Kosovo: Healing Land for the Future

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List of Abbreviations

Abbreviation	In Full
AI	Administrative Instruction
BGS	British Geological Survey
CBK	Central Bank of Kosovo
CL:AIRE	Contaminated Land: Applications in Real Environments
CLRP	Clean-Up and Land Reclamation Project
CSM	Conceptual Site Model
DEFRA	Department of Food Environment and Rural Affairs
DoWCoP	Definition of Waste Code of Practice
DST	Decision Support Tool
EEA	European Environmental Agency
EC	European Commission
EIA	Environmental Impact Assessment
EIS	Environmental Information System
ESIA	Environmental and Social Impact Assessment
EU	European Union
EUO	European Union Office
EUR	Euro (European currency)
EY	Ernest & Young
FAO	Food and Agriculture Organization
GAC	Generic Assessment Criteria
GDP	Gross Domestic Product
GIS	Geographical Information System
GIZ	German Corporation for International Cooperation
GoK	Government of Kosovo
HERA	Human and Environmental Risk Assessment
HMRC	Her Majesty Revenue & Customs
HOMBRE	Holistic Management of Brownfield Regeneration
HWM	Hazardous Waste Material
ICMM	Independent Commission for Minerals and Mines
IFI	**I**nternational Financing Institution
IHW	Industrial Hazardous Waste
IPPC	Integrated Prevention Pollution Control
ISO	International Organization for Standardization
INTRC	Interstate Technology and Regulatory Council
KEK	Kosovo Energy Corporation
KEPA	Kosovo Environmental Protection Agency
KES	Kosovo Environmental Strategy
KFVA	Kosovo Food and Veterinary Agency
KFOR	Kosovo Force/NATO
KGS	Kosovo Geological Survey

Abbreviation	In Full
KPA	Kosovo Privatization Agency
KPI	Key Performance Indicators
KSA	Kosovo Statistical Agency
KTA	Kosovo Trust Agency
MAFRD	Ministry of Agriculture, Forestry and Rural Development
MED	Ministry of Economic Development
MESP	Ministry of Environment and Spatial Planning
MIP	Mitrovica Industrial Park
MTI	Ministry of Trade and Industry
NEAP	National Environmental Action Plan
NGO	Nongovernmental Organization
NICOLE	Network for Industrially Co-ordinated Sustainable Land Management in Europe
NL	Netherland
OECD	Organization for Economic Co-operation and Development
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCT	Polychlorinated Terphenyls
RBLM	Risk Based Land Management
RPS	Regulatory Position Statements
SCS	Soil Contaminant Standards
SME	Small and Medium Enterprises
SOE	Socially Owned Enterprises
SPOSH	Significant Possibility of Significant Harm
S-P-R	Source Pathway Receptor
SRBLM	Sustainable Risk Based Land Management
SSAC	Site Specific Assessment Criteria
TA	Technical Assistance
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Environmental Program
UNMIK	United Nations Mission in Kosovo
VAT	Value Added Tax
WB	The World Bank

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Executive Summary

BACKGROUND

Land contamination is a hidden problem that does not hold the same place in political debate as other environmental problems such as air pollution or waste management—but it is no less grave. Contaminated land can harm the communities' health in many ways. The dangers include poor air quality, increased risk of disease, limited access to healthy foods, a lack of options for physical activity, poor housing quality, and environmental damage leading to toxic air, water, or soil. The legacy of contaminated land in Kosovo has substantial impacts on the society, the environment, and the economy of the country. This includes impacts on human health through direct exposure to contaminated sites, and indirectly through threats to Kosovo's relatively scarce water resources from land contamination, as well as wider environmental risks (e.g., to ecology and agriculture) from land contamination, including transboundary risks via surface water.

Contaminated land impacts are often insidious and cumulative over time. This creates major economic, environmental, and social risks (e.g., from contaminated water or housing situated on contaminated sites). Significant and high-profile incidents may be triggered suddenly and without warning. For example, Denmark, the Netherlands, and the United States in the 1980s to 1990s experienced major incidents from housing on contaminated land. More recently, China experienced an internationally significant incident from a school on a contaminated site. These incidents can have far-reaching political and economic consequences for governments as well as serious impacts on the lives of the people affected.

Structured and appropriate management of contaminated sites improves the functioning of real estate markets, spatial planning, and the sustainable use of land. Agricultural land loss in Kosovo and an absence of legislation governing spatial planning have been flagged by the European Commission as obstacles to Kosovo's preparations for accession to the European Union (EU). Taking agricultural or nature lands for urban development is a major sustainability concern, and Kosovo's land take is abnormally high compared to other countries. Kosovo's land take for development is currently more than six times that of Germany's in relation to the two countries land areas. Moreover, Germany's policy is to reduce its land take by 40 percent over the coming years, as it sees its existing current rate of land take as deeply unsustainable.

Reusing brownfield land is one of the principal actions that can be used to protect human health and the environments and reduce unsustainable levels of land take. Contaminated sites can be redeveloped into healthier and safer environments. In parallel, brownfields regeneration creates opportunities to realize value from degraded land for uses such as commercial and housing development, renewable energy, and the creation of urban green space. This creates new economic activity and improves the livability of towns and cities, which in turn creates highly visible social benefits. Proper functioning of this land "recycling" is contingent on a reliable regulatory and policy framework for contaminated site management integrated into both the environmental and spatial policy domains. A clear contaminated sites regime is also needed to underpin privatization and commercial merger and acquisition processes, as without it longer-term environmental liabilities cannot be estimated. International investors would regard the absence of such a regime as a major investment risk.

Contaminated sites in Kosovo are largely unmanaged; the country has, however, carried out an initial inventory of what it considers particularly significant sites (termed "hotspots"). A 2018 administrative instruction sets out the first legal and regulatory regime for contaminated land. However, this instruction is not complete in its coverage. It has also not yet been broadly implemented, nor does it yet include supporting guidance, tools, resources, and know-how to support full deployment. In 2008 the Kosovo Environmental Protection Agency (KEPA) published a state of the environment report for 2006–2007 that included some initial review of the status of soils in Kosovo. This was followed in 2011 by a joint Ministry of Environment and Spatial Planning (MESP) and KEPA publication which identified 28 hotspot sites considered to be "areas of high pollution in Kosovo." This was a first listing exercise to support the interest of international institutions in managing these sites.

OBJECTIVES

This objective of this report is to provide guiding principles and recommendations for establishing a contaminated site management program in Kosovo that accords with international good practice in sustainable and risk-based land management (SRBLM). Better management of the legacy of land contamination in Kosovo from industry, mining, infrastructure, business, and waste management point sources, will create multiple sustainability benefits and bring tangible economic advancement to Kosovo. The guiding principles for Kosovo apply international norms of good practice in contaminated site management, based on a sustainable and risk-informed basis to:

- Provide an objective rationale for managing individual sites to mitigate harm and limit impacts on financial resources, the environment, the economy, and society.
- Prioritize decisions across sites based on their capacity to cause harm and to maximize beneficial outcomes given available public resources.
- Understand contaminated site management benefits and impacts on financial resources, the environment, the economy, and society.
- Reduce land take for urban and industrial development by facilitating the reuse of treated brownfield sites.

The guiding principles build on positive developments in Kosovo, including hotspot inventory work, ambitions for a cadastre of contaminated sites, and a new administrative instruction related to contaminated soil. These already point in the direction of sustainable risk-based land management. The guiding principles also build on the ideas, enthusiasm, and engagement of Kosovar officials, practitioners from the public and private sectors, and experts who worked with the World Bank team during the course of preparing this report, including a training and consultation workshop in Pristina on May 2–3, 2019.

The guiding principles include eight key broad themes, with each theme describing the current situation in Kosovo (including both positives and deficiencies); setting out a direction for improvement and the desired end goal; and identifying actions to achieve this improvement. The eight themes are,

- Promoting sustainable and risk-based land management for contaminated sites.
- Providing clarity on the boundary between what is considered contaminated versus not contaminated and the actions that ensue.
- Inventorying sites to understand the scale of the problem, to identify, prioritize, and managing sites, and to gain access to information.

- Developing a clear approach to the management of liabilities and supporting a polluter pays principle as much as possible.
- Providing a framework for policy and governance and the supporting tools and guidance needed for its implementation.
- Delivering effective risk management and sustainable remediation for sites requiring action, in particular sites where wider synergies and benefits are possible.
- Supporting the development of wider sectoral know-how.
- Encouraging transparent procurement procedures and reporting.

This report also helps to understand the potential scale of the contaminated site management challenge in Kosovo. It expands on an existing 2011 "hotspots" report to develop a more comprehensive inventory approach for contaminated sites. Furthermore, it provides steps for inventorying and prioritizing contaminated sites following international good practices and includes examples from the legal and institutional setup in the United Kingdom for land contamination management and how the municipality of Chongqing in China applied the principles of good international practice for contaminated site management. These examples can further guide Kosovo in setting up specific legal and institutional arrangements for SRBLM in the country.

SUMMARY FINDINGS

The number of contaminated sites in Kosovo that will require remediation has been estimated to be around 200. This is extrapolated from an estimation of 4,000 sites where contamination might be at least suspected on the basis of past and current use. This estimate equates to 0.37 suspect sites per km^2 of Kosovo's 10,887 km^2 land area, which is relatively low by European standards. Similar estimates for other European countries include the Netherlands at 16.5 suspect sites per km^2 of land area; England and Wales at 1.98; and Hungary at 0.43. The identification of suspect sites based on their past and current use is in line with typical international practice for initial site identification as well as a previous draft European Commission (EC) Soils Directive. It is also in line with a contaminated sites cadastre approach that Kosovo itself suggested in its response to a 2011 EC survey. The extrapolation of 200 sites possibly requiring remediation is based on the experience of Hungary, which has good available inventory data and a similar number of suspect sites *pro rata* for its land area. Many of these suspect sites are likely to be relatively small (e.g., gas stations, vehicle repair shops) and in the hands of small businesses that are poorly equipped to manage potential land contamination issues.

The total cost of site-based actions for managing the entire Kosovo contaminated land legacy is cautiously estimated to be €345 million over 20 years. In 2014, the average annual expenditure per capita on contaminated site management in European countries (including some Balkan states) was reported to be €10 from public and private sources. If a similar level of investment is achieved in Kosovo, this equates to €20 million per annum at 2019 prices. While these estimated costs seem large, they are in line with, *or less than*, other countries' investments in contaminated land management. Moreover, they are also relatively low compared to other types of major infrastructure investments and have the potential to generate significant economic value through the enhanced reuse of brownfield land and its wider benefits. At this level of spending Kosovo is predicted to have largely dealt with its contaminated land legacy within 20 years. This would be a major achievement compared with most European countries. Furthermore, well targeted contaminated sites management projects may also have great attractiveness for support from international partners and donors, already active in Kosovo.

The scale of the contaminated site management challenge in Kosovo is large given the resources available; hence, some form of prioritization is required. The key policy domains for contaminated site management in Kosovo are environmental regulation and spatial planning. Kosovo can follow well-established international approaches to prioritization. Internationally, the triggers for management (investigation, assessment, remediation) of sites are generally one or more of the following: i) enforcement action over a site's potential to cause harm; iii) a planning application to develop a site; and/or iii) corporate triggers such as privatization, mergers and acquisition, or liabilities management. In general, the prioritization of sites emerging via the planning process or as a result of corporate triggers is primarily bottom-up, wherein the decision to act is made by the site owner/manager on the basis of their own specific site and its economic circumstances. The prioritization of sites for enforcement actions is generally on the basis of the seriousness of the potential harm that might arise. However, the same contaminated land regime sets the benchmarks for contaminated site management whatever the trigger is, and its regulation and planning activities are typically publicly funded at national, regional, and local levels. In addition, public investments in individual contaminated site management may be made because (1) no liable party (polluter or site owner) can be identified or can pay at a particular site ("orphan sites"); and/or (2) there is a case for public investment to support regeneration or some other wider public good. Public investments at an individual site level in Kosovo will depend greatly on wider political choices about the country's development priorities, such as privatization, and also about which sites might be seen as nationally significant given their scale and public profile.

Private sector interest in contaminated sites remediation can be enhanced by tax breaks (e.g., on remediation spending) and environmental taxation, especially taxation of landfills and use of greenfield sites. There is an additional benefit from the use of a tax regime to encourage good choices in land management. International experience shows that the costs for contaminated site management can fall heavily on public budgets. Taxes on the landfilling of excavated soil or land take (greenfield sites) could be hypothecated to support ongoing public costs for the overall land contamination regime, thus reducing the burden of funding contaminated site management from general taxation. Well-targeted environmental taxes can also have good public acceptance, if transparently managed and shown to lead to wider societal benefits.

RECOMMENDATIONS

While the challenge is significant, Kosovo can use a phased approach to successfully reduce the number and impacts of contaminated sites for the benefits of its people and its economy. The establishment phase would encompass a series of actions over a period of five years for example, including (a) developing the benchmarks and systems necessary to implement Kosovo contaminated site inventory and site prioritization; (b) establishing the right legal and institutional management platform (including capacity building and knowledge sharing); and (c) contaminated site remediation demonstrations to deliver high value and practical outcomes on the ground. These actions can be undertaken simultaneously and in an integrated manner to establish an in-depth, sustainable and risk-based approach in order to provide a durable, robust and competent long-term foundation for contaminated site management in the country. These actions are based on the learning-by-doing method: focusing on the development of systems and benchmarks at the national level, practical delivery of inventories at the national or local level, and practical remediation piloting and demonstrations.

The suggested demonstration projects are ones where remediation is less complex and/or wider goals and benefits can be integrated (e.g., job creation, materials recovery, greener industry, public amenity and redevelopment, sustainable energy, and capacity building):

- Suggested Demonstration Project (SDP) 1: Municipality-scale demonstration of inventory development, including practical delivery of site investigation, assessment and remediation of high priority sites. This would be carried out in one or two municipalities in order to test the concept at a manageable scale before replicating it at the national level.
- SDP2: Integrated remediation and redevelopment project for an asbestos impacted area in Hani I Elezit to create a linear park, developing an existing blueprint already prepared by the municipality (complete implementation within the first phase).
- SDP3: Piloting integrated greener industry and repurposing of historic flotation waste tailings as a basis for replication across various Trepça sites and facilities, if possible linking to other planned projects on improvement of water quality for catchments impacted by tailings deposits.
- SDP4: Preparation of a master plan for establishing a Peace Park in the Mitrovice Industrial Park integrating site investigation and assessment and options appraisal with a shared brownfields regeneration concept across the different communities of Mitrovice as basis for continued reconciliation. The master plan would support the fundraising and investment case for the Peace Park regeneration and the technical basis for effective risk management.
- SDP5: Demonstration (multi-hectare) scale testing at the Kosovo Energy Corporation (KEK) of phytoremediation and revegetation for biomass for energy, integrated with a design for other renewables options and public open space for the community of Obiliq. The outcome of this demonstration would be a masterplan and investment model for brownfields renewable energy and public parkland across KEK's 30 km^2 land holding.

Long term, subsequent phases for scale-up would include a stronger focus on remediation support for individual priority sites, building on accumulated experience and appetite for further investment. A subsequent phase could start 3–4 years into the first phase, depending on the rate of progress in setting up the overarching contaminated site management program. Whichever actions the country may choose for the first and subsequent phases, the ability to phase-in different aspects of the contaminated site program would provide flexibility to adjust to policy, legislative, budgetary, and other operational constraints.

