, COED, and rehabilitation), MOEW (share of the COED) and LAF (assessment fee). The breakdown of the additional compensations emanating from the punitive damages after the ruling of the judicial branch still needs to be discussed and decided by the ministries. Hence, the MOE share must be credited to a MOE designated account at Banque du Liban. On the disbursement side, setting the regional, priority, and quantitative criteria to disburse the available funds could be done by the GOL and reviewed by the relevant public entities, representatives from civil society, and academia. The decision-making body should be inclusive. The decision-making and implementation process will have to be accompanied by clear checks and balances, implementation excellence, monitoring through third parties, and evaluation.

7.18 Concomitantly, the GOL could pursue setting up the National Environment Fund, where its legal structure will follow the civil law system of Lebanon. Lebanon does not have a common law system that will allow it to set up a trust fund. Therefore, the National Environment Fund could be set outside the country, e.g., the United Kingdom, as a foundation and obtain the status as a non-profit corporation under national tax laws to attract contributions from individuals, official development assistance, corporations, or private foundations.

References

- Arany I., Aszalós R., Kuslits B., Tanács E. 2018. Ecosystem services in protected karst areas. Interreg Danube Transnational Programme, ECO KARST project.
- Bayon, Ricardo, Carolyn Deere, Ruth Norris and Scott E. Smith. 2000. Environmental Funds: Lessons Learned and Future Prospects. IUCN. Geneva.
- Campbell, Brett Afton. 2015. Aggregate Resource Extraction: Examining Environmental Impacts on Optimal Extraction and Reclamation Strategies. Master Thesis. University of Alberta.
- Carroll, Christopher, Jiri Slacalek, Kiichi Tokuoka and Matthew N. White. 2017. "The Distribution of Wealth and the Marginal Propensity to Consume." *Quantitative Economics* (2017) June 3, 2017.
- Central Administration of Statistics website: <www.cas.gov.lb>.
- Central Administration of Statistics, International Labour Organisation and European Union (CAS/ILO/EU). 2020. Labour Force and Household Living Conditions Survey (LFHLCS) 2018–2019 Lebanon. Beirut.
- Climate and Clean Air Coalition website: <[Black carbon | Climate & Clean Air Coalition \(cccoalition.org\)](http://Black carbon | Climate & Clean Air Coalition (cccoalition.org))>
- Conseil National de la Recherche Scientifique website: <www.cnrs.edu.lb>
- De Groot R. et al. 2012. "Global estimates of the value of ecosystems and their services." *Ecosystem Services*, 1, 50-61.
- Doing Business in Lebanon website: <[Doing Business in Lebanon \(doingbusinessinlebanon.com\)](http://Doing Business in Lebanon (doingbusinessinlebanon.com))>
- El-Fadel, M. L. Abi-Esber and T. Ayash. 2009. Managing emissions from highly industrialized areas: Regulatory compliance under uncertainty. *Atmospheric Environment* 43 (2009) 5015–5026.
- Environmental Defense Fund (EDF). 2016. *The Green Freight Handbook: A Practical Guide for Developing a Sustainable Freight Transportation Strategy for Business*. Long Island, N.Y.
- Erickcek, G.A. 2006. An assessment of the economic impact of the proposed Stoneco Gravel Mine Operation on Richland Township. Kalamazoo: W.E. Upjohn Institute for Employment Research, August.
- Gakidou, E., Afshin, A., Abajoubir, A.A., et al. 2017. "Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016." *Lancet*, 390: 1345-422.
- Ghannam, K. and M. El-Fadel. 2013. A framework for emissions source apportionment in industrial areas: MM5/CALPUFF in a near-field application, *Journal of the Air & Waste Management Association*, 63:2, 190-204, DOI: 10.1080/10962247.2012.739982
- High-Level Commission on Carbon Prices. 2017. Report of the High-Level Commission on Carbon Prices. Supported by the World Bank, ADEME and Ministère de la Transition Ecologique (France). Stiglitz, J. and N. Stern (chairs). Washington, D.C.
- Hite, D. 2006. Summary Analysis: Impact of operation gravel pit on house values, Delaware County, Ohio. Dept. Agricultural Economics and Rural Sociology, Auburn University, May.
- Hwang I, Hopke PK, Pinto JP. 2008. Source apportionment and spatial distributions of coarse particles during the Regional Air Pollution Study. *Environ Sci Technol*. 2008 May 15;42(10):3524-30. doi: 10.1021/es0716204. PMID: 18546684.
- IMF data website: <www.imf.org/en/Data>
- Invest Development Authority in Lebanon (IDAL). 2016. *Taxation Schemes in Lebanon*. Presidency of the Council of Ministers. Beirut. Website: <[ARTS \(databank.com.lb\)](http://ARTS (databank.com.lb))>

Institute for Health Metrics and Evaluation (IHME) website: <www.healthdata.org>.

IUCN, UNEP and FAO ECOLEX website: <www.ecolex.org>

Lebanese Republic Ministry of Economy and Trade. 2005. Economic Accounts of Lebanon 1997-2002. Economic Accounts Mission. With the Support of UNDP. Beirut.

Lebanese Republic Presidency of the Council of Ministers. 2007. Economic Accounts of Lebanon 2003-2004. Economic Accounts Mission. Beirut.

Lebanese Republic Presidency of the Council of Ministers. 2007. Economic Accounts of Lebanon 2005. Economic Accounts Mission. Beirut.

Lelieveld, Jos, Klaus Klingmüller, Andrea Pozzer, Ulrich Pöschl, Mohammed Fnais, Andreas Daiber, Thomas Münzel, "Cardiovascular disease burden from ambient air pollution in Europe reassessed using novel hazard ratio functions." *European Heart Journal*, ehz135.

Lovett, C., M. Sowlat, N. Saliba, A. Shihadeh, and C. Sioutas. 2018. "Oxidative potential of ambient particulate matter in Beirut during Saharan and Arabian dust events." *Atmospheric Environment*, 188, 34-42.

Mari, Montse, Francisco Sánchez-Soberón, Carme Audí-Miró, Barend L. van Drooge, Albert Soler, Joan O. Grimalt, Marta Schuhmacher. 2016. "Source Apportionment of Inorganic and Organic PM in the Ambient Air around a Cement Plant: Assessment of Complementary Tools." *Aerosol and Air Quality Research*, 16: 3230–3242

Ministry of Environment website: <www.moe.gov.lb>.

Ministry of Environment. 2007. Alleviating Barriers to Quarry Rehabilitation in Lebanon - ABQUAR, Final Report. Funded by the European Commission – Life Third Countries Program and executed by ELARD. Beirut.

Ministry of Environment. 2017. *National Strategy for Air Quality Management in Lebanon*. European Union Support to Reforms – Environmental Governance. Project executed by GFA Consulting Group led consortium. Beirut.

Ministry of Environment, UNDP and GEF (MOE/UNDP/GEF). 2015. *Economic Costs to Lebanon from Climate Change: A First Look*. Beirut.

Ministry of Environment, UNDP and GEF (MOE/UNDP/GEF). 2016. Lebanon's Third National Communication to the UNFCCC. Beirut, Lebanon

Ministry of Environment and UNDP (MOE/UNDP). 2019. *Rapid Cost of Environmental Degradation 2018*. Beirut.

Ministry of Environment and UNDP (MOE/UNDP). 2021. State of the Environment and Future Outlook: *Turning the Crises into Opportunities 2020*. Financed by UNHCR and UNICEF. Beirut.

Murray, C. and A. Lopez. 1996. The Global Burden of Disease. Global Burden of Disease and Injury Series. WHO and the World Bank. Harvard School of Public Health, Cambridge, Massachusetts.

Navrud, Ståle. 2009. Value Transfer Techniques and Expected Uncertainties. New Energy Externalities Developments for Sustainability (NEEDS). Project no: 502687. Deliverable n° 2.– - RS 3a. SWECO. Stockholm.

OECD. 2015. The Economic Consequences of Climate Change. OECD Publishing. Paris.

Pope, C. A. III, R. T. Burnett, Turner MC, et al. 2011. "Lung cancer and cardiovascular disease mortality associated with ambient air pollution and cigarette smoke: shape of the exposure-response relationship." *Environmental Health Perspectives*, 119:1616-1621.

Pradhan, Elina and Dean T. Jamison. 2018. Standardized Sensitivity Analysis in BCA: An Education Case Study. Guidelines for Benefit-Cost Analysis Project Working Paper No. 5 Prepared for the Benefit-Cost Analysis Reference Case Guidance Project Funded by the Bill and Melinda Gates Foundation.

Saad L, G. Mahy, B. Delpuech and C. Khater C. 2010. "What options for Lebanese calcareous quarries rehabilitation? From legal framework to field applications." *Ecological Restoration and Sustainable Development – Establishing Links Across Frontiers Proceedings 7th European Conference on Ecological Restoration Avignon, France, 23-27/08/2010*.

Sustainable Environmental Solutions (SES). 2018. Cimenterie nationale Dispersion Model. Sin el Fil.

Spurgeon, J. 1998 "The Socio-Economic Costs and Benefits of Coastal Habitat Rehabilitation and Creation." *Marine Pollution Bulletin*. Volume 37, Number 8-12, pp. 373-382.

Stanaway, J., and GBD 2017 Risk Factor Collaborators. 2018. "Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017: Main Document; Supplements I and II." *Lancet*, 392: 1923–94.

United States Environmental Protection Agency (US EPA). 2017. Revisions to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter. Federal Register / Vol. 82, No. 10 / Tuesday, January 17, 2017 / Rules and Regulations.

Viscusi, W. Kip and Clayton J. Masterman. 2017. "Income Elasticities and Global Values of a Statistical Life." *J. Benefit Cost Anal.* 2017; 8(2): 226–250.

WHO website: <www.who.int>.

World Bank and Institute for Health Metrics and Evaluation (World Bank and IHME). 2016. *The Cost of Air Pollution: Strengthening the Economic Case for Action*. Washington, D.C.

World Bank. 2016. *Discounting Costs and Benefits in Economic Analysis of World Bank Projects Note*. Washington, D.C.

World Bank (WDI). 2022. World Development Indicators. Washington, D.C.

World Bank website: <www.worldbank.org>.

Xu, Y., J.-F. Lamarque and B. M. Sanderson. 2018. "The Importance of Aerosol Scenarios in Projections of Future Heat Extremes." *Climatic Change* 146 (3- 4): 393–406. doi:10.1007 /s10584-015-1565-1

Yazbeck, Josiane. 2022. *Les dommages et intérêts punitifs en droit français et en droit libanais*. Beirut.

Zhang, Wenhui, Xing Peng, Xiaohui Bi Yuan Cheng Danni Liang Jianhui Wu Yingze Tian Yufen Zhang Yinchang Feng. 2021. *Source apportionment of PM2.5 using online and offline measurements of chemical components in Tianjin*. China.

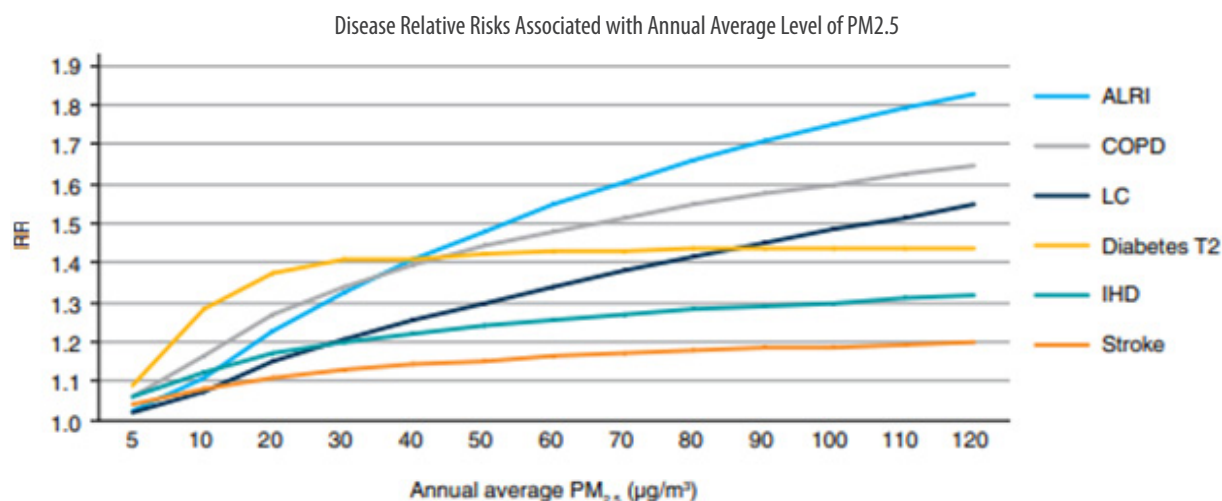
Annex 1

Air Pollution Methodological Process

Air Pollution Quantification

The effects of air pollution on a person's health can range from breathing to severe cardiovascular diseases, cancer and more recently, diabetes. Connecting exposure to adverse health effects was carried out and refined over the years with Stanaway et. al. (2018) which is the most recent study that was adopted by the Global Burden of Disease (GBD) to derive a dose-response function establishing the diseases associated with various levels of air pollution from PM2.5. There latter is considered the most potent air pollutant affecting human health.

Figure A1.1: Relative Risks of Major Health Outcomes Associated with PM2.5 Exposure



Source: Adapted from Stanaway et. al. (2018).