To maximize sustainability, cleanup and reuse options should be considered early in the planning process, enabling best management practices of SRBLM during remediation to carry forward. Early consideration of green and sustainable remediation opportunities and transparent mechanisms offers the greatest flexibility and likelihood for related practices to be incorporated throughout site investigation, remediation, and redevelopment/reuse. The regulatory initiatives on contaminated site management should actively support site remediation and redevelopment that result in beneficial reuse such as commercial operations, industrial facilities, housing, greenspace, and renewable energy development.

EXPECTED BENEFITS

The value of implementing the recommended program is substantial and can be considerably expanded by carefully integrating contaminated site management with wider environmental, social, and economic initiatives. These key substantial economic values,

benefits, opportunities, and potential drivers for contaminated sites remediation include the following:

- Protecting the health of communities and transforming environments into healthy and safe places
- Removing market risks for real estate and divestment (including privatization) and, in parallel, raising surrounding property and business values (which could also lead to enhanced tax revenues).
- Removing a serious political risk to EU accession and taking actions on a transboundary threat which may be or may become a concern for neighboring countries.
- Kosovo is a country where water resources are relatively scarce. Better contaminated site management can reduce threats to existing water resources and widen the pool of water resources available for use.
- Dust blow from contaminated sites, especially tailings, are already serious public health concerns in several areas of Kosovo. Site remediation can be linked to improving air quality in these localities.
- Creating pubic open space and amenities on former brownfields benefits public health and wellbeing. This in turn supports economic performance by improving productivity (fewer sick days), reducing the strain on health budgets. An improved sense of place also leads to better social cohesion and improved livability.
- Linking site remediation to the reuse and redevelopment of contaminated land can harness financial marketplace drivers and ease resource constraints. Such an approach does not, however, eliminate the need for other program development and funding.
- Rehabilitating contaminated could serve as a neutral platform for positive engagement among the different ethnic communities in Kosovo around such sites.
- Sustainable contaminated site management can lead to environmental business development opportunities, such as the creation of a knowledge hub to improve local capacity, employment, and skills. Such a knowledge hub could also have export potential to surrounding countries. Associated development for regeneration also creates a platform for local entrepreneurship and small and medium enterprise start-ups, both directly as suppliers of remediation/regeneration services and also indirectly via opportunities for business on treated sites (e.g., cafes in new parkland).
- Projects that integrate land rehabilitation with greening industry preventing pollution both deal with the legacy of past land contamination and create opportunities for the future. They also provide opportunities for industries to become more efficient in their use of water, energy, and other natural resources.
- Better use of brownfield sites offers a significant opportunity for renewables production, including energy (e.g., photovoltaics, wind, biomass) and renewable feedstocks (e.g., plastics, biofuel).
- Creating a positive and forward-looking reputation for Kosovo.

1 Introduction

1.1 Objectives

Contaminated land can harm the communities' health in many ways. The dangers include poor air quality, increased risk of disease, limited access to healthy foods, a lack of options for physical activity, poor housing quality, and environmental damage leading to toxic air, water, or soil. Land contamination is an international challenge, not just a Kosovar one. The United Nations Environmental Program (UNEP) explicitly recognizes managing soil pollution as necessary to achieve sustainable development (UNEP 2018), and land contamination is seen as a key threat to sustainable soil by both the European Union (EU)[1] and the Food and Agriculture Organization (FAO 2018). It has been described as humanity's next greatest challenge after climate change.[2] Over the past 20–30 years, contaminated land management approaches have matured in many countries. A good example is China, where a comprehensive policy and legislative framework has been put in place in recent years (World Bank 2018 China Report). In others, such as Colombia, the situation is more emergent (Arias Espana *et al.* 2018).

The key objective of this report is to provide guiding principles and recommendations for establishing a contaminated site management program in Kosovo that accords with international good practice in sustainable and risk-based land management (SRBLM). Specifically, this report helps to understand the potential scale of a Kosovo contaminated land management program, to expand a 2011 Kosovar hotspots list (MESP and KEPA 2011), to develop a more comprehensive inventory approach, and to set out guiding principles and recommendations for establishing a contaminated site management program in Kosovo.

This report provides a recommended program for contaminated site management over a relatively long (20-year) time horizon. This program will help Kosovo to prevent potentially significant unforeseen consequences in several economic areas, including real estate markets and public budgets, and to avoid the pressure to accept legislation that is not optimal for the country's social and environmental needs. The program will also assist Kosovo's compliance directly and indirectly with existing and emerging EU legislation and strategies as a part of its European Union (EU) accession candidacy.[3]

This report focuses on the legacy from point sources (contaminated sites). The recommended program is a well-defined and investable program, strongly oriented toward capacity building and a learning-by-doing approach for Kosovar stakeholders and practitioners. The program reflects good practice in management, policy, and regulation in other European countries (Nathanail *et al.* 2013). Moreover, it builds upon the World Bank advisory report on Developing a Program for Contaminated Site Management in Low- and Middle-Income Countries (Kovalick and Montgomery 2014).

The intended audience of this report is twofold. The technical assessment sections (Chapters 2, 3 and Annex 1, 2) target practitioners and stakeholders in contaminated site management in Kosovo (including agencies, regulators, planners, local authorities, site owners and operators, academics, consultants, and contractors). The Executive Summary and the guiding principles and recommended program for contaminated site management (Chapter 4) would also be of interest to policy makers.

1.2 Data and Information Sources and Methods

This report is based on a series of data and information sources: publications (including grey literature resources made available by the World Bank, Kosovo Environmental Protection Agency, Kosovo Geological Survey, and the Ministry of Environment and Spatial Planning); an inventorying process

[1] http://ec.europa.eu/environment/soil/three_en.htm Accessed April 2019
[2] https://www.globalcitizen.org/en/content/polluted-soil-clean-up-world March 2019
[3] https://ec.europa.eu/neighbourhood-enlargement/countries/detailed-country-information/kosovo_en July 2019

for suspected contaminated sites (based on the potential for land contamination from their current and/or previous uses); a series of site visits across two missions to the country; and engagement with 15 Kosovar experts over a two-day training and consultation workshop in Pristina on May 2–3, 2019. The inventorying process consolidated information from published and grey literature sources, a series of interviews with key Kosovar stakeholders, a telephone survey of Kosovar municipalities, and cross-referencing with other World Bank initiatives in Kosovo (for example, related to the mining sector).

After initial refinement the work was divided into several broad tasks: identification of potential or suspect contaminated sites; a series of preliminary qualitative risk assessments and remediation option appraisals for a limited number of exemplar sites; provision of good practice and policy and institutional guidance (including examples from the United Kingdom (UK) and Chongqing in China); training for contaminated site management based on international best practices; the development of guiding principles and a recommended program for contaminated site management based on a benchmarking of Kosovo's needs against international standards; and two case studies that outline the potential benefits of improved contaminated site management and brownfields regeneration in Kosovo.

There are significant cross-linkages between contaminated site management and other environmental policy domains, such as waste management, integrated pollution prevention and control (IPPC), land use planning, water management protection, and broader ecological policy (see Figure 1). These related regimes are discussed where they impinge directly on industrially contaminated land management.

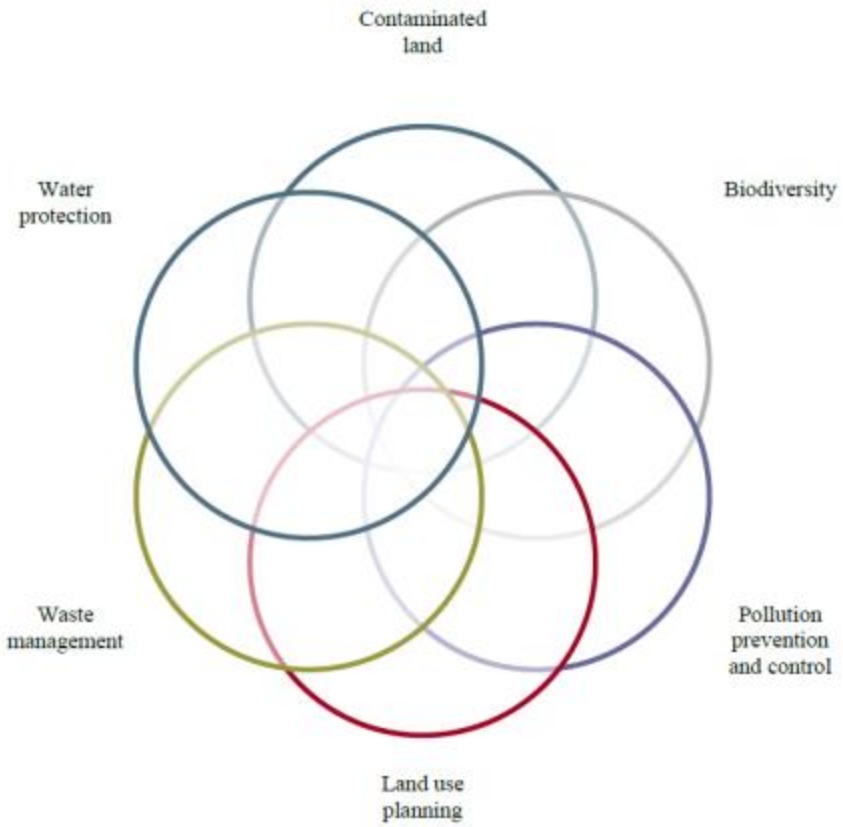

Figure 1. Example of Interacting Legal Regimes and Land Contamination (from Nathanail *et al.* 2013)

In addition to point sources (contaminated sites), contamination can arise in different contexts. These include, for example, diffuse contamination, future spillages and emissions, naturally elevated levels of trace elements, and warfare. Each is briefly outlined below.

- ***Diffuse contamination*** of significant areas of agricultural land in Kosovo may have occurred from the use of biocides in agriculture and from atmospheric fallout from two smelters operating in Mitrovice. Diffuse contamination from smelters has occurred in many counties, including the UK (Avonmouth) and the Netherlands/Belgium (Kempen region). There is conflicting information about diffuse contamination of agricultural soils in Kosovo. A major survey published by the EU in 2013 (GIZ International Services and NIRAS 2015) concluded that overall agricultural soil was not contaminated when benchmarked against the "Kosovo List" of thresholds,[4] and it found no food chain impacts. However, the World Bank reports that "Soil and plant tests have shown that farmland within 25 km of Mitrovica is contaminated with lead, zinc, mercury, and cadmium, and is unsuitable for agriculture because of the health impact" (World Bank 2013). Other testing studies for soil, plants, and foodstuffs in Kosovo have also found elevated levels of organic pollutants (Berisha *et al.* 2013; Gashi *et al.* 2016). In general, while soil protection is a common denominator for agricultural land management and land contamination, most countries manage diffuse contamination of soil in agricultural and urban areas as a separate domain to contaminated site management. Diffuse pollution of soil and surface and ground water from the agricultural industry is also a concern in many countries, primarily from nitrogen and phosphorous compounds and from the use of biocides.
- ***Prevention of future spillages and emissions***. Future contamination tends to be managed as part of the environmental regulation of industry, and this is made explicit in the EU's Industrial Emissions Directive 2010/75/EU. Kosovo seeks accession to the EU, and an industrial permitting system is already well advanced in Kosovo (See Annex 1). There is an important synergy between greening industry to optimize value and avoiding future contamination and brownfields creation (e.g., in Kosovo's mining sector).
- ***Natural contamination.*** Elevated levels of trace elements in soil and water can also arise from underlying geologies, and so might be expected in the metalliferous areas of Kosovo. For example, southwest England has elevated levels of arsenic because of its underlying geology. So-called natural contamination of soils and groundwater typically falls under public health and agricultural policy agendas and does have close linkage to the industrially contaminated land policy agenda. In the UK, initial risk-based thresholds for arsenic in the soil could have concluded that much of Cornwall was contaminated. More in-depth studies, considering the bio-accessibility of arsenic, found that these thresholds were too low as assumptions made about the amount absorbed from ingestion were too conservative. Nonetheless, natural contamination could still lead to soil levels that exceed risk-based thresholds (Environment Agency 2009, Middleton *et al.* 2017). For example, arsenic in well water has caused widespread human health impacts in Bangladesh (Smith *et al.* 2000).
- ***Military activities.*** Military activities, such as from propellants and explosives, can also lead to land contamination. One concern in Kosovo is the legacy of depleted uranium munitions (UNEP 2001). The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) [5] has concluded that "no clinically significant pathology related to radiation exposure to depleted uranium was found." During the missions to Kosovo that supported this report, however, several Kosovar stakeholders specifically raised ongoing fears about, and anecdotal reports of, health from impacts from depleted uranium contamination. The contamination legacy of the 1998–1999 conflict has an impact on contaminated land management in terms of damaged industrial sites. The assessment of impacts of depleted uranium and other munitions expended in the conflict are, however, considered outside the scope of the report.

[4] Kosovo List dated 16th January 2009 (Administrative Instruction on Utmost Permitted Levels of Discharging and Dispersal of Pollutants in Soil) now superseded by a 2018 Administrative Instruction, see Annex 2.
[5] https://www.un.org/disarmament/convarms/more-on-depleted-uranium Accessed May 2019

While this report does not specifically focus on the related policy and institutional domains, the guiding principles with specific examples and the recommended program for contaminated site management include the suggestion of exploratory studies for each domain to ensure their close integration with industrial land contamination policy.

1.3 Structure of the Report

This report describes the possible scale of land contamination issues in Kosovo from point sources, sets out guiding principles and recommends an investable program for their management, and outlines potential benefits. The report is organized as follows:

- Chapter 1 provides objectives, data sources and methods.
- Chapter 2 describes and updates the existing report and work on hotspots in Kosovo (MESP and KEPA 2011) and extends the definition of the problem to a more general treatment and initial inventory of suspected contaminated sites. This chapter also introduces a phased approach and steps for the inventory process.
- Chapter 3 provides international policy frameworks and good practices in contaminated land management and identifies gaps and needs in Kosovo.
- Chapter 4 sets out the guiding principles and a recommended program for contaminated site management in Kosovo.

Annex 1 of the report provides a detailed review of international policy frameworks and good practices in contaminated land management and Annex 2 summarizes the current state of practice in Kosovo.

2 From *ad hoc* Identification of Hotspots to a Systematic Contaminated Sites Inventory

In 2008 the Kosovo Environmental Protection Agency (KEPA) published a state of the environment report for 2006–2007 (KEPA 2008) that included some initial review of the status of soils in Kosovo. This was followed in 2011 by a joint Ministry of Environment and Spatial Planning (MESP)/KEPA publication (MESP/KEPA 2011) which identified 28 hotspot sites considered to be "areas of high pollution in Kosovo." This was a first listing exercise to support the interest of international institutions in managing these sites. The listing was passed on to a 2011 European survey of contaminated land across the European Union (EU), the European Economic Area, and several Balkan states (JRC 2014) as 28 identified "potentially contaminated sites." Kosovo also suggested to the 2011 survey researchers that two sites were remediated and the total number of "potentially contaminated sites" that might exist in Kosovo was 111. However, no sufficient supporting evidence has been located for either estimate.

Section 2.1 pulls out key highlights from this hotspot reporting. This is not, however, a rigorous inventory of contaminated lands in Kosovo. Section 2.2 describes a systematic inventorying process for contaminated sites based on the approaches used by several EU countries (see Annex 1), using the Netherlands and Hungary as case studies. Section 2.2 also sets out the steps for a similar inventorying process in Kosovo and provides an initial estimate of the possible number of sites in Kosovo where contamination might be suspected based on current and past land use. The inventory approach described in Section 2.2 is also in line with Kosovo's own (unimplemented) suggestions for a proposed Kosovar contaminated land cadastre provided to the 2011 European Survey (JRC 2014).

Inventory processes for the identification and management of land contamination are strongly related to effective spatial planning and effective land reuse, thus avoiding the use of virgin lands from agriculture and nature areas (i.e., greenfield sites) by making more effective use of previously used brownfield sites that are often affected by land contamination (CABERNET 2006, World Bank 2010A).

Promotion of the reuse of brownfields is one of the most important means of reducing the loss of agricultural and natural land to urban, mining, and industrial uses; this issue is a major sustainable development concern across Europe.[6] Land take is a key sustainability indicator used by the European Environment Agency. Agricultural land loss in Kosovo and an absence of legislation governing spatial planning have been flagged by the European Commission as obstacles to Kosovo's preparations for EU accession (EC 2019).

Kosovo's land take is abnormally high compared to other countries. Land take from agriculture to urban use alone has been estimated at 5,000 ha per year (World Bank 2013), or 14 ha per day. This compares with a 2011 estimated land take (across all types of land take) in Germany of 74 ha[7]per day. The land area of Kosovo is 10,887 $km^{2,}$ so each year Kosovo loses almost 0.5 ha of agricultural land per square kilometer of the country's surface. Germany has a land area of 357,386 km^2, so its annual land take pro rata is 0.08 ha per km^2 of its surface. Hence Kosovo's land take for development is more than six times that of Germany's in relation to the two countries' land areas. Germany is urgently seeking to reduce its land take to 30 ha/day by 2020 (40 percent of current levels). The equivalent target for Kosovo would be 152 ha per year, which is a reduction greatly in excess of 95 percent of its current estimated annual land take.

There are a number of key reasons to reduce land take. Preservation of agricultural and natural productivity, landscape quality, better urban and transportation planning, water resource preservation, and mitigating flood damage risks are a few examples of why minimizing land take is so important.

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[6] https://www.eea.europa.eu/data-and-maps/indicators/land-take-2 Accessed May 2019
[7] https://www.umweltbundesamt.de/en/topics/soil-agriculture/land-use-reduction#textpart-1

2.1 KEPA/MESP Hotspots Reporting

Table 1 lists the sites identified in the 2011 MESP/KEPA hotspots report, and their location is shown in Figure 2. These hotspot sites include small isolated contaminated sites, contaminated sites in urban areas, and large and complex sites (e.g., large former mine works areas). The 2011 report grouped the 28 hotspots into three categories.

- Category A sites—typically mining, industrial, tailings, and ash dump sites which were suspected to be highest polluters of the land, water and air, and with larger spans of pollution. Fourteen of the hotspot sites were included in this category.
- Category B sites—waste landfills.
- Category C sites—typically hazardous, radioactive waste moved and stored by the Kosovo Force/NATO (KFOR) in ex-factories and other public storage spaces without sufficient safety standards. Information is lacking in Kosovo institutions about the content, type, and quantity of chemical or radioactive wastes being stored (KFOR may have more detailed information).

The total area of these hotspots is about 9.94 km^2 or 0.09 percent of the territory of Kosovo. These hotspots were seen as underused in terms of economic, agriculture, urban planning, recreation, and tourism needs. Thus, in addition to the impact on the environment and public health, they have an impact on other areas of social development.

KEPA/MESP will release an updated report in late 2019 that identifies an additional 14 hotspots sites have been added, primarily sites where hazardous wastes are being stored in some way or another. The EU has been supporting Kosovo in the development of a centralized hazardous waste storage facility, pending decisions on the longer-term fate of these hazardous wastes. The aim was to consolidate storage of these materials in one central location. Agreeing on the site location was challenging, however, and this initiative has now failed (see Chapter 3).

The World Bank team in 2019 carried out visits to the majority of the industrial site hotspots (asterisked in Table 1 below). These short site visits were conducted to gather initial site information to support preliminary and qualitative risk assessments for several hotspot sites as a model for further work: in particular, inventorying contaminated land to distinguish potentially contaminated sites from a larger pool of suspect sites (see Section 2.2). Fifteen sites were visited with a view to collecting the following initial information:

- Contact/stakeholder name
- Site name
- Previous land use
- Grid / location reference
- Basic site information
- Current and planned land use and setting
- Historical information about past uses and activities (sources)
- Geological and hydrogeological context
- Walkover / photographs
- Potential sensitive receptors
- Potential pathways
- Any relevant planning / regulatory conditions on the site, funder interests, and/or key local stakeholder interests
- Other key stakeholders

Fifteen hotspots were surveyed. Summary visit reports for these sites, including preliminary qualitative risk assessment and remediation option appraisal, are available separately. It was not possible in the time available for most of the site visits to gather detailed information about their geology and hydrogeological features, which limits the scope of the preliminary risk assessments and remediation options suggested in the survey visit report available separately.

Some of the sites identified in the 2011 survey have had some management interventions, supported by international bodies such as the World Bank, the European Commission, and the UN Development Program. Overall these interventions have been what the U.S. Environmental Protection Agency would describe as "removal actions" to mitigate particularly important impacts.[8]

Table 1. Sites Listed in the MESP and KEPA Report on Hotspots in Kosovo (MESP and KEPA 2011)

Site	Activity in the past
The facility of ex Agriculture enterprise in Shiroke-Therande	Storage of pesticides and fertilizers
Ex auto spare parts factory in Peje *	Storage of hazardous industrial chemicals
Municipal sanitary landfill in Podujeve	Waste landfill
Municipal sanitary landfill in Peje	Waste landfill
Regional sanitary landfill in Gjilan	Waste landfill
Regional sanitary landfill in Prizren	Waste landfill
Regional sanitary landfill in Mirash-Obiliq	Waste landfill
Municipal sanitary landfill in Mitrovice	Waste landfill
Tire and conveyor production plant in Suhareke	Waste oils and soil contamination
Industrial park in Mitrovice *	Multiple source megasite
Slag landfill of FerronickelCikatove- Drenas *	Deposit of industrial slag of Ferronickel
Tailings at Badovc *	Deposit of heavy metals
Tailings of sterile materials in Kishnice *	Deposit of heavy metals
Tailings at Mareci 1 and Mareci 2 the water Stream, and a mine in Artane *	Deposit of heavy metals
Tailings at Kelmend-Mitrovice *	Deposit of heavy metals
Radioactive materials in the industrial complex Trepce - Mitrovice	Storage of radioactive materials – thorium nitrate
Radioactive materials at "Tuneli i Pare," Mitrovice *	Storage of radioactive materials –Strontium, Thorium and Americium
Industrial landfill in Zvecan	Landfill of heavy metals
Industrial landfill in Leposaviq	Landfill of heavy metals
Ash dump in TPP A *	Industrial landfill
Ash dump in TPP B *	landfill and the impact areal
Phenol tanks *	Storage of phenol
Mine in Deve-Gjakove *	Deposit of heavy metals
Mine in Golesh-Municipality of Lipjan *	Exploitation and processing of heavy metals
Stan Terg mine*	Heavy metals
Industrial complex of SharrCem, Hani i Elezit *	Deposits of asbestos materials

[8] https://cfpub.epa.gov/compliance/models/view.cfm?model_ID=755

Figure 2. Location of the Hotspots Identified in MESP & KEPA 2011

2.2 Creating and Managing an Inventory of Suspect Sites

It is important to understand the prevalence of contaminated land and to locate and prioritize contaminated sites to optimize the management of the impacts on health, water, and the wider environment. Kosovo, in 2011, foresaw undertaking an inventory of contaminated sites (JRC 2014); that work remains to be implemented. Such an inventory would serve an important spatial planning purpose. In a country with scarce land resources, it is important to maximize the transition of brownfield sites back into productive use, to reduce both the pressure on greenfield sites and the impact of blight and underused sites on urban land values and urban land use. The rapid rate of construction and development in Kosovo after the war, and its unsustainable rate of land take for buildings, heighten the urgency to manage contaminated land further.

Virtually all countries with developed contaminated land management and brownfield regeneration policies have some form of inventorying process whereby sites suspected of being contaminated are located, assessed, and prioritized for action. Nathanail et al. (2013) have reviewed these processes across 14 countries around the world. Inventory systems are most frequently managed at the national or regional level, with data collected at the local level. The inventory process is general done via a sequential, phased approach. There is, of course, often iteration and updating of inventories as new information about suspect sites emerges through the inventorying process.

The typical inventory process is as follows:

- ***Identification of suspect sites.*** This step identifies sites where the presence of contamination is suspected on the basis of current and/or past use. A wide range of industrial, business, and infrastructural land uses may be contaminated. For example, the Environment Agency in the

UK published a series of 46 profiles of potentially contaminative land uses.[9] Each profile provides information about the potential contamination issues of that industry type. The range of profiles is summarized in Table 2 and is much wider than the site types considered by the MESP/KEPA hotspots survey.

- ***Identification of potentially contaminated sites from the inventory of suspected sites.*** This step involves carrying out an initial assessment of suspect sites to determine if there is evidence of potential contamination. This process, referred to as Phase 1 site investigation, typically involves the evaluation of available site reports and a site visit and walkover. In this context potential contamination does not describe the simple presence of substances elevated above background but instead describes an assessment of whether the presence of contamination has the potential to cause harm. The state of practice in most EU countries (and that will likely emerge in any future EU Soils Directive) is that this assessment is made on the basis of risk (see Annex 1). At this stage, risk assessment tends to be preliminary and qualitative and designed to establish whether there are feasible source-pathway-receptor linkages present that lead to risks. Where there is insufficient information to make a decision, the site is designated as potentially contaminated as a fail safe.
- ***Identification of contaminated sites where intervention is needed.*** In this step, a more detailed risk assessment following intrusive site investigation is used to determine if potentially contaminated sites are in fact contaminated according to the regulatory / legal definition of contamination in that country. This judgement is often based on comparison of contamination levels in soil and water samples with a set of generic threshold values, seen as indicative of a need for further action. Countries vary in how such thresholds are used and the concepts behind them. For example, thresholds may be used to designate that remediation is needed or that more detailed risk assessment is needed. In many countries, systems exist where site specific thresholds can be developed and used. This process is often referred to as Phase" site investigation.
- ***Identification of remediated sites.*** This step records where risks have been verifiably managed sufficient to satisfy regulatory / legal requirements.

This sequential approach was already foreseen in the cadastre ambitions that Kosovo reported in 2011 (JRC 2014).

An important question that arises is what to do with the information for sites that drop out at each step, particularly those sites that have been managed or remediated to mitigate their potential for causing harm. It is good practice to retain information for all sites, and some of this information (e.g., past and present uses, ownership) may also be useful for land-use databases for spatial planning. It's also important to keep this information because remediation or management will have been designed to mitigate harm in the specific context of the site's use (see Chapter 3). A future change in land use will change the risk management context—and require a new investigation and assessment.

Table 2. List of UK Profiles of Potentially Contaminative Land Uses

Airports	Engineering Works - vehicle manufacturing works
Animal and Animal Processing Works	Gas Works, Coke Works and other Coal Carbonization Plants
Asbestos Manufacturing Works	Metal Manufacturing, Refining and Finishing Works - electroplating and other metal finishing works
Ceramics, Cement and Asphalt Manufacturing Works	Metal Manufacturing, Refining and Finishing Works - iron and steel works
Chemical Works - coatings, paints and printing inks manufacturing works	Metal Manufacturing, Refining and Finishing Works - lead works
Chemical Works - cosmetics and toiletries manufacturing works	Metal Manufacturing, Refining and Finishing Works - non-ferrous metal works (excluding lead works)
Chemical Works - disinfectants manufacturing works	

[9] https://webarchive.nationalarchives.gov.uk/20140328091253/http://www.environment-agency.gov.uk/research/planning/33708.aspx Accessed May 2019

Chemical Works - explosives, propellants and pyrotechnics manufacturing works	Metal Manufacturing, Refining and Finishing Works - precious metal recovery works
Chemical Works - fertilizer manufacturing works	Oil Refineries and bulk storage of crude oil and petroleum products
Chemical Works - fine chemicals manufacturing works	Power Stations, excluding nuclear power stations
Chemical Works - inorganic chemical manufacturing works	Profile of Miscellaneous Industries
Chemical works - linoleum, vinyl and bitumen-based floor covering manufacturing works.	Pulp and Paper Manufacturing Works
Chemical Works - mastics, sealants, adhesives and roofing felt manufacturing works	Railway land
Chemical Works - Organic Chemical Works	Road Vehicle Fueling, Service and Repair - garages and filling stations
Chemical Works - pesticide manufacturing works	Road Vehicle Fueling, Service and Repair - transport and haulage centers
Chemical Works - pharmaceutical manufacturing works	Sewage Works and Sewage Farms
Chemical Works - rubber processing works	Textile Works and Dye works
Chemical Works - soap and detergent manufacturing works	Timber Products Manufacturing Works
Dockyards and dockland	Timber Treatment Works
Engineering Works - aircraft manufacturing works	Waste Recycling, Treatment and Disposal Sites - drum and tank cleaning and recycling plants
Engineering Works - electrical and electronic equipment manufacturing works	Waste Recycling, Treatment and Disposal Sites - hazardous waste treatment plants
Engineering Works - Mechanical engineering and ordnance works	Waste Recycling, treatment and disposal sites - landfills and other waste treatment or waste disposal sites
Engineering Works - railway engineering works	Waste Recycling, Treatment and Disposal Sites - metal recycling sites
Engineering Works - ship building repair and ship breaking including naval shipyards	Waste Recycling, Treatment and Disposal Sites - solvent recovery works

Table 3 shows the progression of the inventory of suspect sites in Hungary and the Netherlands. The two countries have a markedly different incidence of suspect sites per km^2 (16.5 versus 0.43), likely reflecting their different industrial histories as well as institutional and methodological differences in how sites are identified and defined. For purposes of comparison, within the UK, the Environment Agency has tentatively estimated that there are 300,000 suspect sites in England and Wales. Across the joint land area of Hungary and the Netherlands (130,395 km^2) this equates to 1.98 suspect sites per km^2 of land surface.

Hungary may be a better comparator for a Kosovo inventory than the Netherlands as it has a similar background of agriculture moving to industry—especially under central socialist control—although there is less mining in Hungary. Prior to 1990, levels of GDP per capita in Hungary were lower than in Kosovo, and available information[10] indicates that the overall level of industrialization in Hungary was lower than in the former Yugoslavia. The JRC 2014 report strongly suggests that no inventory systems were underway in the Balkan States other than the envisaged cadastre in Kosovo.

Experience indicates that the number of sites diminishes at each step, as not all suspect sites have credible potential risks. In addition, not all sites where there are credible potential risks are found to pose significant risks once further investigation has taken place. Ultimately, sites posing significant risks are managed/remediated so that they no longer cause unacceptable harm.