The relationship between PM2.5 air pollution and long-term premature mortality on the exposed population is usually assumed to be log-linear that may be applied to estimate the relative risk of mortality from concentration levels of PM2.5 (Figure A1.1):

$$\text{Relative Risk} = [(X + 1)/(X_0 + 1)]^\beta$$

Where:

X is the annual concentration of PM2.5

X₀ is a threshold level below which it may be assumed that the relative risk of mortality from PM2.5 is used and ranges between 1.0 and 4.7 µg/m³ (no mortality effect from PM2.5) according to various studies although the WHO suggest the annual PM2.5 lower threshold with no health effects at 5 instead of 10 since 2021.

The β coefficient are not mentioned in the Stanaway et al., (2018) for the 6 diseases although they were set in previous studies at 0.1551 for cardiopulmonary mortality and 0.2322 for lung cancer mortality (Pope et al., 2011).

The RR for each level of PM2.5 is provided by the GBD 2019 for each disease.

Indeed, Stanaway et. al. (2018) provides the relative risk (RR) associated with an increase of 1 µg/m³ of PM2.5 for the following diseases: Acute Lower Respiratory Infection (ALRI), Chronic Obstructive Pulmonary Disease (COPD), Ischemic Heart Disease (IHD), Trachea, Bronchus and Lung Cancer (LC), Stroke and Diabetes Mellitus II (Diabetes T2) (Figure A1.1). An RR greater than 1 means that there is a greater risk

in the exposed group relative to the unexposed group: for instance, the RR of acquiring lung cancer with smoking is 3. To derive the fraction of people likely to die from the above-cited diseases with a causal correlation with the ambient annual average level of PM2.5. The attributable fractions (AF) assess the proportion of cases in a population attributable to certain risk factors as reported in the GBD 2019. The AF is calculated by using the Levin formula, which requires only the RR estimate and the prevalence of the risk factor (P):

$$AF = P*(RR-1)/1+P*(RR-1)$$

Where:

- P is the population (prevalence of the disease among the population) having one of the 6 diseases as derived from the GBD.
- RR being the relative risk of acquiring the disease from a certain level of PM2.5 level.

The overall mortality is the sum of the 6 AFs. More methodological details are found in *World Bank and Institute for Health Metrics and Evaluation (2016) and Stanaway et. al. (2018)* as well as on the GDB website.

Table A1.1: Source Apportionment Rapid Literature Review

Citation	Source Attribution	Percentage of Total PM Emissions
Hwang, et al. 2008. Apportionment and spatial distributions of coarse particles during the Regional Air Pollution Stud– - PubMed (nih.gov)	Cement kiln/Quarrying	25.1% of PM _{2.5}
	Soil dust	23.9% of PM _{2.5}
Ghannam and El Fadel. 2013. Framework for emissions source apportionment in industrial areas: MM5/CALPUFF in a near-field application	Quarrying	7% of PM ₁₀
	Point Source (production)	93% of PM ₁₀
Mari et. al. 2016. Source Apportionment of Inorganic and Organic PM in the Ambient Air around a Cement Plant: Assessment of Complementary Tools	Organic dust	9% of PM _{2.5}
Zhang et al. 2021. Influence of quarry mining dust on PM2.5 in a city adjacent to a limestone quarry: Seasonal characteristics and source contributions	Quarrying	6% of PM _{2.5}
	Soil dust	13% of PM _{2.5}
	Cement dust	13% of PM _{2.5}

Source: in Table.

Table A1.1 illustrates the quarrying dust apportionment. However, dust resuspension is not mentioned in any of the citations but was accounted in the SES (2018) figure. The literature provides a range from 6% to 9% and validate the level of 6.5% monitored by SES (2018) and will be retained for the analysis in terms of the marginal emission attributable the quarrying.

Table A1.2 provides an example of the marginal premature mortality by age brackets and for the 6 diseases attributable to a hypothetical quarry in Metn. The level of PM2.5 is derived from MOE/UNDP, 2021 and is set at 30.6 µg/m³ over the period. µg/m³

For morbidity, a coefficient between premature death and the Years Lived with Disability (denominated in Disability-Adjusted Live Years which stands for one year-lost of health life –Murray and Lopez, 1996) was derived from the GBD 2019 for Lebanon and used to determine the morbidity in quarry area associated with the level of pollution.

Table A1.2: Sample Quarry Area Population Overall and Air Pollution Marginal Premature Death, 2019

		Total	<5	5-14	15-49	50-69	70+	Source
Lebanon Resident Population	000'	4,842.5	485.8	731.2	1,220.3	1,922.5	532.7	CAS 2020
Quarry Area Population	000'	38.8	3.5	5.0	9.3	16.8	4.2	CAS 2020
Total Respiratory Disease Mortality								
Ischemic Heart Disease (IHD)	Death/100,000	272.2	0.0	0.0	35.2	465.5	3006.8	IHME 2019
Chronic Obstructive Pulmonary Disease	Death/100,000	21.4	0.2	0.1	1.5	28.2	266.4	IHME 2019
Trachea, Brochus and Lung Cancer	Death/100,000	36.7	0.0	0.0	5.0	96.2	320.1	IHME 2019
Acute Respiratory Infection (ARI)	Death/100,000	25.0	13.4	1.0	2.5	22.0	319.4	IHME 2019
Stroke	Death/100,000	44.4	0.2	0.2	3.9	43.6	586.3	IHME 2019
Diabetes Mellitus II	Death/100,000	20.3	0.0	0.0	1.4	38.5	230.3	IHME 2019
Total Respiratory Disease Mortality	Death # Met n	321	0	0	5	116	200	Calculation
Ischemic Heart Disease (IHD)	Death # Met n	208	-	-	3	78	127	Calculation
Chronic Obstructive Pulmonary Disease	Death # Met n	16	0	0	0	5	11	Calculation
Trachea, Brochus and Lung Cancer	Death # Met n	30	0	0	0	16	14	Calculation
Acute Respiratory Infection (ARI)	Death # Met n	18	0	0	0	4	13	Calculation
Stroke	Death # Met n	32	0	0	0	7	25	Calculation
Diabetes Mellitus II	Death # Met n	16	-	-	0	6	10	Calculation
Air pollution-related death from Quarry	Marginal Death # Quarry	2.12	-	-	0.03	0.52	0.72	Calculation
Ischemic Heart Disease (IHD)	Marginal Death # Quarry	1.19	-	-	0.03	0.50	0.67	Calculation
Chronic Obstructive Pulmonary Disease	Marginal Death # Quarry	0.18	-	-	-	-	-	Calculation
Trachea, Bronchus and Lung Cancer	Marginal Death # Quarry	0.35	-	-	-	-	-	Calculation
Acute Respiratory Infection (ARI)	Marginal Death # Quarry	0.31	-	-	-	-	-	Calculation
Stroke	Marginal Death # Quarry	0.08	-	-	0.00	0.03	0.05	Calculation
Diabetes Mellitus II	Marginal Death # Quarry	0.01	-	-	-	-	-	Calculation

Source: Author.

Air Pollution Valuation

The value of statistical life (VSL) or value people are willing to pay to reduce the risk of premature mortality. The benefit transfer involves transposing existing monetary environmental values estimated at one site (study site) to another (policy site), usually with similar context or physical characteristics.³³ There are two approaches for the benefit transfer: the unit value transfer; and the transfer function. In this particular case, we will rely on the unit value transfer and more specifically on the transfer of the unit to adjust for differences in income value as described in Navrud (2009).

The transfer of the unit to adjust for differences in income value is as follows:

$$Wp = WPs \times (Yp / Ys)^\beta$$

Where:

Wp = willingness to pay by household in policy country

WPs = willingness to pay by household in study country

Yp = income in the country policy denominated in purchasing power parity dollar (PPP\$)

Ys = income in the country of study denominated in purchasing power parity dollar (PPP\$)

β = income elasticity for different environmental goods and services, which are considered normal goods, are typically greater than 0 (perfectly inelastic which would have meant that the $Wp = WPs$ only adjusted by income where $\beta = 1.2$).

In this particular case, the income elasticity is assumed to be conservatively set at 1.2 (more inelastic), which means that the percentage responsiveness of the utility is significantly and slightly lower to the percentage change in income. The VSL policy country considered is the one calculated for the OECD countries for 2005 at US\$3 million (OECD, 2015). The figure was adjusted for growth and inflation and set in 2019 prices.

For morbidity, the GDP per capita is used for each DALY lost in lieu of the cost of illness valuation.

Annex 2

Sight and Noise Pollution Methodological Process

Sight and Noise Pollution or Land Price Depreciation Quantification

A hedonic pricing method developed by Campbell (2015) demonstrates that proximity to the operational quarry lowered nearby property values. The percentage change in the log linear function of the price of a residence was 0.12229 as distance increases. A single coefficient, -0.006715, will be applied to all residential values, as it represents a weighted average of the impact of a given quarry in a radius around the quarry in which an average of 100% of the radius includes properties whose values are actually affected by the quarry. The coefficient will be applied to average real estate values in each Casa for 2019. The quarry area population is used and divided by the member number per household (CAS, 2020) which will allow to derive the number of residences (Table A2.1). However, it was not possible to differentiate the attributes of the residence (e, g., high standing, number of bathrooms and balconies, etc.).

Table A2.1: Residence Depreciation due to Quarrying

Input	Unit	Residence Price After Quarrying
Density	Capita/m ²	D
Area based on radius retained	m ²	R
Population	#	P=DxR
Household members	#	H
Number of residences	#	R=P/H
Average Cost per residence	US\$	V (from Table A2.2)
Depreciation coefficient	#	C=-0.006715
Total Depreciation	US\$	T=VxRxRxC

Source: Campbell (2015); Property Finder website <www.propertyfinder.com.lb>; OLX website: <www.olx.com.lb/en/properties>; Realty Lebanon <www.realtylebanon.com>; CAS (2020); MOE/UNDP (2019).

Sight and Noise Pollution or Land Price Depreciation Valuation

An average residence price was derived from current real estate listing in the quarry Area per Casa (MOE/UNDP, 2019). The depreciation will not be divided over the number of years of extraction but rather to one year as the amount is to be paid in full as a damage cost (Table A2.2).

Table A2.2: Average Real Estate Value

Mohafaza/Casa	Casa Value	Mohafaza Value
	US\$	US\$
Beirut		475,377
Mount Lebanon (other Casas)		158,909
Kesrwan	140,169	
Baabda	129,060	
Metn	207,497	
Nabatieh		54,554
Bekaa		37,769
South		77,158
North		51,754

Source: adapted from MOE/UNDP (2019).

It is important to mention that we are assuming that there is no double counting when considering the health burden of air pollution and the residence depreciation due to sight pollution as both degradations are occurring simultaneously and affecting the people wellbeing and the people assets living around the quarries.

Annex 3

Sight and Noise Pollution Methodological Process

Table A3.1: Quarry Dataset and Calculation Template

Input	Unit	Year 1	Year N	Total LP billion	Total US\$ million
Year					
Area	m ²				
Production with a 38% annual rate	m ³				
Production annualized rate	m ³				
Production annualized rate	Ton				
Rock Gate Price Low (2019)	US\$/ m ³				
Rock Gate Price High (2019)	US\$/ m ³				
Sand Gate Price Low (2019)	US\$/ m ³				
Sand Gate Price High (2019)	US\$/ m ³				
Turnover midpoint	US\$				
Turnover midpoint	LP million				
GDP (WDI) real growth	±%				
GDP/Capita (WDI)	US\$/Capita				
GDP (IMF) real growth	±%				
Value of Statistical Life (VSL)	US\$				
BDL TB Yield end of period	%				
BDL TB Yield annual average	%				
Estimated MOF Stamp	US\$				
Estimated MOF Stamp	LP million				

Input	Unit	Year 1	Year N	Total LP billion	Total US\$ million
Estimated profits	US\$				
Estimated profits	LP million				
Estimated profit Income Tax	LP million				
Estimated profit Income Tax	US\$				
Cumulative Late Fee and Income Tax	LP million				
Cumulative Late Fee and Income Tax	US\$				
Estimated profit Corporate Tax	LP million				
Estimated profit Corporate Tax	US\$				
Cumulative Late Fee and Corporate Tax	LP million				
Cumulative Late Fee and Corporate Tax	US\$				
Estimated profit Corporate Tax	LP million				
Estimated profit Corporate Tax	US\$				
Cumulative Late Fee and Corporate Tax	LP million				
Cumulative Late Fee and Corporate Tax	US\$				
VAT per unit price	US\$				
Total VAT	US\$				
Total VAT	LP million				
Cumulative Late Fee and VAT	LP million				
Cumulative Late Fee and VAT	US\$				
MOF/Municipality Fee (LP15,000/m2)	LP million				
Financial Warranty (LP9,000/ m3)	LP million				
Interest on Warranty (Annual Avg. TB Yield)	LP million				
Interest on Warranty (Annual Avg. TB Yield)	US\$				

Input	Unit	Year 1	Year N	Total LP billion	Total US\$ million
Penalty Article 24 of Decree 8803/2002	LP million				
EIA	LP million				
EMP implementation (10% of EIA)	LP million				
EMP Supervision (60 men/year)	LP million				
LAF fee per quarry assessed	LP 1 million				
Air pollution	US\$				
Sight Pollution	US\$				
Water, Erosion and Ecological services disruption (0.1%/GDP/Capita)	US\$				
Grey Rehabilitation (US\$70/m2)	LP million				
Green Cover Rehabilitation (US\$4/m2)	LP million				
Population Growth	±%				
Population Living in the Quarry Area	#				
Density	population/ km ²				
Residence	#				
Deflator 2010 Base 100	%				
Deflator 2018	%				
Exchange rate	US\$/LP				
Grand Total					

Source: Author.