[10] https://en.wikipedia.org/wiki/Economy_of_the_Socialist_Federal_Republic_of_Yugoslavia https://en.wikipedia.org/wiki/Economy_of_Hungary and http://chnm.gmu.edu/1989/items/show/671

Table 3. Contaminated Land Inventorying Processes in the Netherlands and Hungary (Nathanail et al. 2013, Hasznos 2019).

Stage	Number of Sites	
	The Netherlands	**Hungary**
Land area (km^2)	42,508	93,030
Suspect sites	700,000	30,000 – 40,000
Suspect sites per km^2 of land area	16.5	Up to 0.43
Potentially contaminated sites	420,000	15,000 – 20,000 *(50% of suspect sites)*
Contaminated sites necessitating action (further investigation, risk assessment, and *possibly* remediation)	56,000 seriously contaminated sites and 11,000 serious and urgent sites	2000 *(10-13% of potentially contaminated sites)*
Remediated sites /sites where remediation is underway (so far)	>10,000	600 *(work in progress)*

A range of information sources about contaminated sites was used to establish the first, tentative estimate of the number of suspected contaminated sites in Kosovo, across different categories of land use, largely based on the UK profiles mentioned in Table 2.[11] A number of additional information sources were also used to collate this estimate, including interviews with key stakeholders in Kosovo (e.g., Ministry of Environment and Special Planning, Kosovo Environmental Protection Agency, Kosovo Geological Survey); a telephone survey of Kosovo municipalities and other agencies; and information from the Agency for Business Registration in the Ministry of Trade and Industry.

Table 4 presents a list of the potential number of suspect contaminated sites across a range of types. The initial overall estimate includes 4,000 sites suspected of having had contaminative use (including >1,500 illegal waste dump sites). It is important to note that this is an indicative estimate and not an exhaustive listing of the contaminants that may potentially be present. The incidence of suspect sites in Kosovo, while challenging, is in fact relatively low, at 0.37 suspect sites per km^2 of Kosovo's land area.

While merely an estimate, the information is enough to develop a preliminary estimate of the potential scale and management costs for the contaminated site problem in Kosovo.

That said, a number of uncertainties remain:

- The availability of information for some categories is affected by limited access to both sites and information about some types of sites.
- Information has been collected over a relatively short period of time; thus, it does not include all potential sources of information.
- The numbers are affected because there is no clear distinction or definition (yet) of what might be within the scope of historical information. Many site categories represent contemporary information (e.g., for waste sites and wood treatment works). Some numbers relating to process industries, for example, relate only to sites operating up to the 1999 war (e.g., metal manufacturing, textile manufacturing, plastic manufacturing, bricks and roof tiles production). Since then many new businesses have emerged. Given the state of governance and environmental enforcement in Kosovo (ECRAN 2016), new facilities operating since the war might also be suspect sites. It is not clear at this stage how to consider these sites in Table 4 since (a) they may

[11] Ernst and Young and HPC (2017); EPA 2008; MESP and KEPA 2011 (and its 2019 updating); MESP and KEPA 2014; MESP 2017; Trepça 2011; US EPA 1979

be complying with permits; and (b) they may be continuing activities on already-listed sites. It is likely that this will require a localized decision for each individual site.
- Some listings reflect potentially contaminating uses (e.g., dry cleaning operations are for currently operating facilities and the possibility of older sites in different locations has not yet been considered).

These uncertainties could be reduced by a more in-depth survey of various information sources, including Privatization Agency of Kosovo records; more detailed scrutiny of municipality planning records and maps (especially historical maps); aerial photographs; and environmental permitting records for industrial processes. This would complete the first stage of the inventory process. Further action would then be needed to complete the subsequent stages, as well as to establish a suitable information management platform and platform access.

The information presented in Table 4 was collected in aggregate format based on the information sources described in Section 1.2. The information supplied and processed within the time frame and resources of this project allowed estimation of potential numbers of sites of different types within areas, but did not include specific geographical locations (except for a limited number of cases). Validation of the suspect site information collated here, and localization of sites, would be a necessary first step for inventory development in Kosovo. Therefore, the guiding principles and recommended program discussed in Chapter 4 include an inventorying process that starts with the conversion of this tentative list to a site-by-site inventory listing. This early stage work should also collate available information about site ownership over time and explore opportunities for value creation (e.g., brownfield sites that are also potential redevelopment opportunities).

The overall inventory process, including the site-based investigations and risk assessment needed to process sites, would be a significant cost and effort for Kosovo. Therefore a phased approach is recommended, with the first phase being to pilot the inventory in a limited number of municipalities (and then gradually replicate the process across other municipalities). It is also important to recognize that the inventory program relates to both regulatory interests in the prevention of harm (to human health, water, and the wider environment) and in spatial planning. In line with other countries' experiences, the development of an inventory is not solely a top-down survey of sites within particular local authority areas but also bottom-up process (i.e., as a result of planning applications for built developments or public complaints about sites).

The triggers for remediation of sites in countries with a functioning contaminated land regime typically include one or more of the following:

- Enforcement action or the possibility of enforcement action over a site's potential to cause harm.
- A planning application to develop a site.
- Corporate triggers such as privatization, mergers and acquisition, or liabilities management.

In general, the prioritization of sites for remediation emerging via the planning process or as a result of corporate triggers is bottom up in that the decision to act is made by the site owner/manager on the basis of their own specific site and its economic circumstances. The prioritization of sites for remediation is generally on the basis of the seriousness of the potential harm that might arise.

The contaminated land regime establishes the benchmarks for contaminated site management whatever the trigger is, and its regulation and planning activities are typically publicly funded at national, regional, and local levels In addition, public investments in individual contaminated sites remediation may be made for one of two reasons: no liable party (polluter or site owner) can be identified or can pay at a particular site (orphan sites), which are likely prioritized on the basis of mitigation of harm; and/or there is a case for public investment to support regeneration or some other wider public good, likely prioritized on the basis of economic outcomes.

Kosovo would be expected to adopt a similar model for its contaminated site management regime. Public investments at an individual sites level, however, will depend on wider political choices about Kosovo's development priorities (e.g., privatization) as well as on which sites might be seen as nationally significant given their scale and public profile. In addition, donor interests may lead to prioritization of projects centered on brownfields regeneration. Brownfields regeneration demonstration projects in Kosovo, supported by the program developed by this report, should be prioritized where they lead to multiple additional wider benefits in other domains (see Section 4.4).

It should be noted that careful consideration needs to be given to how information from any Kosovo geographical inventory process is managed. Countries vary in their interest in using inventories and the level of public access. In Hungary and the Netherlands, the inventories are used, subject to an overarching national set of rules, to determine contaminated land management priorities, as well as to support local authority decision making and spatial planning. In the UK, inventories are the responsibility of local authorities and can vary in approach from authority to authority. Some countries place all inventory data in the public domain, so that anyone can see if there are land contamination issues and if these have been managed. A potential consequence of this is that listed sites lose value. This value loss may persist even if a suspected site is found not to be contaminated or if a contaminated site is remediated. One of the most well-known examples of this followed the development of inventories in Denmark, which was then obliged to compensate land owners for lost value. As a result, some countries have taken a more cautious approach to information disclosure. The EU has signed on to the Aarhus Convention, which requires that inventory information be potentially accessible to the public.

Table 4. Potential Number of Suspect Contaminated Sites by Type in Kosovo

Type of Site	Number of Suspected Sites	Potential Contamination Problems / Source Terms
Airports	2	Spillage and leaks of fuels for aircraft and vehicles, firefighting chemicals and fuels; substances used for aircraft servicing and maintenance; lubricants; buildings and pipework from asbestos; PCBs used in (old) electricity supply systems (e.g. from transformer oils).
Animal and Animal Processing Works	15	Chemical contaminants may arise from biocides, degreasers, and cleaning products; also present may be organic wastes and biological risks (e.g., from pathogens).
Asbestos Processing	2	Storage areas and raw material handing – breakage of asbestos releases fibers into the environment; spillage of asbestos materials.
Asbestos Containing Waste Deposits and Informal Reuse	Suggest >100	Additional sites from the deposit of waste asbestos, or asbestos reused in construction (e.g., as fill or for roof tiling) may be considerable in number, for instance at multiple locations in Hani i Elezit. Asbestos removal activities in Hani i Elezit may also have created new dump areas with uncertain quality of containment.
Cement, Ceramics, Tar and asphalt manufacturing works	21	Organic contamination from leakage and spillage of heating oils and lubricants (e.g., around storage, pipelines and drainage systems, including soakaways); and for asphalt processing additionally from bitumen, tars, and asphalts (PAHs, phenols). Contaminants (e.g., PCBs) may also have leaked from electrical supply systems and asbestos may be present in many facilities. Inorganic contaminants from kiln ash, brick dusts, and glazes. Leakages from underground tanks and pipes is mostly related to kiln and other fuels, workshops, and waste disposal.
Chemical Manufacturing Works - coatings, paints and printing inks manufacturing works	8	Ground contamination may be from spillage of solvents or other liquids, of raw materials during delivery, storage, and use; from storage tanks, drum storage areas, pipework, and tanker off-loading areas; from fuel supplies, especially petroleum-based oils; from use of asbestos in pipe insulation.
Chemical Manufacturing Works - cosmetics and toiletries; soaps and detergents; pharmaceuticals	3	Spillages / leakages from bulk storage areas, pipework, pumps, and production areas. A range of potentially hazardous feedstocks and process additives may be present (e.g., a wide range of organic solvents and precursors for solvents, acids, and alkalis). Contaminants (e.g., PCBs) may also have leaked from electrical supply systems and asbestos may be present in many facilities.
Chemical Manufacturing Works - fertilizers	3	Spillage or leakage of materials around bulk storage and loading areas, effluent vessels, manufacturing plants, underground storage containers, and associated pipework. Contaminants may include heavy metals (e.g., Cd); various chemicals indirectly associated with fertilizer manufacturing; PCBs from onsite electricity substations; and asbestos use on buildings and infrastructure.
Chemical Manufacturing Works - rubber processing	2	Spillages / leakages from bulk storage areas, pipework, pumps, and production areas. Contaminants of concern include fuel, hydraulic, and lubricant oils. Flammable and combustible materials may be onsite.
Chemical Manufacturing Works - linoleum, vinyl and	3	Spillages / leakages from bulk storage areas, pipework, pumps, and production areas. Contamination might come from use of pigments, extenders, binders, additives, and solvents. Paint manufacture workers are potentially exposed to the

Type of Site	Number of Suspected Sites	Potential Contamination Problems / Source Terms
bitumen-based floor covering		chemicals found in paint products.
Dry Cleaning Businesses	147	Primary concern is spillage and loss of drycleaning fluids such as perchloroethylene (PCE), which are hazardous in groundwater at even low levels (US EPA 2011).
Electricity Transmission - power systems, transformer sites. etc.	95	Principle land contamination sources include cable and transformer oils, which (until the Stockholm Convention) included PCBs as well as solvents used in cleaning. Additional contamination problems at coal-powered generation facilities include trace elements and dioxins in ash (in particular fly ash).
Fire Training Areas	34	Use of firefighting foams containing fluoridated organic compounds.
Fuel Distribution and Filling Stations	70	Contamination from leakage and spillage of fuel (e.g., alkanes, BTEX, fuel oxygenates,) in particular from tanks and pipework. Contamination from lubricants, phenols, and solvents used in maintenance. Oily sludge from oil tank cleaning and oil/water separators may also be present.
Gas Works, Coke Works and other Coal Carbonization Plants	1	One facility which used an adapted Lurgi process. Potential sources on site include sludges from the treatment of waste water from coal washing, ash, and ash-quenching water treatment residues, lime sludge, phenol and phenolics, and coal tars (US EPA 1979).
Leather Products - manufacturing works	4	Use of tanning agents (e.g, Chromium) and use of dyes. Anthrax from hides may also be present.
Manufacturing / Engineering Works - electrical and electronic equipment (e.g. batteries, switchgear etc)	6	Lead (the primary metal associated with the automotive battery industry) and other metals such as cadmium, arsenic, silver, tellurium, tin, calcium, copper, and nickel used in molding and casting, and also present in electronic components and fragments. Solvents and degreasers, and contaminants from plating processes. Cable and transformer soils (possibly containing PCBs). Paints and thinners.
Manufacturing / Engineering Works - Mechanical engineering / components	6	Heavy metals. Solvents and degreasers, and contaminants from plating processes. Asbestos may also have been used in component manufacture. Paints and thinners.
Manufacturing / Engineering Works - defense equipment / ordnance	2	Multiple sources from vehicle and equipment maintenance (see Mechanical Engineering / Components). Propellants, explosives, and heavy metals particular to munition manufacturing.
Manufacturing / Engineering Works - vehicles / vehicle parts	1	Heavy metals. Solvents and degreasers, and contaminants from plating processes. Paints and thinners, plasticizers, fuels, and lubricants. Asbestos in buildings and pipework. PCBs used in (old) electricity supply systems (e.g., from transformer oils).
Metal Manufacturing, Refining and Finishing Works - electroplating and other metal finishing works	13	Contamination mainly from leaks, spillages or onsite disposal of raw materials (acid materials) from sumps and tanks, from heavy metals in storage for planting chemicals, and all over; leaks of waste oil and solvent storage tanks; in-process materials or waste products; PCBs from electric transformers and use of asbestos in buildings.
Metal Smelting, Refining and Finishing Works - iron and steel works	1	Contamination from atmospheric deposition of trace elements (e.g., nickel), contamination from metal containing ores, process additives, and wastes (e.g., slags) and byproducts. Contaminants from liquid effluents and from facility maintenance, oils and lubricants, contaminants from electrical supply systems, presence of asbestos in pipework and

Type of Site	Number of Suspected Sites	Potential Contamination Problems / Source Terms
		constructions.
Metal Manufacturing, Smelting, Refining and Finishing Works - lead works	2	Contamination from atmospheric deposition of trace elements (e.g., lead, zinc), contamination from metal containing ores, process additives, and wastes (e.g. slags) and byproducts. Contaminants from liquid effluents and from facility maintenance, oils and lubricants, contaminants from electrical supply systems, presence of asbestos in pipework and constructions
Military Sites (barracks, depots, bases, fuel / munitions facilities)	20	Contamination from fuel storage and distribution and vehicle and equipment maintenance. Propellants, explosives, heavy metals from munitions / munitions maintenance and testing, unexploded munitions, and potentially radioactive materials. Lead, propellants, and other heavy metals at firing ranges.
Mining Sites	14	Metalliferous mining sites can be contaminated by dust and fragments of ore from processing, handling, and transport. Coal mining sites may be contaminated by common brown coal constituents from coal processing and transport. In both cases contamination may be carried some distance offsite by vehicle movements. In addition, fuel oils, lubricants, and solvents may be present on mining sites and asbestos in constructions.
Paper and Pulp Manufacturing Works	2	A variety of substances are used in paper manufacture, including fillers, biocides, coatings, dyes, and inks that are possibly hazardous (e.g., Cd in pigments). Fuel oil, lubricants and solvents may also have been used. Chlorine bleaching of paper may give rise to chlorinated organic substances. Trace element contamination may include B and Hg, and pulp materials may have contained pesticides (e.g., lindane). Process plant and facilities may include facilities and contaminants from electrical supplies and hydraulic systems.
Plastic Products - manufacturing work	7	A range of potentially hazardous compounds are used in plastics manufacture (e.g., as precursors). Also plasticizers, pigments, and cleaning products.
Power Stations	3	Coal storage and processing areas may be contaminated by PAHs and other organic contaminants, as well as having highly elevated organic matter content (from coal dust). Ash materials (in particular fly ash) will have elevated trace element concentrations (e.g., As), and potentially dioxins and elevated radioactivity. A range or organic effluents (e.g., phenolics) may have been produced. Contamination from solvents, degreasers, lubricants, and fuel oils is also possible. Contamination may also arise from transformer and cable fluids, including PCBs from older installations. Asbestos may be widespread in the facility and its infrastructure.
Railway Sites (stations, service depots, good yards)	22	Contamination from fuel storage (see Fuel Distribution and Filling Stations). Contamination from vehicle servicing (see Service / Repair Works for Vehicles). Contamination from cargo spills which may have contained hazardous substances.
Road Transport and Haulage centers	20	Contamination from fuel storage (see Fuel Distribution and Filling Stations). Contamination from vehicle servicing (see Service / Repair Works for Vehicles). Contamination from cargo spills which may have contained hazardous substances.
Service / Repair Works for Vehicles	80- 100	Contamination from lubricants, phenols, and solvents used in maintenance, antifreeze (glycols), and heavy metals from dusts released during maintenance. A wide range of liquids (e.g., antifreeze, brake and other hydraulic fluids, engine oil (PAHs), and solvents) may have been disposed of to soil . Oily sludge from oil tank cleaning & oil/water separators may also be present.

Type of Site	Number of Suspected Sites	Potential Contamination Problems / Source Terms
Textile Works and Dye Works	24	Textile production and dye works may be contaminated by complex organic compounds used as dyes and their precursors, and biocides and pesticides present in natural feedstocks used to make textiles (e.g., released during washing). Depending on age, some of these may be highly toxic (e.g., mercury compounds, pentachlorophenol).
Waste Sites – mine tailings; ash dump sites	17	The waste deposits may contain a range of trace element contaminants. Organic contaminants may also be present in ash deposits such as phenolics, PAHs, dioxins, and furans. Trace element contamination of the surroundings may be extensive if the waste storage was not properly contained, affecting soil surface water and ground water leading to secondary sources (e.g., contaminated river sediment).
Waste sites – hazardous waste	8	Hazardous waste sites could potentially contain almost any kind of hazardous substance given the paucity of recordkeeping.
Waste Sites - landfills and other waste treatment or waste disposal sites	14	Hazardous materials buried with waste deposits and their breakdown products and toxins created by unofficial onsite burning.[12]
Waste Sites - scrap yards, car, metal recycling sites	2 historical and 1572 illegal sites + 76 private waste operators (scrap yards)	A large range of hazardous substances may be present from poor environmental controls and the accidental/deliberate fragmentation of scrap, including trace elements, waste oils, lubricants, fuel, solvents, plasticizers, paint residues, brake and hydraulic fluids, broken batteries, and electrical components as well as combustion products from deliberate or accidental fires.
Waste Sites: incineration (medical waste) / storage (including at hospitals and transfer stations)	7	Contamination from onsite deposits of ash, and particularly fly ash (possibly containing trace elements, dioxins, and furans), and from supplementary fuel. Toxic substances and biological hazards in stored waste streams.
Waste Sites - expired pharmaceutical storage	1	Pharmaceuticals may be hazardous and pose a particular threat to water resources as well as to scavengers.
Wood Products Manufacturing Works (e.g., plywood)	6	Hazardous substances present in resins and adhesives, fuel oil, lubricants and solvents, paints and thinners, and feedstocks may have contained pesticides (e.g., lindane). Process plant and facilities may include facilities and contaminants from electrical supply and hydraulic systems.
Wood Treatment Works	1480 registered	Primary contaminants of concern include wood preservation products (creosote = PAHs, chrome, and pentachlorophenol). For larger facilities, see Wood Products Manufacturing Works (e.g., plywood).
TOTAL	**~4,000**	

[12] Landfill problems also include generation of landfill gas and leachate. This is typically regulated in a different domain than contaminated site management.

3 Benchmarking State of Practice in Kosovo with International Good Practice

3.1 International Good Practice

The policy and technical consensus, based on several decades of experience, is that land contamination management decisions should be made based on risks to human health and the wider environment. For a risk to be present, a source (of hazardous substance or property), a receptor (which could be adversely affected by the contamination) and a pathway (linking the source to the receptor) must be present. This is referred to as a Source-Pathway-Receptor (S-P-R) linkage. It should be noted that this risk-based land management is applied independently of the trigger for site inventory.

A receptor might be a human, an ecologically sensitive site, water resources, or a building. While not generally legislated for, risks to ecological system goods or services provided by the wider environment[13] may become an increasingly important receptor to consider.

Risk management interventions can take place at any point in the S-P-R linkage, as long as it breaks the linkage. The source may be removed, the pathway intercepted, or the receptor behavior or location modified. As seen in Figure 3, a range of risk management / remediation options are available at different points across any particular linkage.[14] This risk-based approach to contaminated sites is termed Risk-Based Land Management (RBLM).

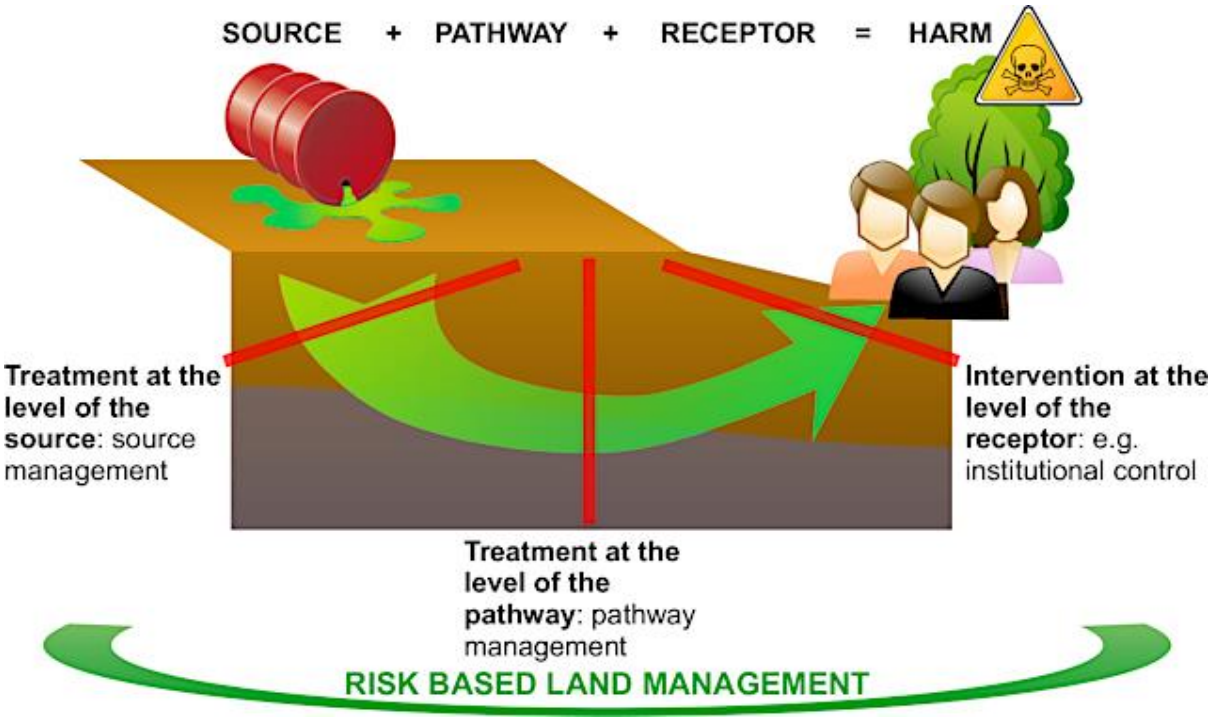

Figure 3. Risk Management along a Contaminant (S-P-R) Linkage (Tack and Bardos *in press*)

The concept of risk-based land management underpins effective contaminated site management, whether for brownfield regeneration, management of an orphan site, improvement of an operational facility, or supporting processes of privatization, merger, or acquisition. Remediation of contaminated land addresses interventions at the source and pathway levels (described in Annex 1), whereas

[13] E.g., as described by the World Health Organization: https://www.who.int/globalchange/ecosystems/en
[14] E.g., as described by *Land contamination: risk management*, https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks

interventions at the receptor level (such as conditions on land use) are addressed by institutional controls. The choice of optimal approach is site specific and depends on the site's S-P-R linkages as well as (among other things) its soil, geological, and hydrogeological context; its man-made infrastructure; and its current and envisaged use. Each site needs its own option appraisal and remediation design process, and a conceptual site model to describe the specific context is widely recommended as good practice (Gibbs et al. 2010). Care needs to be taken to avoid overly generalizing (e.g., that containment is always the cheapest available solution). Technical feasibility and remedial design are discussed in more detail in Annex 1.

Risks depend on the anticipated use of the land, and most countries set their generic risk-based thresholds based on end-use (see Annex 1). This typically means that higher levels of contaminants may be tolerated in some cases (e.g., at sites which are sealed beneath an industrial end-use compared with sites which are intended for residential end-use). Risk management and remediation practices have been extensively reviewed in many technical publications (e.g., Swartjes 2011; Ok et al. *in press*). Extensive information is also available online[15]. In addition, a separate report contains a selection of the 28 Kosovo hotspots, site visit reports, and initial option appraisal suggestions. The program suggested in this report (see Chapter 4) includes a strong emphasis on capacity building on risk assessment and remediation approaches, including the delivery of targeted and relevant technical guidance.

It's important to recognize that the remediation process is not free from impacts. Remediation is not intrinsically sustainable, and poorly planned projects can have serious negative impacts. Therefore, risk management should also meet sustainable development principles. Together these constitute ***sustainable risk-based land management***, or SRBLM (NICOLE/Common Forum 2013).

SRBLM is recognized as the optimal approach for contaminated land decision making. It combines a risk-based framework for determining when harm (or potential harm) is unacceptable and where action is necessary, with ensuring sustainability is incorporated into deciding how such unacceptable risks are to be managed. As such, it ensures a balanced decision is taken which optimizes overall benefits. In the best examples, significant improvements in project sustainability have been delivered, including concurrent reduction of the environmental footprint of the remediation, improved social performance, cost savings, and/or value creation. (See Appendix A for a more detailed discussion.)

For countries with well-established contaminated land policy, regulation, and management, several key themes can be distinguished: Annex 1 provides a more detailed treatment of international trends in developed industrial contaminated land management policy and institutional roles with England as a case study (Annex 1.3). Annex 1.4 provides what and how the municipality - Chongqing in China applies international good practices on SRBLM.

[15] For Example, from https://clu-in.org/ and www.eugris.info.

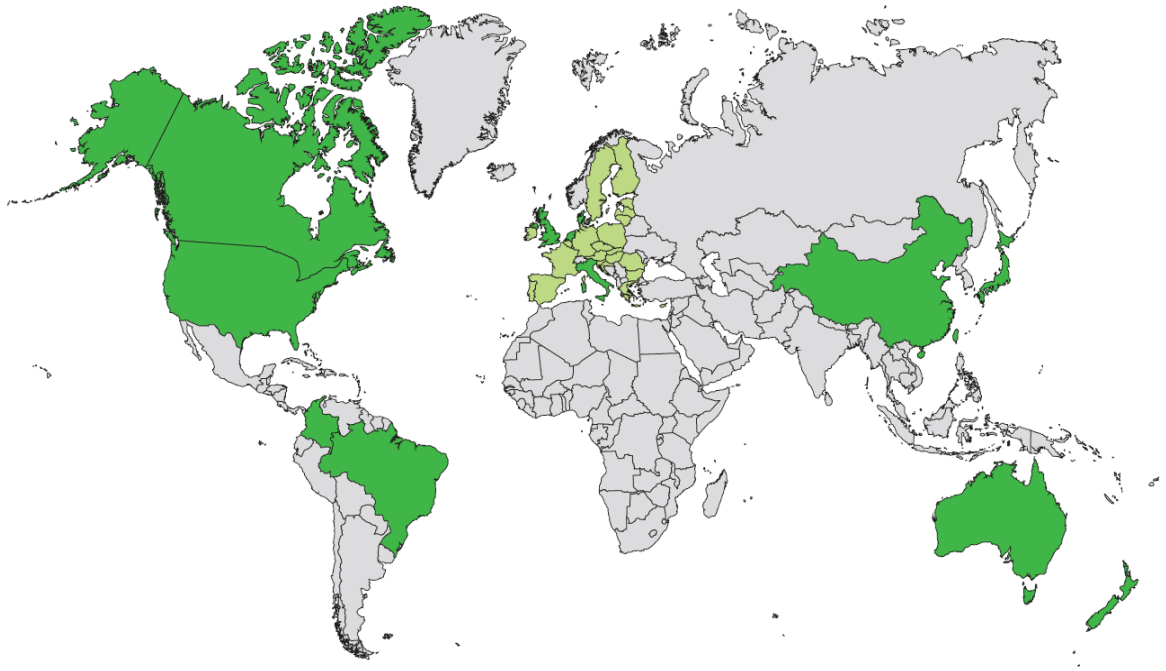

Figure 4. Transitioning to SRBLM

Note: Countries shaded in green have a developing interest in sustainable remediation, lighter green are for the key European contaminated sites stakeholder networks, Common Forum, and NICOLE.

- The underpinning technical rationale for contaminated site management has been risk-based land management and is now increasingly transitioning to SRBLM (See Figure 4).
- As some form of contamination is widespread in most countries a critical question to ask is at what point does the contamination pose sufficient a threat that it needs to be managed. While there is a great deal of shared technical knowledge, the setting of a boundary between what is considered contaminated versus not contaminated and the actions that ensue depends very much on national circumstances.
- An inventory process of sites suspected of being contaminated is crucial to understanding the scale of potential problems and to identify, prioritize, and manage sites (see Section 2.2). Related to this is the question of what level of public access should be provided to inventory information.
- The management of contaminated sites requires financial commitments. Countries set legislation to assign liabilities for who should meet these commitments (and typically adopt a polluter pays principle as far as possible).
- The customization of SRBLM to the national context, boundary setting, and the processes of inventorying and assigning liabilities require a supporting policy and regulatory framework. For policy and regulation to be effective and properly implemented, there needs to be clear governance, policy, technical guidance, and supporting information. Annex 6 describes this policy framework in the UK, which has had contaminated land policy tools in place since the late 1970s.
- Delivery (i.e., the implementation of SRBLM) requires projects on the ground. This starts with site investigation and risk assessment and then proceeds to risk management and remediation. Delivery is triggered by several processes in those countries which have well established and functioning contaminated land markets. In the majority of cases remediation is triggered by planning controls on brownfield redevelopment; the next most common triggers are site owners seeking to manage their long-term liabilities or as a result of merger and acquisition

processes. Site remediation may be triggered by a direct regulatory intervention, based on inventorying processes (e.g., US Superfund National Priorities List).

- Support for the development of wider sectoral know-how is critical to the effective operation of a contaminated site management regime. Without know-how among the different stakeholders (e.g., site owners, service providers, regulators, governmental officials, local authorities), effective implementation is impossible.
- Transparent procurement and procedures and evidence-based reporting underpin the effective management of projects at all stages (investigation, assessment, and remediation). Effective remediation needs to be verified based on clear lines of evidence to enable handover of a demonstrable clean site (e.g., for ongoing operations or as a development platform) (Environment Agency 2010).