Annex 4

Additional Information for Regulatory and Fiscal Damages

Given that all regulatory and fiscal hypothetical dues in terms of charges, fees, penalties, interest rates, etc., are applied to all quarries, any conflicting supporting documentation is to be checked by the competent authority as per the Table A4.1.

Table A4.1: Functional Responsibility Matrix for Quarrying Documentation

Supporting Documentation Provided by the Quarry Owner/ Operator	Competent Authority for Cross-Checking/ Validation of Supporting Documents	Notes
Permit	Governor	Post-2002, only a permit based on an approval decision by the National Council for Quarries is considered legal/ legitimate
Warranty	MoE	
EIA	MoE	
No Objection Next to Water Body	MoEW	
Fee and Stamp	MoF	
Fee Collected on Behalf of the Municipality	MoF	
Personal & Corporate Income Tax	MoF	The amounts should be broken down between income tax and penalties
VAT	MoF	
Survey Costs	LAF	

Annex 5

Regional Results by Cluster

Table A5.1: All Clusters

Mohafaza	Caza	Quarry Code Name	Area Used	Volume	Start Year	Extraction	Regulatory	COED	Rehabilita-	Total	Infringe- ment
			m ²	m ³	YYYY	Type	& Fiscal		tion		
							US\$ Million	US\$ Million	US\$ Million	US\$ Million	
Beqaa	Rachaya	Heloueh1	30,032	151,714	2007	Gravel	1.5	0.1	2.2	3.8	
B	Rachaya	Kfarmeshki1	10,134	29,335	2007	Mosaic	0.7	0.1	0.7	1.6	
B	Rachaya	Majdal Bahiss1	46,251	873,169	2007	Average	4.6	0.1	3.4	8.1	
B	West Bekaa	Lebbaya1	945	3,934	1970	Average	0.5	0.3	0.1	0.8	
B	West Bekaa	Lebbaya2	5,109	22,761	1970	Gravel	0.6	0.3	0.4	1.3	
B	West Bekaa	Yohmor1	88,576	2,151,576	1970	Average	6.0	0.4	6.6	12.9	
B	West Bekaa	Maydoun1	71,602	1,832,457	2007	Gravel	8.5	0.4	5.3	14.2	1
B	West Beqaa	Maydoun2	11,262	48,612	2007	Gravel	0.8	0.3	0.8	1.9	
B	West Beqaa	Maydoun3	84,967	2,125,976	2007	Gravel	9.9	0.4	6.3	16.5	
B	West Beqaa	Maydoun4	43,984	397,517	2007	Gravel	2.6	0.3	3.3	6.2	
B	West Beqaa	Maydoun5	60,370	1,206,831	2007	Gravel	6.0	0.3	4.5	10.8	
B	West Beqaa	Maydoun6	68,898	1,099,604	2007	Gravel	5.6	0.3	5.1	11.1	
B	West Beqaa	Maydoun7	38,883	54,569	2007	Gravel	1.2	0.3	2.9	4.4	
B	West Beqaa	Maydoun8	218,536	2,552,845	2007	Gravel	13.1	0.4	16.2	29.7	1
B	West Beqaa	Qaraoun1	30,337	505,445	2007	Gravel	2.8	0.3	2.2	5.4	
B	West Beqaa	Saghbine1	3,347	662	2007	Gravel	0.5	0.3	0.2	1.1	
B	Zahleh	Hashmash1	36,089	594,360	1970	Gravel	2.1	0.8	2.7	5.6	
B	Zahleh	Hashmash2	42,883	645,843	1970	Gravel	2.3	0.8	3.2	6.3	
B	Zahleh	Hashmash3	63,436	2,703,712	1970	Gravel	6.6	0.9	4.7	12.2	
B	Zahleh	Massa1	41,156	497,972	1970	Gravel	2.0	0.8	3.0	5.9	1
B	Zahleh	Massa2	44,078	905,621	1970	Gravel	2.8	0.9	3.3	6.9	
B	Zahleh	Touitieh1	44,018	736,880	2007	Gravel	3.9	0.9	3.3	8.0	
B	Zahleh	Touitieh2	21,415	212,412	2007	Gravel	1.6	0.8	1.6	4.0	1
B	Zahleh	Touitieh3	37,298	1,036,832	2007	Gravel	5.0	0.8	2.8	8.6	
B	Zahleh	Touitieh4	41,107	477,803	1970	Sand	1.9	0.8	3.0	5.8	1
B	Zahleh	Touitieh5	11,439	442,878	2007	Gravel	2.4	0.7	0.8	4.0	1

Mohafaza	Caza	Quarry Code Name	Area Used	Volume	Start Year	Extraction	Regulatory & Fiscal	COED	Rehabilita- tion	Total	Infringe- ment
			m ²	m ³	YYYY	Type	US\$ Million	US\$ Million	US\$ Million	US\$ Million	
B	Zahleh	Toutieh K. Abou Hamadeh1	94,891	2,224,550	2007	Gravel	10.4	0.9	7.0	18.3	
B	Zahleh	Deir el Ghazal1	31,547	1,137,132	1970	Average	3.2	0.1	2.3	5.6	1
B	Zahleh	Deir el Ghazal2	97,355	918,156	1970	Average	3.7	0.1	7.2	11.0	
B	Zahleh	Deir el Ghazal3	7,748	121,201	1970	Gravel	0.8	0.1	0.6	1.5	1
B	Zahleh	Deir el Ghazal4	4,765	44,974	1970	Gravel	0.6	0.1	0.4	1.1	1
B	Zahleh	'A'eit1	48,187	1,707,048	1970	Average	4.5	0.1	3.6	8.2	1
B	Zahleh	'A'eit2	100,356	3,718,479	1970	Average	9.2	0.1	7.4	16.7	1
B	Zahleh	'A'eit3	155,681	4,163,873	1970	Gravel	10.5	0.1	11.5	22.2	1
Beqaa		34	1,736,682	35,346,733			138.4	14.6	128.5	281.5	12
Baalbeck-H	Baalbeck	Ain Bourday1	66,910	749,196	1970	Average	2.9	0.2	5.0	8.1	1
BH	Baalbeck	Ain Bourday2	57,098	647,131	2007	Average	3.8	0.2	4.2	8.3	1
BH	Baalbeck	Al Fakiha1	11,405	100,189	1970	Gravel	0.8	0.2	0.8	1.8	
BH	Baalbeck	Al Fakiha2	45,397	361,449	1970	Gravel	1.7	0.2	3.4	5.3	
BH	Baalbeck	Al Fakiha3	12,089	170,924	1970	Gravel	1.0	0.2	0.9	2.0	
BH	Baalbeck	Al Fakiha4	3,969	23,487	1970	Gravel	0.6	0.2	0.3	1.0	
BH	Baalbeck	Al Fakiha5	13,460	130,088	1970	Gravel	0.9	0.2	1.0	2.1	
BH	Baalbeck	Al Fakiha6	36,026	266,837	1970	Gravel	1.5	0.2	2.7	4.3	
BH	Baalbeck	Al Nabi Sheet1	32,680	959,437	1970	Average	2.8	0.2	2.4	5.4	
BH	Baalbeck	Al Nabi Sheet2	20,964	467,649	1970	Average	1.7	0.2	1.6	3.4	
BH	Baalbeck	Al Nabi Sheet3	44,111	1,310,133	1970	Average	3.7	0.2	3.3	7.1	
BH	Baalbeck	Al Nabi Sheet4	37,449	404,810	1970	Average	1.8	0.2	2.8	4.8	
BH	Baalbeck	Al Nabi Sheet5	28,044	280,096	1970	Average	1.4	0.2	2.1	3.7	
BH	Baalbeck	Al Nabi Sheet6	45,823	898,727	1970	Average	2.9	0.2	3.4	6.5	
BH	Baalbeck	Arsal1	35,076	381,256	1970	Gravel	1.7	0.2	2.6	4.4	
BH	Baalbeck	Arsal2	8,643	50,509	1970	Mosaic	0.7	0.2	0.6	1.5	
BH	Baalbeck	Arsal3	4,576	30,235	1970	Mosaic	0.6	0.2	0.3	1.1	
BH	Baalbeck	Arsal4	15,037	108,766	1970	Mosaic	0.9	0.2	1.1	2.2	
BH	Baalbeck	Arsal5	14,911	184,213	1970	Mosaic	1.1	0.2	1.1	2.3	1
BH	Baalbeck	Arsal6	5,623	101,512	1970	Mosaic	0.8	0.2	0.4	1.4	
BH	Baalbeck	Arsal7	37,532	413,480	1970	Mosaic	1.8	0.2	2.8	4.8	
BH	Baalbeck	Arsal8	15,061	75,548	1970	Mosaic	0.8	0.2	1.1	2.1	1
BH	Baalbeck	Arsal9	2,412	4,719	1970	Mosaic	0.5	0.2	0.2	0.9	

Mohafaza	Caza	Quarry Code Name	Area Used	Volume	Start Year	Extraction	Regulatory	COED	Rehabilita-	Total	Infringe- ment
			m ²	m ³	YYYY	Type	& Fiscal		tion		
							US\$ Million	US\$ Million	US\$ Million	US\$ Million	
BH	Baalbeck	Arsal10	15,968	93,516	1970	Mosaic	0.9	0.2	1.2	2.2	
BH	Baalbeck	Arsal11	14,706	336,652	1970	Mosaic	1.4	0.2	1.1	2.6	
BH	Baalbeck	Arsal12	4,242	2,431	1970	Mosaic	0.6	0.2	0.3	1.0	
BH	Baalbeck	Arsal13	56,961	665,652	1970	Mosaic	2.6	0.2	4.2	7.0	1
BH	Baalbeck	Arsal14	11,575	69,404	1970	Mosaic	0.8	0.2	0.9	1.8	
BH	Baalbeck	Arsal15	21,047	98,029	1970	Gravel	0.9	0.2	1.6	2.7	
BH	Baalbeck	Arsal16	9,895	114,415	1970	Mosaic	0.9	0.2	0.7	1.8	1
BH	Baalbeck	Arsal17	69,102	546,925	1970	Average	2.5	0.2	5.1	7.9	1
BH	Baalbeck	Arsal18	19,585	53,934	1970	Gravel	0.8	0.2	1.4	2.5	
BH	Baalbeck	Arsal19	11,665	173,602	1970	Mosaic	1.0	0.2	0.9	2.0	
BH	Baalbeck	Arsal20	3,511	29,207	1970	Mosaic	0.6	0.2	0.3	1.0	
BH	Baalbeck	Arsal21	10,158	87,387	1970	Mosaic	0.8	0.2	0.8	1.7	
BH	Baalbeck	Arsal22	21,675	177,648	1970	Gravel	1.1	0.2	1.6	2.9	
BH	Baalbeck	Arsal23	694	763	1970	Mosaic	0.5	0.2	0.1	0.7	
BH	Baalbeck	Arsal24	3,528	26,072	1970	Gravel	0.6	0.2	0.3	1.0	
BH	Baalbeck	Arsal25	1,990	2,395	1970	Mosaic	0.5	0.2	0.1	0.8	
BH	Baalbeck	Arsal26	18,158	145,229	1970	Mosaic	1.0	0.2	1.3	2.5	
BH	Baalbeck	Arsal27	2,895	8,211	1970	Mosaic	0.6	0.2	0.2	0.9	
BH	Baalbeck	Arsal28	21,687	283,675	1970	Gravel	1.3	0.2	1.6	3.1	
BH	Baalbeck	Arsal29	13,978	35,123	1970	Gravel	0.7	0.2	1.0	1.9	
BH	Baalbeck	Arsal30	169,590	4,157,228	1970	Average	11.1	0.2	12.5	23.8	
BH	Baalbeck	Arsal31	6,825	70,663	1970	Mosaic	0.7	0.2	0.5	1.4	
BH	Baalbeck	Arsal32	23,462	398,386	1970	Mosaic	1.6	0.2	1.7	3.5	1
BH	Baalbeck	Arsal33	1,255	6,164	1970	Gravel	0.5	0.2	0.1	0.8	
BH	Baalbeck	Arsal34	7,726	20,764	1970	Gravel	0.6	0.2	0.6	1.4	
BH	Baalbeck	Arsal35	16,146	233,010	1970	Gravel	1.1	0.2	1.2	2.5	
BH	Baalbeck	Arsal36	10,936	92,137	1970	Mosaic	0.8	0.2	0.8	1.8	1
BH	Baalbeck	Arsal37	25,177	132,275	1970	Mosaic	1.1	0.2	1.9	3.1	1
BH	Baalbeck	Arsal38	13,752	69,522	1970	Gravel	0.8	0.2	1.0	2.0	
BH	Baalbeck	Arsal39	4,362	23,607	1970	Average	0.6	0.2	0.3	1.1	
BH	Baalbeck	Arsal40	10,532	81,987	1970	Mosaic	0.8	0.2	0.8	1.7	
BH	Baalbeck	Arsal41	32,854	130,254	1970	Mosaic	1.2	0.2	2.4	3.8	1