3.2 Status Quo

The current situation in Kosovo is one of relatively unmanaged contaminated sites with some initial inventorying of what are considered particularly significant sites (the hotspots). Annex 2 sets out legislation and institutions and policies and strategies in Kosovo that have some relevance to contaminated land, along with institutions, liabilities and funding, and in particular how these translate to the management of contaminated sites in Kosovo. The most significant development has been a 2018 piece of secondary legislation, the Administrative Instruction (AI) on Limited Values of Emissions of Polluted Materials into Soil (No. 11/2018). This instrument is not as yet complete as secondary legislation. It is also not broadly implemented as it does not yet have supporting guidance, tools, resources and know-how to support full deployment.

The principle negative impacts of this status quo in Kosovo include:

- Threats to human health from seriously contaminated sites.
- Threats to relatively scarce water resources from land contamination.
- Wider environmental risks (e.g., to ecology and agriculture) from land contamination.
- Unsustainable urban land take from greenfield sites (agriculture, parkland, and natural areas).
- Downside risks for real estate markets and related inward investments.
- Environmental liabilities limiting the attractiveness and value to international investors of privatizations.
- Impedes Kosovo's ambition to accede to the EU (World Bank 2017).

Kosovo has four rivers basins. The rivers in Kosovo run in the direction of the Adriatic Sea (Drini I Bardhë) via Albania, the Aegean Sea (Lepenci) via Macedonia, and the Black Sea (rivers Ibar, Sitnica and Morava e Binçit) via Serbia. As a result, contamination of rivers from contaminated land (e.g., tailings, dams, waste deposits, and industrial facilities) is likely to have transboundary aspects which may be politically consequential.

The recent cancellation by the European Union of a €12 million investment for a project to build hazardous waste storage in Kosovo[16] highlights the firm line taken by the EU on sound governance and effective environmental policy decision making. It is also a complication for the recommended program in that it removes a possibility for the transfer of dispersed hazardous waste storage from a significant number of sites. The implementation of an effective contaminated site management regime could be an important confidence-building measure.

3.3 Gap Analysis

[16] http://www.rtklive.com/en/news-single.php?ID=14196 Accessed June 2019

Table 5 provides a gap analysis of the current status in Kosovo and the international norms of good practice discussed in Annex 1. Gaps are described across the eight themes set out in Section 3.2. The gap analysis is developed further in the starting points outlined in the guiding principles in Chapter 4.

Table 5. Kosovo Good Practice Gap Analysis

Key Theme	Current Status in Kosovo	Gap
1 SRBLM	The existing listing of hotspots discusses threats to human health and water and collates available evidence.	SRBLM is not formally included in Kosovo regulation and policy (and, indeed, not even mentioned).
2 Boundary Setting	A 2018 AI sets out a series of threshold limits for various trace elements in the soil and then problem areas will be recorded. Based on this, an action program will be developed by various ministries. Land will be monitored every five years.	A problematic definition appears to be related to soil functionality. The technical basis for the thresholds and their use in determination, however, is unclear. It is also unclear whether this AI is predominantly concerned with agricultural soils or contaminated sites.
3 Inventorying	Local authorities are mandated by MESP to identify contaminated sites, and the list of contaminated sites is to be collated centrally by MESP.	The design and implementation of the inventory process, the technical guidance, the basis for determination, and the approach to prioritization and action do not yet exist in any meaningful detail. The linkage to planning and brownfields reuse is undefined.
4 Liabilities	The 2018 AI sets out a series of liabilities to the site owner or local authority. The obligation appears to be limited to preventing the spread of pollution.	A comprehensive and rigorous liability scheme for contaminated sites related to mitigation of risks is not defined.
5 Policy Frameworks	Secondary legislation has recently been brought forward (2018).	The regulatory and policy framework is relatively immature. While the 2018 AI is a good start, it is insufficient to support an effective contaminated land regime in Kosovo in line with accepted good practice.
6 Delivery	A number of at least partial remediation projects have been carried out, almost all on the basis of support from foreign donors.	The Kosovo market is immature, lacking the capacity to provide for delivery, especially where inventory and planning triggers identify a significant demand. There are no well-executed and transparently reported exemplar projects that have achieved verifiable SRBLM outcomes.
7 Know-how	A number of Kosovo practitioners from public and private-sector organizations took part in a project workshop on May 1–2, 2019. They showed good baseline skills and much enthusiasm.	Development of applied skills is SRBLM and contaminated site management in general is at a low level in Kosovo. Several specialists could act as a first cohort with training support. There is a further need to disseminate this know-how more widely to local authorities and other delivery bodies.
8 Transparency	The aim in Kosovo is toward open processes and web-based sharing of environmental information related to contaminated sites.	The development of evidence-based decision making based on principles of sound science, and the development of systems of governance, are urgently needed.

4 Guiding Principles and Recommended Program

The purpose of guiding principles is to help Kosovo develop its contaminated site management regime to a state of policy and practice that can (a) mitigate the significant problems created by the status quo; (b) create benefits and added value by bringing contaminated land / brownfields back into a cycle of effective land use; and (c) maximize synergies and added value with other policy interests.

These broader policy interests include improved water resources, renewable energy, greener industry, privatization and inward investment, training and capacity building, environmental business service development, supporting entrepreneurship and small and medium enterprises, and potentially using brownfields regeneration as a platform for positive engagement between different communities within Kosovo.

The **guiding principles** discussed in Section 4.1 describe a set of activities over approximately 20 years for establishing effective contaminated site management in Kosovo. They are structured across eight broad themes:

- Theme 1. Promoting sustainable and risk-based land management (SRBLM) for contaminated sites
- Theme 2. Providing clarity on the boundary between what is considered contaminated versus not contaminated (as well as on the actions that ensue).
- Theme 3. Conducting an inventory to understand the scale of the problem and to identify, prioritize, and manage sites (and manage access to information).
- Theme 4. Developing a clear approach to the management of liabilities (and supporting, as far as possible, the polluter pays principle).
- Theme 5. Providing a framework for policy and governance along with the supporting tools and guidance needed for its implementation.
- Theme 6. Delivering effective risk management and sustainable remediation for sites requiring action, (and, in particular, sites where wider synergies and benefits are possible).
- Theme 7. Supporting wider sectoral know-how development.
- Theme 8. Engaging transparent procurement procedures and reporting.

There is some (unavoidable) overlap between these themes and how the themes interact with each other. For example, the need for guidance (Theme 5) crosses the other themes as well. As a conceptual framework, however, these themes align closely with the common elements of international contaminated site management policy and practice identified in Section 3.1.

The guiding principles take as its baseline the current situation for contaminated site management in Kosovo. Each broad theme then identifies a desirable direction for Kosovo to achieve good practice and the destination (or endpoint) that should be achieved. Each then summarizes the benefits of reaching this endpoint and the key actions that need to be taken to achieve it.

These key actions have also been framed in Section 4.2 as a recommended program structure for contaminated site management in Kosovo:

- An establishment phase
- Subsequent scale-up phases

No country has yet totally eliminated its legacy of contaminated sites (Nathanail *et al.* 2013), although the Netherlands might claim to be furthest along after having dealt with the sites it has classified as serious and urgent. Many countries, however, have put in place active contaminated site management regimes which protect humans and the environment and create opportunities for economic development.

If Kosovo can learn from the experience of other countries which have pioneered contaminated site management and can deploy the current international state of practice, it will be able to make swift progress and avoid some of the missteps (and their costs and wider impacts) that other countries have experienced. There is obviously a significant cost to these activities (see Section 4.3); equally, however, there is the potential to generate significant benefits and added value over the 20-year timeline outlined in Section 4.4.

4.1 Guiding Principles

4.1.1 Theme 1. Promoting Sustainable and Risk-based Land Management (SRBLM) for Contaminated Sites in Kosovo

Starting point. The Administrative Instruction (AI) on Limited Values of Emissions of Polluted Materials into Soil (No. 11/2018) recognizes the importance of risk assessment as a tool for contaminated land decision making. This is a positive development since sustainable and risk-based land management is increasingly accepted as the European good practice norm. However, the AI is silent about sustainable remediation. There appears to be only limited capacity and experience related to sustainable risk-based land management within Kosovar institutions and no private sector able to deliver SRBLM. The current land contamination focus has been toward agricultural land, with a suggested 2025 policy target for "re-cultivation and adequate use of agricultural land" (JRC 2014).

Desirable direction of travel. The Government of Kosovo needs to explicitly recognize and embrace the need for contaminated site management. This is needed not only for the mitigation of harm to human health and the environment but also to better support the functioning of spatial planning and land markets that underpin major economic interests—and to reduce Kosovo's currently excessive levels of virgin land take for urban development. SRBLM offers the most cost- and resource-effective path for achieving this transition. SRBLM needs to be closely integrated into Kosovo policy and practice for contaminated site management to operate on a par with international good practice.

Destination. (a) Mitigate harm from land contamination, without unacceptable secondary impacts, while also aiming to create a net benefit for human health, the environment and the Kosovar economy. (b) Achieve parity with European (and international) good practice.

Benefits. SRBLM optimizes how harm from contaminated sites is mitigated. It provides an objective means of identifying which problem sites are the most serious or most urgent so that these can be prioritized for action. It provides a rational approach for ensuring the most cost-effective and sustainable remedial approach at the individual site level, minimizing unnecessary impacts and costs. International inward investors are reassured that, if a business or real estate they have an interest in has potential environmental liabilities, they can be managed according to established norms. The potential for substantial investment in contaminated sites in Kosovo via partner international institutions creates a unique opportunity for Kosovo to develop as a regional knowledge hub and export environmental services to other countries in the region.

Key actions. The primary actions relate to capacity building in Kosovar institutions to deliver contaminated site management policy, regulation, and administration to Kosovo site owners (including the Privatization Agency of Kosovo) and the development of service providers able to deliver SRBLM-based solutions within Kosovo. These actions need to be embedded in all the other activity themes within the guiding principles. They need to be supported by the development of local research, training and know-how and by Kosovar participation in international contaminated land Conferences to support ongoing (and hopefully two-way) knowledge transfer. The state of the art and state of practice are not static and will likely evolve considerably over a 15–20 year timeline. Therefore (a) the Kosovo contaminated land regime needs to be able to rapidly adopt to new developments; (b) these guiding principles will need over time to be periodically reviewed and revised; and (c) Kosovo should become a contributor to this ongoing development. This engagement will be important for Kosovo to become a regional knowledge hub for land contamination management.

4.1.2 Theme 2. Providing Clarity on the Boundary Between What is Considered Contaminated versus Not Contaminated (and the actions that ensue)

Starting point - thresholds. The 2018 AI on Limited Values of Emissions of Polluted Materials into Soil includes a series of threshold criteria for elements that it suggests be applied to the demarcation between when sites are or are not contaminated. Again, this is a positive development even though

their principle application may be for the management of agricultural land. However, the range of contaminants considered is rather narrow and the rationale for their derivation is not properly explained in risk management (source-pathway-receptor terms). The AI introduces generic assessment criteria, and the potential for using site-specific assessment criteria on contaminated sites is not obvious. Hence, the thresholds provided do not meet European best practices. In addition, they only cover a rather limited range of substances of concern for land contamination; thus, their applicability across the contaminated sites domain is limited. Furthermore, the linkage of these thresholds to SRBLM is unclear.

Starting point – setting date points for when contamination is to be considered historic. Regarding boundary setting, Kosovo also needs to consider what contamination is historic (and dealt with by the contaminated sites regime) and what contamination is to modern (and in contravention of a modern environmental operating permit). Under the European Environmental Emissions Directive, historic sites would be required to achieve a more complete clean-up. In many countries, land contamination is an obligatory consideration in determining planning permissions for developments and other changes to the land. These decisions typically run in parallel and are linked to inventorying processes. These linkages are not clear in Kosovo, nor are they yet supported by detailed policies and regulations.

Desirable direction of travel. The development of risk-based thresholds and guidance for site assessment using generic or site-specific risk assessment is an urgent priority, as is achieving political agreement about a cutoff date separating when a historic contaminated sites regime will apply in Kosovo and when sites have to be treated to the background level in compliance with European Directives.

Destination. (a) Policy choices made for the types of boundaries (e.g., which boundaries to set for contaminated/non-contaminated, historic/modern contamination) as well as choices about degrees of sensitivity for different land uses (e.g., agricultural, residential, industrial, and built development where soil is sealed versus developments with open gardens and other open spaces). Policy choices are underpinned by clear evidence and sound science. (b) Policy choices offer a clear approach to boundary setting for what are considered contaminated sites both in terms of acceptable/unacceptable levels of risk and in terms of which regulatory regime site management is to fall under (historic or modern). (c) Development of a consistent approach to risk-based generic assessment criteria for screening purposes, transparent documentation of how such criteria were derived, and a system that can also allow for site-specific risk assessment and risk management targets in determining further actions.

Benefits. Clear boundary setting provides certainty in contaminated site management and planning decisions for brownfields and supports more effective delivery of human health and environmental protection; clarity in determining and assigning liability; clarity for real estate markets and divestment (including privatization); and a consistent and documented national approach for national and international service providers to deliver on contaminated brownfields site assessment and remediation. These activities also prepare Kosovo to engage in the development of boundary setting in the likely upcoming proposed EC Soils Directive.

Key actions. The most urgent action to support and maintain the momentum established in the AI on Limited Values of Emissions of Polluted Materials into Soil is to elaborate on a more detailed science and evidence-based contaminated sites / brownfields management and policy for risk-based decision making. This should be applied both to direct and indirect (via the planning regime) regulation. (See also Theme 5). Boundary setting for historic versus modern contamination problems is a political choice, but the rationale could be connected to when effective environmental permitting and control processes for potentially polluting land uses first became reliably implemented in Kosovo. The existing administrative instruction would benefit from being reconsidered to improve the robustness, transparency, and clarity of the derivation and application of these thresholds. There is a wide international technical base already existing that can be adapted for Kosovo, taking into account its own particular context. Special socioeconomic situations in Kosovo might include protection of

people on site informally (e.g. for scavenging), as well how land might be reused. Cultural differences may have a significant bearing on exposure pathways, and so affect the reliability of risk models imported from other countries. One example of borrowing international practice and adapting it to the national context is China's use of the HERA model for human health and environmental risk assessment (Han *et al.* 2016). These actions need to be supported by comprehensive guidance, a transparent and portable technical rationale,[17] and a robust policy framework (see Theme 5). It should also be subject to international expert peer review scrutiny both in development and application.

4.1.3 Theme 3. Inventorying Sites to Understand the Scale of the Problem and to Identify, Prioritize, and Manage Sites (and access to information)

Starting point. Many countries take the view that a wide-ranging process of identifying and assessing suspected contaminated sites is of great importance in prioritizing contaminated site management action and ensuring scarce resources are put to optimal use (See Sections 2.2 and 3.1). The World Bank shares this opinion (World Bank 2018 China Report). The 2011 review of hotspots in Kosovo (MESP and KEPA 2011) and its updating, as well as Kosovo's European reporting (JRC 2014), show a desire for site identification, and an approach to the assignment of responsibilities to local authorities for an inventory (cadaster) under the auspices of the Ministry of Environment and Spatial Planning (MESP) has been set out, Local authorities, MESP and the Kosovo Environmental Protection Agency (KEPA) are constrained, however, by their available capacities, resources, and financing. An inventory of sites where hazardous waste was being stored was collated under a separate AI (MESP 2017). The AI on Limited Values of Emissions of Polluted Materials into Soil hints at an interest in establishing an inventory of contaminated sites, perhaps reliant on local authority inputs, which will be made available online. It is not, however, ether a rigorously defined or comprehensive approach—and it is resource limited. Moreover, the application of an inventory in a strategic way to prioritization, planning, and other forms of contaminated sites decision making has not been clearly elaborated.

Desirable direction of travel. The development of a robust inventory process and implementation of its strategic use is needed to underpin decision making (e.g., for prioritization of remediation projects by seriousness and urgency of the problems to be addressed) and ensure that land contamination concerns are properly addressed in planning applications and regional spatial planning.

Destination. (a) A coherent inventory system that is transparently linked to the process of agreed-upon boundary setting in Kosovo and based on the process of identifying suspected sites, preliminary screening, detailed assessment, and determining actions. This is also the approach most likely to be in compliance with any future European legislation. The inventory model would follow the approaches used in the Netherlands and Hungary, rather than the United Kingdom. This is of critical importance to the targeting of remediation effort in any subsequent phases for contaminated site management in Kosovo. (b) An open question is the extent to which there will be public access to information. In the Netherlands, the inventory is online and fully searchable. The reason that the United Kingdom opted for a fragmented system was to avoid this as several politically influential and developers were worried that public access to knowledge would detrimentally affect their portfolio values. That debate took place in the 1990s; it has been rendered void by the advance of big data technology. Today, suspicion of contamination for any site in the U.K. can easily be determined by a postal code-based search from a number of commercial providers who provide localized reports from existing public databases and mapping. Moreover, the Aarhus conventions likely requires that the public be guaranteed access to this environmental information in an EU Member State.

Benefits. The principle benefit is effective targeting and optimization of the use of public resources in contaminated site management. Public access to information may be seen as destabilizing for some real estate managers (and home owners) but seems to be unavoidable. A positive consequence may be

[17] I.e., such that the *same* technical approaches can be used for both generic and site specific assessment criteria

more open functioning of markets with clarity about potential property liabilities readily available. These activities also prepare Kosovo to engage with the development of inventories in any potential upcoming EC Soils Directive proposal.

Key actions. A first action is to develop and integrate the existing contaminated sites identification processes in Kosovo into a more structured and overarching system that provides a more comprehensive understanding of the extent and location of contamination in Kosovo. Section 2.2 provides an initial starting point, with a listing of readily available information about suspect sites. The next step would be to develop this out into a GIS-based system, with individual suspect sites specifically flagged. Initial characterization, known as Phase 1, would identify which of these are potentially contaminated and screen out those which are not. Sites remaining as potentially contaminated would require a more detailed (Phase 2) investigation to identify which of the potential sites can be screened out, which have land contamination problems, and which have problems that are serious/urgent and necessitate a remediation approach. The inventory would need to be updated with the outcomes of each stage. This system needs a two-way integration with planning control so that planning authorities can bring forward suspect sites to the inventory and use the inventory to identify sites with a potential land contamination problem that needs to be considered in any application process. The inventory could potentially be centrally delivered, with support for site information from local authorities. While most countries use local authorities to deliver inventory information to a central information bank, these local authorities tend to be larger than municipalities in Kosovo. Indeed, the entire population of Kosovo is similar to that of many cities. Given the availability of trained personnel and financial resources, it seems most expedient to develop the inventory and its systems centrally, and pilot it with one or two local authorities. Replication to more local authorities can then take place once the system is established and brownfields know-how is more widely disseminated. The process of Phase 1 and Phase 2 site investigation also fits into the wider feasibility assessment for brownfields redevelopment assessment for transition countries described by the World Bank (World Bank 2010A).

4.1.4 Theme 4 Developing a Clear Approach to the Management of Liabilities (and supporting, as far as possible, the polluter pays principle)

Starting point. The AI on Limited Values of Emissions of Polluted Materials into Soil identifies the importance of the polluter pays principle and sets out a contaminated sites liability structure (although the details have not been spelled out). However, the uncertainties related to SRBLM know-how (Theme 1) and boundary setting (Theme 2) mean that the scale of liabilities cannot be determined based on international norms. Moreover, limited practitioner and market awareness and know-how, as well as the absence of specific cases of liability settlements in Kosovar courts, mean that this liability scheme is not able to be fully tested and clearly implemented. A related issue is the lack of fully developed budgetary tools to direct contaminated sites activities in Kosovo and ensure the social costs of contaminated sites and their management are properly recovered. Of particular significance is that many sites were socially owned enterprises where there is no longer an existing polluter who can be made to pay.

Desirable direction of travel. Develop clarity in the scale of potential environmental liabilities and who would have to bear them.

Destination. A clear liability regime supported by detailed guidance that has been tested in the courts and is transparent across the contaminated land sector and real estate markets.

Benefits. Clarity about liabilities will support more open real estate markets and divestment. Where there is a lack of clarity, fear of the unknown can strongly inhibit international investors.

Key actions. More detailed elaboration of the AI on Limited Values of Emissions of Polluted Materials into Soil liability regime in guidance and case study materials, and some refinement in the light of an international peer review exercise to learn from the experience of others, in order to optimize the regime as much as possible. Liability management for contaminated sites (encompassing

brownfields and their regeneration) has been extensively reviewed, and a great deal of information is available (e.g. CABERNET 2006, Nathanail et al. 2013, World Bank 2010). Table 6 illustrates an outline framework for how international practice in the assignment of contaminated sites liabilities might translate to the Kosovar context. However, liability holders may not necessarily be those who pay for remediation. Two examples where such a situation might occur are in brownfields regeneration / redevelopment and as part of a merger and acquisitions process. A brownfields vendor may accept a discounted price for land so that the purchaser or developer undertakes its remediation. Similarly, in merger and acquisitions processes a purchaser may buy potentially contaminated sites but offset their potential liabilities against the purchase price. Alternatively, a public body may support brownfields regeneration, at least partially, because it delivers a wider public good.

Table 6. An Outline Framework for Liability Management in Kosovo

Historic Land Contamination (occurred prior to a generally set cutoff date)	Recent, Ongoing, and Future Contamination (occurred after the generally set cutoff date)
The polluter (if they can be traced and causation established on the basis of balance of probabilities); otherwise the site owner. If neither the polluter nor site owner can be traced, or if they lack resources (e.g., as a result of bankruptcy), the site becomes an orphan site. The management of orphan sites will fall to public budgets. Special circumstances apply to orphan sites.	The polluter, which will generally be the person or body that has an operating permit with the environmental regulator. If they lack resources (e.g., as a result of bankruptcy), the site becomes an orphan site.

There are also potential budgetary tools for Kosovo to encourage better contaminated site management on a voluntary basis and to generate additional public resources for contaminated site management. These generally follow a carrot-and-stick approach, (i.e., incentivizing desirable practice and disincentivizing undesirable practices). Two examples are the use of corporation tax relief as an incentive to manage a contaminated site (e.g., 150-percent tax relief instead of 100-percent for site management costs) as a carrot and a landfill tax as a stick. A landfill tax can also be extended as a punitive rate for illegal deposits in order to reduce the likelihood of poor waste management driving future land contamination. The excessive land-take for urban development in Kosovo suggests that a tax on greenfield land use might also be an interesting environmental tax alternative. An attractive feature of a well-planned environmental tax system is that the public can see good behavior being rewarded and less desirable behaviors being punished. Hypothecation of these tax regime income streams to an Eco Fund to support site remediation could allow them to directly support public costs in contaminated site management in Kosovo, thus reducing the competition of this activity with other general budgetary priorities (e.g., defense, education).

Poor past practices and the aftermath of the war mean that these assets may come with substantial environmental liabilities. An important refinement of the liability regime in Kosovo will be how past liabilities (or, indeed, from Kosovo Force/NATO actions on hazardous wastes) should be assigned, as well as the policy toward orphan sites (including sites abandoned during conflict).

4.1.5 Theme 5. Providing a Framework for Policy and Governance and the Supporting Tools and Guidance Needed for its Implementation

Starting point. The AI on Limited Values of Emissions of Polluted Materials into Soil is a piece of secondary legislation which draws from a series of laws passed by the Kosovar government. Yet the AI is not supported by a package of supporting guidance and tools. Cross linkages with other regimes, in particular those legislated at a European level, are identified in some but not all cases (and, in all cases, not fully elaborated). For example, excavated site materials fall under the Waste Framework Directive, so that remediation operations will need to be permitted under the Industrials Emissions Directive. These domains also include soil protection more generally (e.g., considering diffuse pollution); public health (e.g., considering whether there are sources of harm from natural contamination or the legacy of conflict); and, critically, the interrelationship between addressing the

legacy of land contamination and the prevention of future land contamination via the Integrated Pollution Prevention Control and the greening industry.

Land use planning is an essential tool for pollution prevention and control (World Bank 2011). A key cross-linkage in most countries is with the planning regime in order to ensure development projects properly consider and manage any issues of land contamination; this also helps to ensure that any institutional controls set for a contaminated / remediated site are properly recorded and applied in future site management decision making. In common with other countries, planning controls in Kosovo are implemented by local authorities. It is unclear whether these local authorities are able to properly take into account issues related to contaminated site management in their planning control and recordkeeping measures. The importance of achieving sustainable development in contaminated site management should be built into policy and governance and their supporting tools and guidance. Many international institutions and partners for Kosovo have raised governance concerns, and it is imperative that any contaminated sites program operates to the highest standards of public integrity and openness.

The European EFFACE Project found that "basic problems of [environmental] enforcement are related with weak governance, rule of law, and lack of resources, even though Kosovo has a most complex legal framework made of new legislation that must be compatible with the EU requirements. The brand-new institutions are under-resourced, and officials and inspectorate services are not well trained." (Fajardo, 2015).

Desirable direction of travel. Enhancement of existing secondary legislation, leading in time to primary legislation on contaminated site management (possibly triggered by the emergence of a new EU Soils Directive).

Destination. (a) Defining in policy and regulation what SRBLM means in practical terms for contaminated land and brownfields decision making; and (b) supporting this position with comprehensive policy, legal, and technical guidance.

Benefits. The principle benefit is in ensuring the most effective delivery of risk management at the individual site level, minimizing unnecessary impacts and cost. International inward investors are reassured that, if a business or real estate they have an interest in has potential environmental liabilities, it can be managed according to familiar norms. The potential for substantial investment in contaminated sites via partner international institutions creates a unique opportunity for Kosovo to develop as a regional knowledge hub and to export environmental services to other countries in the region.

Key actions. In the short term, contaminated land policy based on existing laws should be more clearly elaborated in a new iteration of the AI on Limited Values of Emissions of Polluted Materials into Soil; this AI should also incorporate developments in SRBLM, boundary setting, site inventory, and assignment and estimation of environmental liability developed across Themes 1–4. Kosovo should also consider whether there needs to be primary legislation addressing a specific contaminated sites regime.

Legislation needs to be supported by a comprehensive range of guidance, regulation, and regulatory practice notes. This system should address process guidance to show how sites should be managed or inventories compiled and managed (or remediation verification carried out); technical guidance to support particular actions (e.g., site investigation, risk assessment); and thresholds guidance to explain boundary setting. Much of this is likely to be print guidance, although some may be software or online based (e.g., templates or access to big data, such as the inventory). An important activity in developing this system will be open consultation with all interested parties. While this is typical for environmental legislation and guidance in EU Member States, it does not happen in Kosovo. This consultation process is important for several reasons: to ensure that knowledge and information is not missed; to provide engagement and transparency; to support the development of policy, regulations, and guidance; and to develop sectoral awareness and know-how.

This system also needs to be linked to a range of other domains to ensure:

- A critical point of linkage to obligatory consideration of land contamination in planning.
- An effective interface with environmental permitting for remediation practice.
- Prevention of future/modern contamination.
- An effective interface with waste legislation.
- An effective interface with legislation related to water.
- An effective interface with legislation related to mining (e.g., aftercare requirements).
- An effective interface with health and safety practice.
- An effective interface with sustainable development policy.
- An effective interface with EU Accession planning.

This list is not exhaustive.

One example of an effective interface is with the waste regime. Under the EU Waste Framework Directive, excavated materials are considered waste. Kosovo needs to determine and then set up a regime for how this impacts contaminated site management (e.g., for permitting ex situ treatment, for dealing with *in situ* process wastes, and for promoting the recycling of soils and aggregate).

4.1.6 Theme 6 Delivering Effective Risk Management and Sustainable Remediation for Sites Requiring Action (and, in particular, sites where wider synergies and benefits are possible)

Starting point. A range of site remediation projects have taken place in Kosovo, ranging from attempts to cover tailings deposits to reduce dust blow-off to removal of hazardous materials (e.g., emptying tanks), to more comprehensive initiatives (e.g., a range of operations at the gasification facility at Kosovo A). This work, though welcome, has been fragmented, and the agreed endpoints not necessarily aligned with effective achievement of SRBLM. For some sites the intervention could generously be described as cosmetic; at others, some major source terms have been managed (although residual sources may well remain in place). Remediation end points have been agreed to on an *ad hoc* basis, often using a range of international good practices. However, the management of contaminated land rehabilitation of brownfields has enormous potential for synergies with other types of activities (e.g., provision of public amenity or generation of renewable energy).

Desirable direction of travel. Ensuring remediation projects, including those supported by foreign donors, meet the developing Kosovo contaminated site management regime. Exploiting wider opportunities for synergy.

Destination. (a) A common SRBLM approach for contaminated site management that is relevant for the Kosovo context. (b) Provision of an opportunity matrix or other guidance to ensure that, when site development and remediation are planned, those involved are aware of potential additional synergies. (c) These actions should be supported by a series of remediation case studies that show both the deployment of the Kosovo contaminated regime developed under guiding principles and synergies and added value with other domains. Achieving support for pilot projects could be a key goal for securing donor funding for future Kosovo site management projects.

Box 1. An Example of Kosovo Energy Corporation (KEK)

The site owned by Kosovo Energy Corporation (KEK), which includes lignite mining, ash disposal, and power generation plant over some 30 km^2, offers an example of how various synergies might be exploited. A 2018 report (Vels et al. 2018) collates the available site information for the former lignite mining zones in this area and suggests restoration measures. The report recognizes the possible benefits for restoring this area for local urban settlements, and suggests several low-cost

restoration measures, albeit without a full consideration of risks and sustainability. This plan could be developed[18] to create broader opportunities.

The site adjoins the town of Obiliq, 10 km from the capital city, Pristina, where there is little if any urban greenspace.

There are national plans to establish a brown coal-fired power station. These plans have found difficulty in securing donor lending and financing because of climate change concerns; these plans have also received significant criticism from a number of civil society commentators. In other Member States, power stations have been shifting away from coal and toward biomass inputs, often at considerable scale.[19] Biomass from restored brownfield / restored contaminated land might be a useful and greener supplement to lignite, both reducing the climate change impact of the planned plant and improving the husbandry of the lignite resource.

A substantial amount of the biomass input could be produced locally from KEK's own land holding. This could be part of the site rehabilitation process and combined with providing public open space. This would have significant public health and wellbeing benefits for the local town and reputational benefits for KEK.