Mohafaza	Caza	Quarry Code Name	Area Used	Volume	Start Year	Extraction	Regulatory	COED	Rehabilita-	Total	Infringe- ment
			m ²	m ³	YYYY	Type	& Fiscal	US\$	US\$	US\$ Million	
							Million	Million		Million	
BH	Baalbeck	Arsal42	5,601	59,712	1970	Gravel	0.7	0.2	0.4	1.3	
BH	Baalbeck	Arsal43	166,117	355,362	1970	Average	3.5	0.2	12.3	16.1	1
BH	Baalbeck	Arsal44	61,716	381,548	1970	Mosaic	2.1	0.2	4.6	6.8	1
BH	Baalbeck	Arsal45	23,101	195,149	1970	Average	1.2	0.2	1.7	3.1	
BH	Baalbeck	Arsal46	19,488	62,487	1970	Mosaic	0.9	0.2	1.4	2.5	
BH	Baalbeck	Arsal47	16,200	80,806	1970	Mosaic	0.9	0.2	1.2	2.2	
BH	Baalbeck	Bechouat1	2,336	2,304	2007	Mosaic	0.5	0.2	0.2	0.9	
BH	Baalbeck	Bechouat2	1,301	962	2007	Mosaic	0.5	0.2	0.1	0.8	
BH	Baalbeck	Bechouat3	682	1,055	2007	Mosaic	0.5	0.2	0.1	0.7	
BH	Baalbeck	Bechouat4	1,682	970	2007	Mosaic	0.5	0.2	0.1	0.8	1
BH	Baalbeck	Bechouat5	4,299	8,624	2007	Average	0.6	0.2	0.3	1.1	1
BH	Baalbeck	Bednayel1	3,061	6,510	1970	Gravel	0.5	0.2	0.2	0.9	
BH	Baalbeck	Britel1	22,006	189,804	2007	Gravel	1.5	0.2	1.6	3.3	
BH	Baalbeck	Britel2	4,111	29,008	2007	Gravel	0.7	0.2	0.3	1.1	
BH	Baalbeck	Cheibeh1	6,040	2,715	1970	Sand	0.6	0.2	0.4	1.2	1
BH	Baalbeck	Cheibeh2	250,146	1,082,971	1970	Sand	5.6	0.3	18.5	24.4	1
BH	Baalbeck	Cheibeh3	81,773	692,345	1970	Average	3.0	0.2	6.1	9.3	1
BH	Baalbeck	Chmestar1	8,032	6,978	2007	Gravel	0.6	0.2	0.6	1.4	1
BH	Baalbeck	Deir el Ahmar1	18,367	3,242	1970	Gravel	0.7	0.2	1.4	2.3	1
BH	Baalbeck	Hadath Baalbeck1	12,572	93,355	2007	Gravel	1.0	0.2	0.9	2.1	
BH	Baalbeck	Hadath Baalbeck2	6,378	148,187	1970	Average	0.9	0.2	0.5	1.5	
BH	Baalbeck	Hadath Baalbeck3	94,065	1,353,075	1970	Gravel	4.3	0.2	7.0	11.5	1
BH	Baalbeck	Hadath Baalbeck4	18,631	315,271	1970	Average	1.4	0.2	1.4	2.9	
BH	Baalbeck	Hour 'A'la1	4,605	41,134	1970	Gravel	0.6	0.2	0.3	1.1	
BH	Baalbeck	Hour 'A'la2	28,432	492,335	1970	Average	1.9	0.2	2.1	4.2	1
BH	Baalbeck	Nahleh1	28,186	329,112	1970	Average	1.5	0.2	2.1	3.8	1
BH	Baalbeck	Ras Baalbeck Gharby1	29,167	68,661	1970	Mosaic	1.0	0.2	2.2	3.4	
BH	Baalbeck	Ras Baalbeck Gharby2	11,002	21,787	1970	Mosaic	0.7	0.2	0.8	1.7	1
BH	Baalbeck	Ras Baalbeck Sahel1	30,173	444,509	1970	Gravel	1.7	0.2	2.2	4.1	

Mohafaza	Caza	Quarry Code Name	Area Used	Volume	Start Year	Extraction	Regulatory	COED	Rehabilita-	Total	Infringe- ment
			m ²	m ³	YYYY	Type	& Fiscal	US\$	US\$	US\$ Million	
							Million	Million		Million	
BH	Baalbeck	Ras Baalbeck Sahel2	4,100	18,178	1970	Gravel	0.6	0.2	0.3	1.0	1
BH	Baalbeck	Ras Baalbeck Sahel3	9,672	105,879	1970	Gravel	0.8	0.2	0.7	1.7	1
BH	Baalbeck	Ras Baalbeck Sahel4	13,260	216,036	1970	Gravel	1.1	0.2	1.0	2.2	1
BH	Baalbeck	Ras Baalbeck Sahel5	5,601	25,631	1970	Gravel	0.6	0.2	0.4	1.2	1
BH	Baalbeck	Ras Baalbeck Sahel6	6,560	113,493	1970	Gravel	0.8	0.2	0.5	1.4	1
BH	Baalbeck	Ras Baalbeck Sahel7	25,956	328,905	1970	Gravel	1.5	0.2	1.9	3.6	1
BH	Baalbeck	Ras Baalbeck Sahel8	6,028	31,874	1970	Gravel	0.6	0.2	0.4	1.2	
BH	Baalbeck	Ras Baalbeck Sahel9	19,243	128,023	1970	Gravel	1.0	0.2	1.4	2.6	1
BH	Baalbeck	Ras Baalbeck Sahel10	17,599	128,835	1970	Gravel	1.0	0.2	1.3	2.4	1
BH	Baalbeck	Ras Baalbeck Sahel11	3,249	8,238	1970	Gravel	0.6	0.2	0.2	1.0	1
BH	Baalbeck	Ras Baalbeck Sahel12	18,703	447,067	1970	Gravel	1.6	0.2	1.4	3.2	1
BH	Baalbeck	Ras Baalbeck Sahel13	14,195	83,692	1970	Gravel	0.8	0.2	1.1	2.1	1
BH	Baalbeck	Riha1	1,112	1,087	2007	Gravel	0.5	0.2	0.1	0.8	
BH	Baalbeck	Tamnin1	23,010	17,479	1970	Gravel	0.8	0.2	1.7	2.7	1
BH	Baalbeck	Taraya1	43,180	121,595	2007	Mosaic	1.5	0.2	3.2	4.9	
BH	Hermel	Al Khreibeh1	5,924	24,348	1970	Gravel	0.6	0.1	0.4	1.1	
BH	Hermel	Al Sharbeen1	57,432	1,137,427	1970	Gravel	3.4	0.1	4.2	7.8	
BH	Hermel	Al Sharbeen2	30,159	528,773	1970	Gravel	1.9	0.1	2.2	4.2	
BH	Hermel	Al Sharbeen3	49,428	1,179,821	1970	Average	3.5	0.1	3.7	7.3	
BH	Hermel	Al Sharbeen4	43,337	802,682	1970	Gravel	2.6	0.1	3.2	5.9	
BH	Hermel	Al Sharbeen5	53,036	965,805	1970	Gravel	3.0	0.1	3.9	7.0	
BH	Hermel	Al Sharbeen6	35,917	1,059,305	1970	Average	3.1	0.1	2.7	5.8	
BH	Hermel	Al Sharbeen7	29,906	239,575	1970	Gravel	1.3	0.1	2.2	3.6	
BH	Hermel	Al Sharbeen8	113,728	3,314,927	1970	Gravel	8.4	0.1	8.4	16.9	
BH	Hermel	Al Sharbeen9	19,273	146,846	1970	Gravel	1.0	0.1	1.4	2.5	
BH	Hermel	Al Sharbeen10	12,228	526,288	1970	Average	1.7	0.1	0.9	2.7	

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			m ²	m ³	YYYY	Type	& Fiscal		tion		
							US\$ Million	US\$ Million	US\$ Million	US\$ Million	
BH	Hermel	Al Sharbeen11	71,947	1,106,897	1970	Gravel	3.5	0.1	5.3	9.0	
BH	Hermel	Al Sharbeen12	45,881	499,006	1970	Gravel	2.0	0.1	3.4	5.5	
BH	Hermel	Al Sharbeen13	12,528	273,757	1970	Gravel	1.2	0.1	0.9	2.2	
BH	Hermel	Al Sharbeen14	56,773	1,685,016	1970	Average	4.6	0.1	4.2	8.9	
BH	Hermel	Al Sharbeen15	46,987	1,228,244	1970	Gravel	3.5	0.1	3.5	7.0	
BH	Hermel	Al Sharbeen16	22,811	349,650	1970	Average	1.5	0.1	1.7	3.3	
BH	Hermel	Zighreen1	35,185	342,493	1970	Gravel	1.6	0.1	2.6	4.3	
BH	Hermel	Zighreen2	13,246	127,533	1970	Gravel	0.9	0.1	1.0	2.0	
BH	Hermel	Zighreen3	10,207	144,134	1970	Gravel	0.9	0.1	0.8	1.7	
BH	Hermel	Zighreen4	15,001	57,482	1970	Gravel	0.8	0.1	1.1	2.0	
BH	Hermel	Zighreen5	10,206	186,237	1970	Gravel	1.0	0.1	0.8	1.8	
BH	Hermel	Zighreen6	46,949	418,026	1970	Gravel	1.9	0.1	3.5	5.4	
BH	Hermel	Zighreen7	6,699	58,605	1970	Gravel	0.7	0.1	0.5	1.3	
BH	Hermel	Zighreen8	20,770	233,574	1970	Gravel	1.2	0.1	1.5	2.8	
Baalbeck-Hermel		124	3,286,229	41,369,099			187.3	19.9	243.2	450.3	36
Mount Leb	Aley	Ain Dara1	74,554	37,749	2007	Gravel	1.5	3.2	5.5	10.2	
ML	Aley	Ain Dara2	65,060	723,379	2007	Gravel	4.1	3.1	4.8	12.0	
ML	Aley	Ain Dara3	98,549	2,015,167	2007	Gravel	9.6	3.3	7.3	20.2	
ML	Aley	Ain Dara4	21,253	174,084	2007	Gravel	1.4	2.7	1.6	5.7	1
ML	Aley	Ain Dara5	68,513	1,297,582	2007	Gravel	6.4	3.1	5.1	14.6	
ML	Aley	Ain Dara6	31,007	271,936	2007	Gravel	1.9	2.8	2.3	7.1	
ML	Aley	Ain Dara7	5,753	125,340	2007	Gravel	1.1	2.5	0.4	4.0	
ML	Aley	Ain Dara8	45,960	1,115,973	2007	Gravel	5.4	3.0	3.4	11.8	
ML	Aley	Ain Dara9	33,750	216,781	2007	Gravel	1.8	2.9	2.5	7.1	
ML	Aley	Ain Dara10	47,860	4,078	2007	Gravel	1.1	3.0	3.5	7.6	
ML	Aley	Ain Dara11	64,623	333,912	2007	Gravel	2.6	3.1	4.8	10.5	
ML	Aley	Ain Dara12	22,488	174,610	2007	Gravel	1.5	2.7	1.7	5.8	
ML	Aley	Ain Dara13	122,229	1,202,402	2007	Gravel	6.7	3.4	9.0	19.2	
ML	Aley	Ain Dara14	42,019	320,979	2007	Average	2.3	2.9	3.1	8.4	
ML	Aley	Ain Dara15	60,579	42,966	2007	Gravel	1.4	3.1	4.5	8.9	
ML	Aley	Ain Dara16	46,938	441,559	2007	Gravel	2.8	3.0	3.5	9.2	
ML	Aley	Ain Dara17	27,295	21,317	2007	Gravel	0.6	2.8	2.0	5.4	

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							Million	Million		Million	
ML	Aley	Ain Dara18	78,566	3,291,327	2007	Gravel	14.4	3.2	5.8	23.4	
ML	Aley	Ain Dara19	27,133	665,602	2007	Gravel	3.4	2.8	2.0	8.2	
ML	Aley	Ain Dara20	78,473	1,363,568	2007	Gravel	6.8	3.2	5.8	15.8	1
ML	Aley	Ain Dara21	605,140	3,134,562	2007	Average	21.3	4.9	44.8	71.0	1
ML	Aley	Ain Dara22	24,027	293,501	2007	Gravel	1.9	2.8	1.8	6.5	
ML	Aley	Ain Dara23	60,204	899,618	2007	Gravel	4.7	3.1	4.5	12.3	
ML	Aley	Ain Dara24	17,117	242,032	2007	Gravel	1.7	2.7	1.3	5.6	
ML	Aley	Ain Dara25	312,705	4,356,161	2007	Gravel	21.3	4.2	23.1	48.6	1
ML	Aley	Ain Dara26	24,152	1,049,212	2007	Gravel	4.9	2.8	1.8	9.4	
ML	Aley	Ain Dara27	11,730	10,110	2007	Gravel	0.7	2.6	0.9	4.1	
ML	Aley	Ain Dara28	35,422	383,913	2007	Gravel	2.4	2.9	2.6	7.9	
ML	Aley	Charoun1	4,224	16,990	2007	Gravel	0.6	2.4	0.3	3.4	1
ML	Baabda	K'e'h1	6,772	43,000	1970	Average	0.7	13.2	0.5	14.4	1
ML	Chouf	Amatour1	5,229	11,474	2007	Average	0.6	1.1	0.4	2.1	
ML	Chouf	Baasir1	61,580	1,335,733	2007	Gravel	6.5	1.4	4.6	12.4	1
ML	Chouf	Baasir2	51,624	543,689	2007	Gravel	3.2	1.3	3.8	8.4	1
ML	Chouf	Baasir 'A'kur1	52,800	696,636	2007	Average	4.0	1.3	3.9	9.2	
ML	Chouf	Dahr el Mghara1	47,901	2,090,001	1970	Average	5.3	1.3	3.5	10.1	
ML	Chouf	Sibline1	97,998	812,573	2007	Average	5.1	1.5	7.3	13.8	
ML	Chouf	Sibline2	208,610	407,123	2007	Average	5.0	1.7	15.4	22.2	
ML	Chouf	Sibline3	56,303	359,045	2007	Average	2.7	1.4	4.2	8.2	
ML	Chouf	Sibline4	105,603	568,897	2007	Average	4.2	1.5	7.8	13.5	
ML	Metn	Abou Mizan1	41,165	2,509,257	2007	Gravel	10.8	2.6	3.0	16.5	
ML	Metn	Abou Mizan2	31,727	1,285,276	2007	Gravel	5.9	2.5	2.3	10.8	
ML	Metn	Abou Mizan3	34,452	1,491,385	1970	Gravel	3.8	2.6	2.5	9.0	1
ML	Metn	Biakout1	89,657	1,783,972	1970	Average	5.3	2.9	6.6	14.8	
ML	Metn	Deir Chamra1	38,681	1,338,898	1970	Average	3.7	2.6	2.9	9.1	1
ML	Metn	Majdal Tarchich1	48,343	690,416	2007	Gravel	3.8	2.7	3.6	10.0	
ML	Metn	Majdal Tarchich2	3,775	756,010	2007	Gravel	3.5	2.2	0.3	5.9	1

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ML	Metn	Mtein1	16,541	333,897	1970	Average	1.4	2.4	1.2	5.0	
ML	Metn	Mtein2	4,973	148,680	1970	Average	0.6	2.2	0.4	3.1	
ML	Jbeil	Balhas1	3,069	11,469	2007	Sand	0.6	0.6	0.2	1.4	
ML	Jbeil	Balhas2	16,045	46,050	2007	Sand	0.9	0.7	1.2	2.7	
ML	Jbeil	Balhas3	10,521	46,476	2007	Average	0.8	0.7	0.8	2.3	
ML	Jbeil	Balhas4	1,780	1,950	2007	Sand	0.5	0.6	0.1	1.3	
ML	Jbeil	Balhas5	35,013	65,801	2007	Sand	1.2	0.7	2.6	4.5	
ML	Jbeil	Balhas6	10,633	35,614	2007	Sand	0.8	0.7	0.8	2.2	
ML	Jbeil	Balhas7	9,619	39,796	2007	Average	0.8	0.6	0.7	2.1	
ML	Jbeil	Balhas8	3,295	7,722	2007	Sand	0.6	0.6	0.2	1.4	
ML	Jbeil	Balhas9	3,109	1,291	2007	Sand	0.5	0.6	0.2	1.4	1
ML	Jbeil	Halat1	70,339	2,690,938	1970	Gravel	6.6	0.8	5.2	12.6	1
ML	Jbeil	Kahmaz1	10,150	29,198	2007	Average	0.8	0.7	0.8	2.2	
ML	Jbeil	Kahmaz2	52,371	215,184	2007	Average	2.1	0.8	3.9	6.7	
ML	Jbeil	Mghayrah1	5,290	476	2007	Sand	0.6	0.6	0.4	1.6	
ML	Jbeil	Tartij1	8,900	204,861	2007	Average	1.4	0.6	0.7	2.7	
ML	Jbeil	Tartij2	5,627	45,218	1970	Average	0.7	0.6	0.4	1.7	
ML	Kesrewan	B'a'atouta1	2,175	16,536	1970	Sand	0.6	2.1	0.2	2.8	
ML	Kesrewan	B'a'atouta2	61,746	1,328,155	1970	Average	4.0	2.8	4.6	11.3	
ML	Kesrewan	B'a'atouta3	52,848	689,658	1970	Average	2.6	2.7	3.9	9.2	
ML	Kesrewan	Faraya1	17,177	159,334	2007	Average	1.4	2.4	1.3	5.0	1
ML	Kesrewan	Hrajel1	10,597	66,792	2007	Sand	0.9	2.3	0.8	4.0	
ML	Kesrewan	Hrajel2	15,025	62,246	2007	Average	1.0	2.4	1.1	4.4	
ML	Kesrewan	Mayrouba1	3,685	65,673	2007	Average	0.8	2.2	0.3	3.2	
ML	Kesrewan	Mayrouba2	7,821	93,039	2007	Average	1.0	2.2	0.6	3.8	
ML	Kesrewan	Mayrouba3	97,780	1,030,220	2007	Sand	5.7	3.0	7.2	15.9	
ML	Kesrewan	Mayrouba4	2,140	214	2007	Sand	0.5	2.1	0.2	2.8	
ML	Kesrewan	Mayrouba5	9,896	55,241	2007	Sand	0.8	2.3	0.7	3.8	
ML	Kesrewan	Mayrouba6	3,714	7,900	2007	Sand	0.6	2.2	0.3	3.0	
ML	Kesrewan	Mayrouba7	4,432	28,513	2007	Sand	0.7	2.2	0.3	3.2	
ML	Kesrewan	Mayrouba8	14,809	148,585	2007	Sand	1.3	2.4	1.1	4.7	
ML	Kesrewan	Mayrouba9	46,027	204,049	2007	Average	1.9	2.7	3.4	8.0	

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			m ²	m ³	YYYY	Type	& Fiscal	US\$	US\$	US\$ Million	US\$
							Million	Million		Million	
ML	Kesrewan	Mayrouba10	15,627	26,075	2007	Sand	0.8	2.4	1.2	4.3	
ML	Kesrewan	Mayrouba11	12,316	136,919	2007	Average	1.2	2.3	0.9	4.4	
ML	Kesrewan	Mayrouba12	19,136	146,394	2007	Sand	1.3	2.4	1.4	5.1	
ML	Kesrewan	Mayrouba13	26,356	229,052	2007	Average	1.8	2.5	2.0	6.2	
ML	Kesrewan	Mayrouba14	3,876	N/A	2007	Sand	0.5	2.2	0.3	3.0	
ML	Kesrewan	Mayrouba15	404	244	2007	Average	0.5	2.0	0.0	2.5	
ML	Kesrewan	Mayrouba16	23,622	9,912	2007	Sand	0.8	2.5	1.7	5.0	
ML	Kesrewan	Mayrouba17	29,104	697,157	2007	Average	3.6	2.5	2.2	8.3	
ML	Kesrewan	Mayrouba18	6,434	74,027	2007	Average	0.9	2.2	0.5	3.6	
ML	Kesrewan	Mayrouba19	12,043	81,241	2007	Average	1.0	2.3	0.9	4.2	
ML	Kesrewan	Mayrouba20	2,678	46,209	2007	Average	0.7	2.1	0.2	3.0	
ML	Kesrewan	Mayrouba21	3,049	4,374	2007	Average	0.6	2.1	0.2	2.9	
ML	Kesrewan	Mayrouba22	18,034	158,793	2007	Average	1.4	2.4	1.3	5.1	
ML	Kesrewan	Mayrouba23	2,227	N/A	2007	Sand	0.5	2.1	0.2	2.8	
ML	Kesrewan	Mayrouba24	11,571	7,683	2007	Sand	0.7	2.3	0.9	3.8	
ML	Kesrewan	Mayrouba25	603	N/A	2007	Sand	0.5	2.0	0.0	2.6	
ML	Kesrewan	Wata el Jaouz1	145,412	35,835	2007	Gravel	2.4	3.2	10.8	16.3	1
ML	Kesrewan	Wata el Jaouz2	41,800	981,552	2007	Gravel	4.9	2.6	3.1	10.6	1
ML	Kesrewan	Wata el Jaouz3	67,000	666,534	2007	Gravel	3.9	2.8	5.0	11.7	
ML	Kesrewan	Wata el Jaouz4	21,171	128,053	2007	Average	1.3	2.4	1.6	5.3	
ML	Kesrewan	Wata el Jaouz5	20,434	122,544	2007	Average	1.3	2.4	1.5	5.2	
ML	Kesrewan	Kfar Zebian1	25,286	213,210	2007	Average	1.7	2.5	1.9	6.0	1
ML	Kesrewan	Kfar Zebian2	4,274	312,250	2007	Sand	1.8	2.2	0.3	4.3	1
ML	Kesrewan	Kfar Zebian3	6,686	80,325	2007	Average	0.9	2.2	0.5	3.6	1
Mount Leb		102	4,269,855	52,967,637			289.8	238.6	316.0	844.4	19
Akkar	Akkar	Jebrael1	43,094	1,295,093	1970	Average	3.6	0.8	3.2	7.7	1
Akkar	Akkar	Andkit1	24,186	337,572	1970	Average	1.5	0.8	1.8	4.1	

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Akkar	Akkar	Bizbina1	27,330	452,630	1970	Average	1.8	0.8	2.0	4.6	1
Akkar	Akkar	Bizbina2	5,461	70,960	1970	Gravel	0.7	0.7	0.4	1.8	
Akkar	Akkar	Takrit1	9,121	63,911	1970	Average	0.8	0.7	0.7	2.1	
Akkar	Akkar	Takrit2	1,668	11,784	1970	Gravel	0.5	0.7	0.1	1.3	1
Akkar	Akkar	Takrit3	1,874	9,539	1970	Gravel	0.5	0.7	0.1	1.3	1
Akkar	Akkar	Takrit4	11,889	13,087	1970	Average	0.7	0.7	0.9	2.3	
Akkar	Akkar	Takrit5	36,140	646,501	1970	Average	2.3	0.8	2.7	5.8	
Akkar	Akkar	Takrit6	5,516	46,640	1970	Average	0.7	0.7	0.4	1.8	1
Akkar	Akkar	Takrit7	4,604	43,303	1970	Average	0.6	0.7	0.3	1.7	
Akkar	Akkar	Takrit8	33,955	508,581	1970	Average	2.0	0.8	2.5	5.3	
Akkar	Akkar	Takrit9	4,404	43,720	1970	Average	0.6	0.7	0.3	1.7	1
Akkar	Akkar	Takrit10	9,664	73,924	1970	Average	0.8	0.7	0.7	2.2	1
Akkar	Akkar	Takrit11	3,484	37,944	1970	Average	0.6	0.7	0.3	1.6	
Akkar		15	222,390	3,655,189			17.7	10.9	16.5	45.0	7
North Leb	Batroun	Bche'leh1	3,390	27,862	2007	Average	0.7	0.4	0.3	1.3	
NL	Batroun	Bche'leh2	12,362	66,961	2007	Average	0.9	0.4	0.9	2.2	1
NL	Batroun	Bche'leh3	5,857	34,597	2007	Average	0.7	0.4	0.4	1.5	
NL	Batroun	Bche'leh4	10,243	53,789	2007	Mosaic	0.8	0.4	0.8	2.0	
NL	Batroun	Bche'leh5	10,993	23,875	2007	Mosaic	0.7	0.4	0.8	1.9	1
NL	Batroun	Bche'leh6	15,074	127,094	2007	Average	1.2	0.4	1.1	2.7	1
NL	Batroun	Chateen1	10,002	133,611	2007	Gravel	1.1	0.4	0.7	2.3	
NL	Batroun	Bdeyhoun1 Cim. Nationale	931,135	13,635,819	2007	Average	67.2	0.8	68.9	136.9	
NL	Batroun	Chekka1 Holcim + Cim. N.	882,971	11,710,846	2007	Average	58.9	1.7	65.3	126.0	
NL	Batroun	Chekka2 Holcim	440,277	2,451,126	2007	Average	16.3	0.7	32.6	49.6	
NL	Batroun	'A'e1	8,916	131,852	2007	Average	1.1	0.4	0.7	2.2	
NL	Batroun	'A'e2	21,343	296,433	2007	Average	2.0	0.4	1.6	3.9	1
NL	Bcherreh	Barhalyoun1	5,119	16,106	1970	Average	0.6	0.2	0.4	1.2	1
NL	Bcherreh	Barhalyoun2	16,138	19,093	2007	Gravel	0.8	0.3	1.2	2.2	
NL	Bcherreh	Barhalyoun3	3,602	18,797	1970	Average	0.6	0.2	0.3	1.1	1

Mohafaza	Caza	Quarry Code Name	Area Used	Volume	Start Year	Extraction	Regulatory	COED	Rehabilita-	Total	Infringe- ment
			m ²	m ³	YYYY	Type	& Fiscal		tion		
							US\$ Million	US\$ Million	US\$ Million	US\$ Million	
NL	Bcherreh	Barhalyoun4	2,955	5,364	2007	Mosaic	0.6	0.2	0.2	1.0	
NL	Bcherreh	Beit Muzer1	15,735	40,026	2007	Average	0.9	0.3	1.2	2.3	1
NL	Bcherreh	Matrit1	2,239	4,914	1970	Average	0.5	0.2	0.2	0.9	
NL	Bcherreh	Matrit2	9,420	37,598	1970	Average	0.7	0.2	0.7	1.6	
NL	Bcherreh	Matrit3	5,414	14,906	1970	Mosaic	0.6	0.2	0.4	1.2	1
NL	Bcherreh	Matrit4	25,006	206,456	1970	Average	1.3	0.3	1.9	3.4	
NL	Dennieh	Al Hawakeer1	38,385	1,595,766	1970	Gravel	4.1	0.4	2.8	7.3	
NL	Dennieh	Jayroun1	5,058	20,129	1970	Gravel	0.6	0.3	0.4	1.3	
NL	Dennieh	Jayroun2	82,932	546,812	1970	Average	2.7	0.4	6.1	9.3	
NL	Dennieh	Jayroun3	7,165	20,464	1970	Average	0.6	0.3	0.5	1.5	
NL	Dennieh	Jayroun4	30,992	199,821	1970	Average	1.3	0.3	2.3	4.0	
NL	Dennieh	Jayroun5	5,127	9,279	1970	Gravel	0.6	0.3	0.4	1.3	
NL	Dennieh	Jayroun6	9,694	98,314	1970	Gravel	0.8	0.3	0.7	1.8	
NL	Dennieh	Kafr Hbou1	27,846	11,847	2007	Gravel	0.9	0.3	2.1	3.3	1
NL	Koura	Banharan1	16,394	54,109	2007	Average	0.9	0.3	1.2	2.5	1
NL	Koura	Kaftoun1	13,989	1,325	1970	Gravel	0.7	0.3	1.0	2.0	1
NL	Koura	Majdal1	48,574	501,079	2007	Gravel	3.0	0.4	3.6	7.0	
NL	Zgharta	Mizyara1	27,802	583,465	1970	Gravel	2.0	0.3	2.1	4.4	1
NL	Zgharta	Mizyara2	32,912	284,024	2007	Average	2.1	0.4	2.4	4.9	1
NL	Zgharta	Mizyara3	43,114	839,511	1970	Gravel	2.7	0.9	3.2	6.7	
North Leb		35	2,828,175	33,823,070			181.3	14.1	209.3	404.6	13
Nabatiyeh	Bint Jbeil	Ain Ebel1	19,885	248,759	1970	Gravel	1.2	0.5	1.5	3.2	
N	Bint Jbeil	Ain Ebel2	17,908	79,429	1970	Gravel	0.9	0.5	1.3	2.7	
N	Bint Jbeil	Beit Yahoun1	13,698	82,543	1970	Mosaic	0.8	0.5	1.0	2.4	
N	Bint Jbeil	Haris1	55,029	338,889	1970	Average	1.9	0.6	4.1	6.6	
N	Hasbaya	Berguess Khamees1	424,378	2,240,598	1970	Gravel	10.0	0.3	31.4	41.7	
N	Hasbaya	Berguess1	41,775	714,417	1970	Gravel	2.4	0.2	3.1	5.7	
N	Hasbaya	Berguess2	60,800	1,976,653	1970	Gravel	5.1	0.2	4.5	9.8	
N	Marjeyoun	Blat1	43,738	741,636	1970	Gravel	2.5	0.4	3.2	6.1	
N	Marjeyoun	Mari1	23,264	197,546	1970	Average	1.2	0.3	1.7	3.3	

Mohafaza	Caza	Quarry Code Name	Area Used	Volume	Start Year	Extraction	Regulatory	COED	Rehabilita-	Total	Infringe- ment
			m ²	m ³	YYYY	Type	& Fiscal	US\$	US\$	US\$ Million	
							Million	Million		Million	
N	Marjeyoun	Mari2	7,480	55,807	1970	Average	0.7	0.3	0.6	1.6	
N	Marjeyoun	Markaba1	52,732	686,317	1970	Average	2.6	0.4	3.9	6.9	
N	Nabatieh	Ain Qana1	4,897	49,632	1970	Gravel	0.7	1.0	0.4	2.0	
N	Nabatieh	Ain Qana2	8,527	123,063	1970	Gravel	0.8	1.0	0.6	2.5	
N	Nabatieh	Basfour1	409,710	6,811,358	1970	Gravel	18.8	1.7	30.3	50.8	
N	Nabatieh	Ara'iet el Jisr1	28,358	124,210	1970	Gravel	1.1	1.1	2.1	4.3	
N	Nabatieh	Kfour1	8,895	332,681	1970	Gravel	1.3	1.0	0.7	2.9	
N	Nabatieh	Kfour2	5,902	199,458	1970	Gravel	1.0	1.0	0.4	2.4	
N	Nabatieh	Kfour3	67,101	334,760	2007	Gravel	2.6	1.2	5.0	8.8	
N	Bint jbeil	Ain Ebel1	49,905	758,461	1970	Gravel	2.6	0.6	3.7	6.9	
N	Bint Jbeil	Al Ghandourieh1	21,221	185,928	1970	Gravel	1.1	0.5	1.6	3.2	
N	Marjeyoun	Chakra1	32,137	136,159	1970	Gravel	1.1	0.4	2.4	3.9	
N	Marjeyoun	Chakra2	30,657	113,682	1970	Gravel	1.1	0.4	2.3	3.7	
N	Nabatiyeh	Kfar Roumman1	22,612	488,313	1970	Gravel	1.7	1.1	1.7	4.5	
Nabatiyeh		23	1,450,609	17,020,299		-	63.1	15.1	107.3	185.6	
South Leb	Jezzine	Aichieh1	14,425	303,555	1970	Average	1.3	0.2	1.1	2.5	
SL	Jezzine	Aichieh2	13,815	92,912	1970	Sand	0.8	0.2	1.0	2.0	
SL	Jezzine	Aichieh3	26,273	255,215	1970	Average	1.4	0.2	1.9	3.5	
SL	Jezzine	Aichieh4	27,645	315,970	1970	Average	1.5	0.2	2.0	3.7	
SL	Jezzine	Aichieh5	53,714	639,356	1970	Sand	2.4	0.2	4.0	6.6	
SL	Jezzine	Aichieh6	6,833	65,267	1970	Average	0.7	0.2	0.5	1.4	
SL	Jezzine	Aichieh7	5,608	206,959	1970	Average	1.0	0.2	0.4	1.6	
SL	Jezzine	Aichieh8	6,002	181,110	1970	Average	0.9	0.2	0.4	1.5	
SL	Jezzine	Al Sarirah1	49,236	887,537	1970	Gravel	2.8	0.2	3.6	6.7	1
SL	Jezzine	Al Sarirah2	49,135	91,782	1970	Gravel	1.3	0.2	3.6	5.1	1
SL	Jezzine	Al Sarirah3	50,837	357,990	1970	Average	1.9	0.2	3.8	5.9	1
SL	Jezzine	Daraya1	117,709	615,107	1970	Sand	3.1	0.2	8.7	12.0	
SL	Jezzine	Daraya2	4,432	7,701	1970	Sand	0.6	0.2	0.3	1.1	
SL	Jezzine	Daraya3	5,379	41,477	1970	Sand	0.6	0.2	0.4	1.2	
SL	Jezzine	Daraya4	7,891	96,155	1970	Sand	0.8	0.2	0.6	1.5	

Mohafaza	Caza	Quarry Code Name	Area Used	Volume	Start Year	Extraction	Regulatory	COED	Rehabilita-	Total	Infringe-
			m ²	m ³	YYYY	Type	& Fiscal		tion		ment
							US\$ Million	US\$ Million	US\$ Million	US\$ Million	
SL	Jezzine	Daraya5	55,805	164,147	1970	Sand	1.5	0.2	4.1	5.8	3
SL	Jezzine	Jezzine1	30,269	111,989	1970	Average	1.1	0.2	2.2	3.6	
SL	Jezzine	Jezzine2	5,250	3,894	2007	Mosaic	0.6	0.2	0.4	1.1	
SL	Jezzine	Jezzine3	55,308	131,524	2007	Mosaic	1.7	0.2	4.1	6.0	
SL	Jezzine	Jezzine4	2,842	10,094	2007	Mosaic	0.6	0.2	0.2	0.9	
SL	Jezzine	Kfarhouna1	3,224	16,918	2007	Mosaic	0.6	0.2	0.2	1.0	
SL	Jezzine	Kfarhouna2	3,975	18,458	2007	Mosaic	0.6	0.2	0.3	1.1	
SL	Jezzine	Kfarhouna3	1,005	4,533	2007	Mosaic	0.5	0.2	0.1	0.8	
SL	Jezzine	Khallet Khazem1	67,337	452,555	2007	Sand	3.1	0.2	5.0	8.3	
SL	Jezzine	Khallet Khazem2	40,775	48,754	2007	Rocks	1.1	0.2	3.0	4.3	
SL	Jezzine	Krouh1	129,308	672,024	2007	Sand	4.7	0.2	9.6	14.5	1
SL	Saida	Mahmoudieh1	4,663	12,801	1970	Sand	0.6	0.2	0.3	1.1	
SL	Saida	Qarouh1	55,661	646,193	2007	Sand	3.7	0.2	4.1	8.0	
SL	Sour	Bablieh1	115,109	237,237	2007	Gravel	2.8	2.0	8.5	13.3	
SL	Sour	Bkesta1	13,763	184,868	1970	Average	1.1	1.6	1.0	3.7	1
SL	Sour	Beflieh1	14,917	442,367	1970	Average	1.6	0.9	1.1	3.5	
SL	Sour	Jouaya1	13,872	52,142	1970	Gravel	0.8	0.9	1.0	2.6	1
SL	Sour	Klayleh1	27,428	493,432	1970	Average	1.9	0.9	2.0	4.8	1
SL	Sour	Mazre't Mechref1	15,800	106,414	1970	Gravel	0.9	0.9	1.2	2.9	
SL	Sour	Nafakhieh1	76,779	1,772,938	1970	Gravel	4.9	1.0	5.7	11.6	
SL	Sour	Qana1	35,002	868,867	1970	Average	2.7	0.9	2.6	6.2	
SL	Sour	Qana2	10,341	30,038	1970	Average	0.7	0.8	0.8	2.3	1
SL	Sour	Rashkananieh1	122,641	1,958,893	1970	Gravel	5.8	1.1	9.1	16.0	1
SL	Sour	Tayr Harfa1	12,836	69,406	1970	Average	0.8	0.8	0.9	2.6	
South Leb		39	1,352,844	12,668,579			65.4	16.9	100.1	182.4	6
Grand Total		372	15,152,762	196,871,923			942.9	330.0	1,121.3	2,394.3	96

Table A5.2: Cement Clusters

Mohafaza	Caza	Quarry Code Name	Area Used	Volume	Start Year	Extraction Type	Regulatory & Fiscal	COED	Rehabilitation	Total	Infringement
			m ²	m ³	YYYY	US\$ Million	US\$ Million	US\$ Million	US\$ Million		
NL	Batroun	Bdeyhoun1 Cim. Nationale	931,135	13,635,819	2007	Average	67.2	0.8	68.9	136.9	
NL	Batroun	Chekka1 Holcim + Cim. N.	882,971	11,710,846	2007	Average	58.9	1.7	65.3	126.0	
NL	Batroun	Chekka2 Holcim	440,277	2,451,126	2007	Average	16.3	0.7	32.6	49.6	1
ML	Chouf	Sibline1	97,998	812,573	2007	Average	5.1	1.5	7.3	13.8	1
ML	Chouf	Sibline2	208,610	407,123	2007	Average	5.0	1.7	15.4	22.2	1
ML	Chouf	Sibline3	56,303	359,045	2007	Average	2.7	1.4	4.2	8.2	
ML	Chouf	Sibline4	105,603	568,897	2007	Average	4.2	1.5	7.8	13.5	
Total		7	2,722,897	29,945,429			159.4	9.3	201.5	370.2	

Annex 6

Template Legal Warning

انذار

(مع مطالبة بتعويض خاص ناتج عن أضرار لاحقة بالبيئة)

إلى السيد أو السادة _____

صاحب العقار رقم _____ من منطقة _____ قضاء _____ محافظة _____

بناءً على قرار مجلس الوزراء رقم ٤٥ تاريخ ٢٠١٩/٣/٢١ القاضي بالموافقة على سياسة الإدارة المتكاملة لقطاع محافر الرمل والأتربة والمقالع والكسارات،

وعملاً بأحكام المادتين ٢٤ و ٢٧ من المرسوم رقم ٨٨٠٣ تاريخ ٢٠٠٢/١٠/٤ وتعديلاته (تنظيم المقالع والكسارات)،

وعملاً بأحكام المواد ٨٦٦ وما يليها من المرسوم الاشتراعي رقم ٩٠ تاريخ ١٩٨٣/٩/١٦ (اصول المحاكمات المدنية)،

وعملاً بأحكام المواد ٥١، ٥٧ و ٦٣ من القانون رقم ٤٤٤ تاريخ ٢٠٠٢/٧/٢٩ (حماية البيئة)،

ولما كان استثماركم يتم خلافاً لأحكام المرسوم ٢٠٠٢/٨٨٠٣ وتعديلاته (تنظيم المقالع والكسارات)،

جننا بكتابتنا هذا نندركم بوجوب وقف العمل فوراً في العقار المذكور أعلاه، وبوجوب دفع مبلغ قدره _____ ل.ل.

وخلال مهلة عشرة أيام من تاريخ تبليغكم هذا الانذار، كتعويض عن الضرر اللاحق بالبيئة جراء عملكم دون ترخيص، وهو

يتضمن أيضاً قيمة العطل والضرر عن تأخركم في أعمال التأهيل وكلفة التأهيل، وذلك تحت طائلة القاء الحجز على العقار

واتخاذ الإجراءات القانونية التي تستتبعها وإنزال العقوبات المفروضة قانوناً بحقكم وبحق كل من استثمار أو استثمار

عقاركم.

وتفضلوا بقبول فائق الاحترام.

Annex 7

Selected Lebanese Laws and Regulations Governing the Quarry Sector

National Regulatory Reference	Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes	
The organization of quarries and crushers. Decree No. 8803 published on October 4, 2002 (Amended by Decree No. 16456 of 27/02/2006 and Decree No. 1735 of 14/04/2009)	Article 25 para. 1	Operator (natural / legal person)	Active quarry without a permit; Active quarry despite the expiry of the period of validity of the permit granted; Active quarry despite the issuance of a decision to stop the work; Active quarry despite the issuance of a decision to suspend the work temporarily.	A fine of LP10 to 20 million. The penalty will be doubled in the event of a repeat offence	N/A	N/A	The statute of limitations for criminal penalties is twice the length of the sentence imposed by the court. However, it may not exceed ten years or be less than five years. The statute of limitations for any other criminal penalty is five years.	N/A	N/A
Criminal Law of 1943 and its updates	Article 733	Operator (natural / legal person)	If a person intentionally destroys or damages something belonging to another person that is not specified in this article shall be punished by a fine not exceeding the value of the damage, but no less than LP20,000. If the value of the damaged items or the resulting damage exceeds LP20,000, in addition to the fine, it is possible to imprison the perpetrator for a period not exceeding six months.	A fine of at least LP20,000			Ibid.		
Criminal Law of 1943 and its updates	Article 770	Operator (natural / legal person)	Any violation other than that mentioned in para. 1 of the provisions of this decree or the conditions of the operating license.	A fine of LP7,000 to 600,000.	N/A	N/A	Ibid.	N/A	N/A

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
Decree No. 8803/2002 (Amended by Decree No. 16456 of 27/02/2006 and Decree No. 1735 of 14/04/2009)	Article 25 para. 2	Operator (natural / legal person)	Any violation other than that cited in paragraph 1 of the provisions of this decree or the conditions of the operating license.	A fine of LP10 to 20 million. The penalty shall be doubled in the event of a repeat offence.			N/A		
Decree No. 8803/2002 & amendments	Article 25 para. 3	Operator (natural / legal person)	Operation of a crusher outside quarries without authorization.	A fine of LP10 to 20 million. The penalty will be doubled in case of a repeat offence.	N/A	N/A	N/A	N/A	N/A
Decree No. 8803/2002 & Amendments	Article 26	Anyone (the operator or owner)	Prevent officially authorized and written administrative supervisors from entering quarries or obstruct their work.	A fine of LP5 to 10 million.	N/A	N/A	N/A	N/A	N/A
Environmental impact assessment procedures. Decree number 8633 published on August 7, 2012	Article 16 para. 1	The operator being the contracting authority except where the owner is himself the operator	For projects that require an environmental impact assessment report, as soon as the developer is informed of the decision to classify his project.	N/A	A fee of LP500,000		N/A	N/A	N/A
Environmental impact assessment procedures. Decree number 8633 published on August 7, 2012	Article 16 para. 2	The private operator being the contracting authority except where the owner is himself the operator	In the case of an exploitation project.	N/A	N/A	A net amount - as a guarantee is deposited with the MoE - of an initial value corresponding to 0.05% of the value of the project, in accordance with the value indicated by the contracting authority	N/A	N/A	N/A
Environmental impact assessment procedures. Decree number 8633 published on August 7, 2012	Article 16 para. 3	Public institutions in the event that they decide to operate a quarry		N/A	N/A	Include in the project budget the cost of reviewing the study and paying for it.	N/A	N/A	N/A
Environmental Protection Law No. 444 - promulgated on July 29, 2002	Article 51	The person responsible for any violation of the environment causing damage to people or the environment.		A special compensation for environmental damage could be claimed by the MOE.	N/A	N/A	N/A	N/A	N/A

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
Environmental Protection Law No. 444 - promulgated on July 29, 2002	Article 52 para. 1	In the case of quarries the person concerned is the operator or the owner if he is himself the operator	Those responsible for any damage to the environment caused by work carried out without authorization or in violation of applicable legal and regulatory provisions, in particular those related to initial environmental review studies or environmental impact assessment studies.	Take all measures leading to the elimination of damage, at their own expense.	N/A	N/A	N/A	N/A	N/A
Environmental Protection Law No. 44 – promulgated on July 29, 2002	Article 52 para. 2	The operator or owner when he is himself the operator	Any damage to the environment caused by work carried out without authorization or in breach of applicable laws and regulations, in particular those related to initial environmental review studies or environmental impact assessments.	Expenses resulting from the measures taken by the competent authorities to prevent any damage to the environment shall be borne by the person responsible for such damage.	N/A	N/A	The statute of limitations for criminal penalties is twice the length of the sentence imposed by the court. However, it may not exceed ten years or be less than five years. The statute of limitations for any other criminal penalty is five years.	N/A	N/A
Environmental Protection Law No. 444 - promulgated on July 29, 2002	Article 58	The operator or owner when he is himself the operator	In the event that the contracting authority implements a quarry project without an environmental impact assessment prior to the operation of the quarry.						
Environmental Protection Law No. 444 - promulgated on July 29, 2002	Article 60	The operator or owner if he is himself an operator	If the operator infringes the provisions of Law No. 444/2002 and its implementing texts relating to classified installations.	A fine of LP2 to 10 million. In case of a repeat offence the penalty is doubled.	N/A	N/A	N/A	N/A	N/A

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
Decree of procedures for the application of Article 61 of Law No. 144 of 31/7/2019 (Public Finance Law for 2019). Decree no. 6569 of 3/7/2020	Article 3	The operator and the owner	Any operator of a quarry bears the cost of the work carried out by the Directorate of Geographical Affairs on the site he operates. (Conducting an in-depth field survey throughout the Lebanese territory of all crusher, quarry and sand pit sites to determine the quantities of materials that have been extracted from these sites)		The cost of the work carried out by the Directorate of Geographical Affairs on the operated site.	N/A	N/A	N/A	According to article 5, any person who legally or illegally exploits a quarry in a property belonging to him or to someone else is considered an exploiter. In the event that the operator is not the owner of the property, the last owner, and any person whose property has been transferred to him since 2004 will be considered jointly and severally liable with him for the payment of taxes and fees. Except in the case where the aforementioned persons prove that the investor has infringed their property by virtue of court cases.
Decree of procedures for the application of Article 61 of Law No. 144 of 31/7/2019 (Public Finance Law for 2019). Decree no. 6569 of 3/7/2020	Article 4	The operator and the owner	The operator is subject to taxes and fees on the basis of the quantities extracted from the site operated from 2004 until the date of the investigation.		Fee based on quantities extracted from the site operated since 2004	N/A	N/A	N/A	Same note as above
Decree of procedures for the application of Article 61 of Law No. 144 of 31/7/2019 (Public Finance Law for 2019). Decree no. 6569 of 3/7/2020	Article 10	The operator	The MoE must collect the cost of environmental degradation, the cost of rehabilitation and impose a penalty for work without a permit, or for violation of the conditions of the permit, in accordance with the principles specified in environmental laws and other applicable texts.	The COED and rehabilitation. Penalty for working without a permit or for violating the conditions of the permit	N/A	N/A	N/A	N/A	N/A

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
Decree No. 8803 published on October 4, 2002 (Amended by Decree No. 16456 of 27/02/2006 and Decree No. 1735 of 14/04/2009)	Article 23	The operator	The operating allowance fees for each quarry are fixed annually by decision of the Minister of Finance in the light of a report drawn up by the National Quarry Council.	Violation of the provisions of the law regarding non-compliance with tax obligations exposes the subject to numerous financial penalties. Only one offence is punishable by the highest payment penalty among the fines imposed under section 48 of the Act. The offender remains subject to the general laws in all that is not contrary to the provisions of the law on value added tax (penal code, civil judicial procedures, procedures for the recovery of indirect tax)	Quarrying Allowance Fees	N/A	N/A	N/A	The text concerning the payment penalty differs between companies and individuals in the event of non-declaration.
Licensing Mechanism for the Rehabilitation of Extraction Sites MoE Decision No. 48 of 17/6/20/2009	Article 8	The fees are determined by a decision of the Minister of Finance on the proposal of the MOE. The annual operating fee of one square meter of the quarry or crusher area for the area specified in the authorization decision is determined according to the following amounts:							
Determination of Quarrying Fees and Allowances MoF Decision No. 1113/1 of November 12, 2010	Article 2	<ul style="list-style-type: none"> - Rock quarries for crushers and landfills LP15,000 - Rock quarries for the mosaic industry LP20,000. - Ornamental stone quarries and free construction LP30,000 - Quarries dedicated to the manufacture of earth LP18,000 - Sand quarries and naturally crushed gravel LP20,000. <p>The annual fee is paid as soon as the authorization decision is issued and for the remaining duration of the first year. The fee is then paid in advance during the month of January of each year and collected for the benefit of the specialized municipal fund or the treasury fund. for quarries located outside the municipal territory.</p>							
Tax Procedure Law of November 11, 2008									

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
Decree No. 8803/2002 & amendments.	Article 7- 13 A	The operator	The value of the bank guarantee is determined by a decision of the Minister of the Environment.			N/A	N/A	N/A	N/A
MoE Dec No. 48 of 17/6/20/2009	Article 9								
Procedure for collecting the tax stamp for quarrying permits or MoF Decision No. 11854 of 11 February 2004	Article 2	The operator	The authorization to operate a quarry or crusher is subject to a tax stamp of LP2,500,000, granted for the entire duration of the license and paid at the time of license grant and renewal.		A tax stamp of LP2,500,000	N/A	N/A	N/A	N/A
	Article 3	The operator	A commission of LP1,000 is levied in favor of the Treasury for each cubic meter of material extracted from the quarry or crusher.		A commission of LP1,000 for each cubic meter of materials extracted	N/A	N/A	N/A	N/A
	Article 4	The operator	Each operator declares ex officio and without the need for notification to the Directorate of Finance the quantities extracted monthly and pays the fees relating thereto, within a maximum period of the fifteenth day of the month following the month in which the declaration relates.		A fee based on the declaration	N/A	N/A	N/A	N/A

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
	Article 6	The operator	The first monthly declaration must be accompanied by a financial guarantee of a value equal to twice the fee that was due to the public treasury for the production of the first month of start of the works, and it shall be renewed annually by an amount equal to the average fee collected for the quantities declared during two full months of the previous year, or for the quantities extracted indicated by the expert report referred to in Article 9 of this Decree (whichever is higher). The financial guarantee is returned only after the work has been definitively stopped and the investor is relieved of liability.		N/A	Financial guarantee equal to twice the fee that was due to the public treasury for the production of the 1st month of start of the works. It shall be renewed annually by an amount equal to the average fee levied for the quantities declared during 2 full months of the preceding year.	N/A	N/A	N/A
The tax stamp Legislative Decree No. 67 of 5 August 1967	Point 5 of Annex 1 to the legal text	The operator	In the event of an infringement involving a document or documents common to several taxes, the highest fine will be applied to the tax difference.	The highest fine	N/A	N/A	N/A	N/A	

National Regulatory Reference	Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
	The operator	<ol style="list-style-type: none"> 1. Do not affix stamps with the value of the required fees, or affix stamps whose value is less than the value of the required fees; 2. Do not mark with the value of the required fees, or put a mark whose value is less than the value of the required fees; 3. Do not collect and conceal part of the fee that institutions subject to the periodic payment method must collect from of the interveners, or conceal what has actually been collected, in whole or in part, and not declare it to the competent financial service when paying the sum of the said commission to the Fund. 	A fine equivalent to five times the royalty or portion of the royalty that the Treasury lost as a result of the violation.	N/A	N/A	N/A	N/A	
	The operator	Any person who delays the payment of the fee imposed on him in cash to the treasury fund beyond the specified period,	A fine equivalent to five times the fee will be imposed.	N/A	N/A	N/A	N/A	
	The operator	Delay or failure to keep the register provided for in Article 32 of the Tax Stamp Act, as well as the register provided for in Article 52 of the Tax Stamp Act	A fine of 50% of the value of the fees due as a result of this violation	N/A	N/A	N/A	N/A	
	The operator	In the event that the information required by law to be recorded in the registers mentioned in the first clause of this article is not recorded,	A fixed fine of LP250,000 will be imposed.	N/A	N/A	N/A	N/A	

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
		The operator	In case of non-payment of the tax due for a specified tax period within the legal deadlines, or in case of insufficiency of the tax paid.		N/A	N/A	N/A		Apart from the payment penalty, a late payment penalty at the monthly rate of the amount of the unpaid tax and 1.5% per month for taxes levied at source and for value added tax, the fraction of a month is considered a whole month.
The Forest Law of 1949	Article 100	The operator	The Department of Forests, in agreement with the Ministry of Public Works, determines the conditions for the extraction of building materials while preserving the forest. The department, if applicable, determines the compensation that must be paid to the State for land works and for the value of the materials extracted.		The compensation to be paid to the State for land works and for the value of the materials extracted.	N/A	N/A	N/A	
Determination of the documents and conditions related to the permit to operate the ornamental stone quarries (block) and the building outside Plan No. (1) annexed to Decree No. 8803/2002 Resolution n° 53/1 - issued on 26/10/2011	Article 5 Para. 1-10	The operator	The operator must submit to the National Quarry Council a bank guarantee, the value of which is determined by the Minister of the Environment in his capacity as head of the National Quarry Council for each cubic meter of the planned operation within one year; The bank guarantee deposited with the MOE is subject to the execution by the applicant/operator of the necessary rehabilitation works because it is a cover allowing the operator to fulfil all his obligations, including proper compliance with the implementation of the decision of the National Quarry Council and a guarantee for the rehabilitation of the ornamental stone quarries and the building.		N/A	A bank guarantee, the value of which is determined by the Minister of the Environment in his capacity as head of the National Quarry Council for each cubic metre of the planned operation within one year.	N/A	N/A	

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
Penal Code	Article 737	Anyone who does not hold official title or disposition and takes possession of property or part of property of others shall be punished by imprisonment from one month to one year and a fine of LP200,000 to LP1 million. The penalty is increased in accordance with article 257 in each of the following two cases: 1- If the act was accompanied by threats or violence against persons or things. 2- If the usurpation occurred on all or part of the public roads or the state or communal domain.		N/A		N/A	N/A		
Penal Code	Article 738	The operator	The operator must submit to the National Quarry Council a bank guarantee, the value of which is determined by the Minister of the Environment in his capacity as head of the National Quarry Council for each cubic meter of the planned operation within one year;	N/A	N/A	A bank guarantee whose value is determined by the Minister of the Environment in his capacity as head of the National Quarry Council for each cubic meter of the planned operation within one year.	N/A	N/A	

National Regulatory Reference	Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
		The bank guarantee deposited with the MOE is subject to the execution by the applicant/operator of the necessary rehabilitation works because it is a cover allowing the operator to fulfil all his obligations, including proper compliance with the implementation of the decision of the National Quarry Council and a guarantee for the rehabilitation of the ornamental stone quarries and the building;						
Determination of the documents and conditions related to the permit to operate the ornamental stone quarries (block) and the building outside Plan No. (1) annexed to Decree No. 8803/2002 Resolution n° 53/1 - issued on 26/10/2011	Article 3	The operator	Among the documents required to obtain a permit to exploit the ornamental stone quarries (block) and the building: A bank guarantee issued by a bank recognized by the Lebanese State in favor of the MOE, worth LP27,000 for each cubic meter to be extracted within one year, to be submitted to the Ministry of Environ-ent - the National Quarry Council, after approval by the National Career Council of the permit;	N/A	A bank guarantee issued by a bank recognized by the Lebanese State in favour of the MoE, with a value of LP/27,000/ for each cubic meter to be extracted within one year	N/A	N/A	This decree lists the documents required for the granting of a permit to operate this type of quarry such as plans, geological reports, the report listing the necessary tools and reports concerning rehabilitation. It also sets out the conditions necessary for permit approval the conditions are environmental, safety and signage.
Determination of the documents and conditions related to the permit to operate the ornamental stone quarries (block) and the building outside Plan No. (1) annexed to Decree No. 8803/2002 Resolution n° 53/1 - issued on 26/10/2011	Article 5	The operator	The operator must submit to the National Quarry Council a bank guarantee, the value of which is determined by the Minister of the Environment in his capacity as head of the National Quarry Council for each cubic meter of the planned operation within one year;	N/A	N/A	A bank guarantee whose value is determined by the Minister of the Environment in his capacity as head of the National Quarry Council for each cubic meter of the planned operation within one year	N/A	

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
			The bank guarantee deposited with the MOE is subject to the execution by the applicant/operator of the necessary rehabilitation works because it is a cover allowing the operator to fulfil all his obligations, including proper compliance with the implementation of the decision of the National Quarry Council and a guarantee for the rehabilitation of crushers for the manufacture of mosaic gravel outside Plan No. (1) annexed to Decree No. 8803/2002						
Determination of documents and conditions relating to the permit and operation of rock quarries and crushers for the manufacture of mosaic gravel outside Plan No. (1) annexed to Decree No. 8803/2002 Resolution n° 53/1 - issued on 26/10/2011	Article 3	The operator	Among the documents required to obtain a permit to exploit rock quarries and crushers for the manufacture of mosaic gravel: A bank guarantee issued by a bank recognized by the Lebanese State in favour of the MOE, worth LP27,000 for each cubic meter to be extracted within one year, to be submitted to the MOE - the National Quarry Council, after approval by the National Career Council of the permit;	N/A	N/A	A bank guarantee issued by a bank recognized by the Lebanese State in favour of the MoE, worth LP27,000 for each cubic meter to be extracted within one year	N/A	N/A	This decree lists the documents required for the granting of a permit to operate this type of quarries such as plans, geological reports, the report listing the necessary tools and reports concerning rehabilitation. It also sets out the conditions necessary for permit approval the conditions are environmental, safety and signage.

National Regulatory Reference		Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
<p>Determination of documents and conditions relating to the permit and operation of rock quarries and crushers for the manufacture of mosaic gravel outside Plan No. (1) annexed to Decree No. 8803/2002</p> <p>Resolution n° 53/1 - issued on 26/10/2011</p>	Article 4	The operator	<p>Annual renewal: Permits are renewed annually, after confirmation by the National Quarry Council of the validity of the operation to date, and upon presentation of the following documents according to the applicable rules and within three months before the expiry date of the permit: A bank guarantee whose renewal or regularization is subject to: If it is proven that the operation and rehabilitation works have proceeded as planned in the integrated study, the bank guarantee will be renewed in the amount of LP27,000. For each cubic metre of production expected within one year from the date of renewal;</p> <p>If the integrated study submitted by the operator at the time of the permit application indicates a delay in the qualification processes for technical reasons, the bank guarantee in the amount of LP27,000. For each cubic metre, will be amended to include the quantity extracted in addition to the quantity that is expected to be extracted during the renewal period;</p> <p>If the operator interferes with the work programme as provided for in the integrated study he has submitted, the National Quarry Council has the right to confiscate part or all of the bank guarantee,</p>	N/A	N/A	<p>Renewal of the bank guarantee:</p> <p>up to LP27,000 for each cubic metre of production expected within one year from the date of renewal;</p> <p>The bank guarantee may be confiscated in the event of a breach and the value of this guarantee may be increased to cover cubic metres not covered by the original guarantee.</p>	N/A	N/A	

National Regulatory Reference	Entities concerned	Details	Fines	Royalties	Guarantees	Statute of Limitation	Late payment penalty	Notes
		<p>or to request a modification of the study according to a new work programme and also request a modification of the value of the bank guarantee to cover the cubic metres extracted and not covered by the bank guarantee, in addition to each cubic metre scheduled to be extracted during the renewal period;</p> <p>If it is proven that the farm has exceeded the area mentioned in the integrated study, it is up to the National Quarry Council to take the appropriate decision regarding this change;</p>						
<p>Determination of documents and conditions related to the permit and operation of crushers (without quarries) for the construction of public or private projects outside Plan No. (1) annexed to Decree No. 8803/2002</p> <p>Resolution n° 54/1 - 26/10/2011</p>	Article 5	The operator	N/A	N/A	A bank guarantee whose value is determined by the Minister of the Environment in his capacity as head of the National Quarry Council for each cubic meter of the planned operation within one year.	N/A	N/A	

Annex 8

Selected French Laws and Regulations Governing the Quarry Sector

French Regulatory Reference	Details
Environmental Code Article L516-1	<p>The operationalization, both after the initial authorization and after an authorization to change operator, of facilities defined by decree in the Council of State presenting significant risks of pollution or accident, quarries and waste storage facilities is subject to the constitution of financial guarantees.</p> <p>These guarantees are intended to ensure, depending on the nature of the dangers or disadvantages of each category of installation, the monitoring of the site and the safe maintenance of the installation, any interventions in the event of an accident before or after closure, and rehabilitation after closure. They do not cover compensation payable by the operator to third parties who may suffer damage as a result of pollution or accident caused by the installation.</p> <p>A decree in the Council of State determines the nature of the guarantees and the rules for fixing their amount. That decree lays down the conditions under which sums paid in respect of financial guarantees are exempt from seizure, within the meaning of Article L. 112-2 of the Code of Civil Enforcement Procedures, by way of derogation from Articles 2284 and 2285 of the Civil Code, and the conditions for their use in the event of the opening of insolvency proceedings.</p> <p>Without prejudice to the administrative fine procedure provided for in 4° of II of Article L. 171-8, breaches of the obligations of financial guarantees give rise to the application of the deposit procedure provided for in 1° of II of Article L. 171-8, regardless of the criminal proceedings that may be exercised.</p>
Environmental Code Article L516-2	<p>For installations falling within the categories referred to in Article L. 516-1, the operator is required to inform the prefect in the event of a substantial change in the technical and financial capacities referred to in Article L. 181-27 (The authorisation takes into account the technical and financial capacities that the petitioner intends to implement, capable of enabling him to carry out his project)</p> <p>If he finds that the technical and financial capacities are not likely to meet the obligations of Article L. 181-27, the prefect may impose the constitution or revision of the financial guarantees referred to in Article L. 516-1.</p> <p>A decree in the Council of State defines the modalities of application of Article L. 516-1 and this article as well as the conditions of their application to installations regularly commissioned or authorized before July, 31 2003.</p>
Environmental Code Article L171-8	<p>I.-Regardless of the criminal proceedings that may be exercised, in the event of non-compliance with the requirements applicable under this Code to installations, works, works, developments, operations, objects, devices and activities, the competent administrative authority shall give formal notice to the person who is responsible for the obligation to comply with them within a period to be determined by it. In the event of an emergency, it shall lay down, by the same act or by a separate act, the measures necessary to prevent serious and imminent dangers to health, public safety or the environment.</p>

French Regulatory Reference	Details
	<p>II.-If, at the expiry of the time limit, it has not been complied with the formal notice, the emergency measures mentioned in the last sentence of I of this article or the measures ordered on the basis of II of Article L. 171-7, the competent administrative authority may adopt one or more of the following administrative penalties:</p> <p>1- Oblige the person put in demand to deposit in the hands of a public accountant before a date determined by the administrative authority an amount corresponding to the amount of the work or operations to be carried out.</p> <p>This sum benefits from a privilege of the same rank as that provided for in Article 1920 of the General Tax Code. It is proceeded to its recovery as in the case of debts of the State foreign to tax and domain.</p> <p>2- Proceed ex officio, in place of the person put on notice and at his expense, to the execution of the prescribed measures. The sums deposited pursuant to 1- of this II shall be used to settle the expenses thus incurred;</p> <p>3- Order the payment of an administrative fine of no more than € 15,000, recovered as in the case of debts of the State foreign to tax and domain, and a daily penalty payment at most equal to € 1,500 applicable from the notification of the decision fixing it and until satisfaction of the formal notice or the measure ordered. The second and last paragraphs of the same 1° apply to the penalty payment.</p> <p>Fines and periodic penalty payments shall be proportionate to the seriousness of the infringements found and shall take into account, in particular, the extent of the disturbance caused to the environment.</p> <p>The fine may not be imposed beyond a period of three years from the discovery of the infringements.</p>
<p>Mining Code Article L333-7</p>	<p>The holder of an exclusive quarry permit is required to pay the owner of the surface, independently of the occupancy allowance provided for in Article L. 153-12, a fee based on the tonnage extracted.</p> <p>In the absence of an amicable agreement, its amount is fixed by the judicial judge, at the request of the most diligent party, taking into account in particular the contracts concluded for the transfer of the right to exploit similar quarries, the consistency of the deposit, the value of the materials likely to be extracted, the conditions of exploitation and the damage suffered.</p> <p>The value of the royalty mentioned in the preceding paragraph for the owner of the surface remains united to the value of that area and is allocated with it to the hypothecs taken by the creditors of that owner.</p>
<p>Mining Code Article L333-7</p>	<p>In return for the exemption from the land contribution granted to them for certain activities, mining companies are liable to departmental and communal mining fees.</p> <p>The fee is due for the entire year according to the situation on January 1 of the tax year.</p> <p>The taxable amount is the net tonnages of products extracted in the previous year.</p> <p>Royalty rates are set each year, with the assent of the General Council of Mines and the Council of State, by decree of the Minister for Mines, the Minister for the Budget and the Minister for the Interior.</p>

French Regulatory Reference	Details
<p>General Tax Code Articles 1519 and 1587</p>	<p>In return for the exemption from the land contribution granted to them for certain activities, mining companies are liable to departmental and communal mining fees.</p> <p>The fee is due for the entire year according to the situation on January 1 of the tax year.</p> <p>The taxable amount is the net tonnages of products extracted in the previous year.</p> <p>Royalty rates are set each year, with the assent of the General Council of Mines and the Council of State, by decree of the Minister for Mines, the Minister for the Budget and the Minister for the Interior.</p>
<p>General Tax Code Article 311 D of Annex II</p>	<p>The fee is collected by assessment. It is payable to the Accountant's Fund of the Directorate-General for Public Finance on which the place of taxation depends. A surcharge of 10% for late payment applies where applicable.</p> <p>The claim period expires on December 31 of the following year depending on the period:</p> <ul style="list-style-type: none"> • the assessment of the roll; • the realization of the event that motivates the complaint; • the receipt by the taxpayer of a new tax notice repairing the shipping errors contained in the one sent previously; • during which the taxpayer has become aware of certain or unduly established direct tax assessments. <p>When the taxpayer is the subject of a recovery or rectification</p>
<p>Draft Amendment of article 1371 of the Civil Code</p>	<p>The author of manifestly deliberate fault, and in particular of a profit-making fault, may be condemned, in addition to compensatory damages, to punitive damages which the judge has the right to benefit for a part to the Treasury. The court's decision to award such damages must be specially reasoned and their amount distinguished from that of other damages.</p>

Source: Compiled by Josiane Yazbeck



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