Benefits. The immediate benefits of this approach would be both better contaminated site management in Kosovo and use of international institutional interest in contaminated site management to support environmental advancement in additional domains. Section 4.4 lists a number of opportunities for the advancement of synergies and the development of enhanced value. The development of know-how through practice leveraged by these projects would enhance the potential for Kosovo to become a regional knowledge hub for better, integrated contaminated sites and brownfield management and rehabilitation. It would also extend this know-how to other domains (e.g., master planning of open space, development of renewable resources).

Key actions. This theme is underpinned by the implementation of the guiding principles in a policy, regulatory, and guidance framework. Specific additional actions include a remediation investment program; a platform for pilot projects; a dialogue between international funders and supporters to agree on common interests in supporting SRBLM for brownfields and contaminated site management in Kosovo; and considering the wider sustainability issues and opportunities for added value.

Box 2. Examples of Potential External Sources Supporting Site Remediation in Kosovo

Several European universities and institutions have expressed interest in supporting the development of integrated approaches to site remediation in Kosovo. They have also expressed a willingness to explore national and European funding sources to support this activity.

Here are three examples:

- The University of Strathclyde has significant experience in establishing shallow-rooted biomass crops on brownfields. They would be interested in collaborating on a project exploring brownfields biomass for energy generation at the KEK site.
- Spaque, a public brownfields regeneration company in Wallonia, Belgium, has invited the Kosovo Geological Survey and Trepça to join the advisory board for an EU Interreg project

[18] And also to ensure it is a complete risk based land management treatment for the site in line with international good practice.

[19] https://www.drax.com/investors/fourth-biomass-unit-conversion/ Accessed May 2019

proposal on repurposing mining wastes.

- The University of Leuven has significant experience in mining waste reuse in the circular economy.[20] They are interested in studying tailings deposits in Kosovo and may be able to carry out some initial feasibility testing within some of their existing projects.

Support for demonstration projects provides a starting point for showing the progression from site investigation through to remediation, which in turn will support the other themes by providing implementation and testing in practice for contaminated site management in a Kosovo context. The types of project to be selected will not be based on seriousness or priority of environmental impacts as this prioritization is relatively time consuming. A series of candidate projects will be selected on their ability to provide wider value across the different benefits summarized in Section 4.4. The importance of this approach is to underscore the wider value of (and societal benefits from) contaminated sites remediation in Kosovo.

Section 4.2.2 identifies an initial set of candidate sites for the first and immediate phase. These have been chosen based on capacity. Subsequent phases should be able to widen the range and scope of remediation support based on greater capacity and know-how, underpinned by the overall program's first phase.

4.1.7 Theme 7. Supporting Wider Sectoral Know-how Development in Kosovo

Starting point. Most countries have databanks of previous permit applications, geographical maps going back potentially several hundred years, aerial photographs going back to at least World War 2, and a wide range of other data and resources that can be applied to suspect site identification. The availability of this information in Kosovo, however, is limited. Moreover, information on subsurface conditions (e.g., hydrology, hydrogeology, geology) is either scarce or difficult to access. This limits the effectiveness of any screening (preliminary) risk assessments as suggested in a separate report on site visits and preliminary risk assessment for selected sites. This means that inventory actions are significantly more expensive as fewer sites can be screened out in Phase 1. As a result, specific intrusive studies are added into Phase 2. There may be significant informational resources, but access to these has been hampered in the past, and the development of permitting in Kosovo is relatively recent. This is a significant challenge for the inventory process.

More generally, SRBLM technical competencies in Kosovo are limited to relatively few people, and in-depth applied know-how is scarce. The ecosystem of supporting activities presented in countries with stablished contaminated land sectors (see the U.K. example in Annex 1) is not available in Kosovo and needs to be established largely from scratch.

A wider concern has been raised about illegal construction in Kosovo, which is often seen around potentially contaminated sites. A lack of public knowledge of the impacts of land contamination impacts health, environment, and real estate values means that site developers, regulators, buyers, and users may not be aware of the consequences of this type of construction.

Desirable direction of travel. The development of professional practice for sustainable and risk-based land management. The development and integration of relevant databanks. The development of a center of focus for contaminated sites know-how.

Destination. (a) SRBLM know-how embedded across a developed contaminated land management regime in Kosovo sufficient for the country to manage its contaminated sites legacy in line with good practice. (b) A center of excellence that enables Kosovo to be a regional knowledge hub in the field and export related environmental services. (c) Integrated and comprehensive databanks to support contaminated site management practice in Kosovo. (d) Regional research and development lead and full participation in the international development of contaminated site management practice.

[20] E.g. https://h2020-nemo.eu/

Benefits. The biggest benefit would be to ensure effective delivery of contaminated sites and brownfield rehabilitation in Kosovo, making use of local skilled personnel as far as possible. This would assist the development of contaminated land management practice in line with the Kosovo context. An additional benefit could be to reduce the scale of importation of environmental services and develop reginal exportation opportunities. Another benefit would be to ensure the necessary skill sets in Kosovo to engage with (and implement) any future EU Soils Directive.

Key actions. An urgent action will be the development of institutional capacities and competences, leading to the development of training and study opportunities for practitioners in general via locally delivered course content. An early cohort able to develop skills and competencies to an accredited international standard would be able to develop Albanian language programs. This action should be supported by the development of an accessible information base that provides learning materials and access to design tools, standards, and other key resources available in other countries (a) to ensure a fully informed Kosovo approach; and (b) to avoid reinventing the wheel.[21] Action needs to be taken to collate available site information and move it into a form that can be used for contaminated site management. This includes geographical (land use) maps, geological and hydrogeological maps, records of past land use, records of past and current permits, and aerial photography. This same information set will be needed to support inventory actions (Theme 3).

Support should be provided for organizations and experts in Kosovo to participate in international research, networking, and conferences. In particular and given its status as an Accession State, Kosovo should participate in the Common Forum to gain early insight and influence in any emerging contaminated sites legislation and to benefit from exchanges of knowledge and experiences with an international peer group of professionals. The Common Forum commentary on the previous Soils Directive proposals highlights some differences of opinion with the European Commission, where problems in approach were identified which would be enormously consequential for Kosovo given its developing contaminated site management agenda (see Table A1.3 in Annex 1).

Moreover, there needs to be a specific public information action within the planning regime to highlight the consequences of improperly managed reuse of contaminated sites and to discourage illegal reuse.

4.1.8 Theme 8. Engaging Transparent Procurement Procedures and Reporting

Starting point. Transparent procurement, processes of stakeholder engagement, regulatory procedures, and reporting of environmental policy effectiveness are not well advanced in Kosovo but are a necessary underpinning for the delivery of these guiding principles.

Desirable direction of travel. Drafting and delivery of transparent procurement, regulatory procedures, and policy reporting.

Destination. (a) A high level of probity and public, funder, and investor confidence in the Kosovo contaminated site management program. (b) Development of these guiding principles by Kosovo into an internationally funded plan of action must also be based on principles of transparency (e.g., in publications), equal accessibility of information by all interested parties, and consultation and review. (c) Wide stakeholder engagement in developing final programs.

Benefits. Transparent procurement underpins effective operation of an open and fair contaminated land market and is the best way to guarantee the right people for a job at the right price. Procurement procedures can also build in wider policy considerations (e.g., achieving sustainable remediation). Transparent regulatory procedures underpin effective prioritization of resources and optimize the mitigation of harm and delivery of wider value. Monitoring and reporting of environmental policy

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[21] An example of a U.K. information provider is the charity www.claire.co.uk, which provides a range of information resources (see Annex 1), and example of an on-line information European initiative is www.eugris.info (although this does need updating).

effectiveness allows the government to manage and refine these guiding principles over the implementation period based on performance.

Key actions. This report should be seen as an initial platform for development and not a final endpoint for discussing a funded program and subsequent implementation of the multiple tasks and actions therein. A first step should be a dialogue to agree upon the broad parameters of the recommended program between the Kosovo government and other funding partners (if the government decides to seek international financing and technical assistance). This can be used to refine planned activities, and in particular Phase 1 activities. It might also be prudent to hold a stakeholder workshop to facilitate stakeholder engagement and feedback. These actions can also be guided by the comprehensive guidance provided in Getting to Green, a report which links pollution management with green growth in a multi-stakeholder approach (World Bank 2011).

Many actions related to governance and procurement depend on general progress in governance and procurement in Kosovo. The recommended program for contaminated site management should have an annual reporting requirement that covers topics such as inventory development and overall site management; progress of actions and activities as set out in Section 4.2; delivery of regulatory and planning decisions within Kosovo related to contaminated sites; review of patterns of governance, probity, and transparency in the sector; and overall progress toward program goals.

A simple take home message is that the contaminated sites regime developed in Kosovo must apply equally, neutrally, and transparently to all sites and projects, regardless of which organizations or individuals are involved or whether they are private sector, public sector or joint public-private partnerships. These key aspects of governance are a central requirement and should be monitored and included in the overall reporting.

4.2 Recommended Program for Contaminated Site Management

The key actions listed in the guiding principles have been formulated into the following program framework in the sections below.

4.2.1 The First and Immediate Phase

The establishment work organizes activities over a 5–year period across three program actions:

- Kosovo Program Action 1 - Risk-based contaminated site inventory, mapping and prioritization.
- Kosovo Program Action 2 - Capacity building, knowledge sharing, and developing regulations, guidance, tools, and institutions.
- Kosovo Program Action 3 - Demonstration of integrated land use planning and sustainable risk-based contaminated land remediation and reuse.

Table 7 summarizes the mapping of the broad activity themes and proposed actions for Phase 1. The work under the first phase has a particular focus on (a) the development of a national site inventory (in phases if needed due to budget and other constraints) and site prioritization; (b) establishment of a legal and institutional management platform, capacity building and knowledge sharing; and (c) strong demonstrations to deliver high-value and practical outcomes on the ground that incorporates multiple synergies and other interests (e.g., urban redevelopment, greening industry (including sustainable mine development), water resource management, renewable energy, and public amenities). More detailed activities for the first phase are recommended and provided separately.

Table 7. The First Phase Work in a Nutshell
(mapping broad activities to program components)

Overall Guiding Principle Themes	Action 1: Contaminated Site Mapping, Inventory and Risk Management Framework	Action 2: Capacity, Knowledge, Regulatory Framework, and Tools	Action 3: Clean-up Demonstration Activities
1. SRBLM	*Underpinning activities*		*Learning by doing*
2. Boundary Setting			
3. Inventory			
4. Liability Management			
5. Framework, Tools, and Guidance			
6. Delivery Actions on Sites			
7. Know-how	*Learning by doing*		*Learning by doing*
8. Reporting and Transparent Procurement Processes			

Phase 1 demonstration projects are opportunities where remediation and wider goals and benefits can be integrated (e.g., job creation, materials recovery, greener industry, public amenities, regeneration, sustainable energy, and capacity building). The suggested demonstration projects outlined in Table 8 are indicative and not final. They will be subject to further review and development during project preparation or implementation.[22]

Table 8. Suggested Demonstration Projects in Kosovo

Number	Descriptions
SDP1	Municipality scale demonstration of inventory development, including practical delivery of site investigation, assessment, and remediation of high-priority sites. This project would be carried out in one municipality as a national case study. It would offer a manageable scale pilot before replication at the national level. There are five principle components to this project: (1) the development of a Kosovo inventory system linked to regulatory and planning control functions by the competent national authorities; (2) piloting of this system at a municipal level; (3) mini demonstration projects for site investigation, risk assessment, and remediation at selected (publicly owned) sites identified through the inventory process; (4) feedback and refinement of the Kosovo inventory system; and (5) an exemplar and training platform to support further replication to additional Kosovar municipalities. An additional action might be the parallel collection of information about brownfield regeneration potential for the various sites reviewed during the municipality inventory pilot, and estimation of the economic cost-benefit of their regeneration.
SDP2	Integrated remediation / regeneration project for an asbestos-impacted area in Hani I Elezit to create a linear park. This project would be based largely on a detailed masterplan already drawn up by the local authority for Hani I Elezit, which they have costed out at €500,000–€600,000. Hani I Elezit is a small town of 9,000–10,000 inhabitants. The River Lepenci runs through it. Asbestos wastes are strewn along the

[22] Some demonstration projects may be in line with priorities for other international funders (e.g., UNEP and EU) who have already funded ad hoc contaminated sites projects in Kosovo. Participating in a more structured program may provide significant improvements in funding outcomes. In addition, a 2014 World Bank report suggested a wide range of possible financing mechanisms that could be used to extend the range of possible demonstration projects by making additional resources available. World Bank 2014 - *Financing Mechanisms for Addressing Remediation of Site Contamination*).

Number	Descriptions
	river banks through the town. The asbestos comes from two factories in the town that used asbestos. The municipality envisions a linear park, creating public access along the waterfront and opening up new leisure and hospitality opportunities for the town linked also to a new stadium. It may be appropriate to integrate the project with a program of asbestos assessment and removal of critical risks from local homes. This would add to the cost but reduce a major public health risk. Community engagement would support providing a clear and exciting identity for the riverfront as a linear park that is meaningful for local people and encourages their interest and participation—and would link local cultural and sporting events to use of the linear park. See Section 4.4. for more detail about the site and its context.
SDP3	Piloting integrated greener industry and repurposing of historic flotation waste tailings as a basis for replication across various sites and facilities, including possible linkages to other planned projects on improving water quality for catchments impacted by tailings deposits. There are two broad components to this project: (a) the repositioning of historic tailings deposits from problem to opportunity, in line with circular economy concepts, by treatment combined with metals recovery; and (b) green industry design studies to optimize ongoing flotation processes in Trepça in terms of resource & energy utilization, waste reduction, and materials recovery to mitigate ongoing and future land burdens from tailings disposal. Tailings recovery tests could proceed toward large pilot demonstrations and existing European landfill mining / tailings recovery projects. Experts have already expressed a willingness to collaborate,
SDP4	Preparation of a master plan for establishing a Peace Park on the Mitrovice Industrial Park (MIP) integrating site investigation and assessment and options appraisal integrated with a shared brownfields regeneration concept across the different communities of Mitrovice as basis for continued reconciliation. The masterplan will support the fundraising and investment case for the Peace Park regeneration and be the technical basis for effective risk management arising from the former uses of the area. More detail about the site and its context is provided in Section 4.4. The scale of the challenge at MIP is daunting, but so is the scale of the opportunity. An integrated masterplan might include a park, renewable energy production, and sustainable business and retail parks. Moreover, in the special context of Mitrovice a process of engagement and community involvement in planning offers a platform for reconciliation and shared interest. The suggested project would establish the information needed to develop an effective remediation strategy for a masterplan built through a process of community and stakeholder engagement, It would also develop a cost-benefit assessment and a multilateral investment case to support an international private-public partnership approach to bringing forward the development of the Peace Park within a wider regeneration concept.
SDP5:	Demonstration (multi-hectare) scale testing at Kosovo Energy Corporation (KEK) of phytoremediation and revegetation for biomass for energy and integrated with design for other renewables options and public open space for the community of Obiliq. The outcome of this demonstration would be a masterplan and investment model for brownfields renewable energy and public parkland across KEK's 30 km^2 land holding. The context for this proposed project is described in Section 4.1.6. The key components of this project would include (a) master planning for an overall site regeneration plan encompassing public amenities and renewable energy reuses (and, potentially, built developments where the situation allows); (b) market building for biomass energy in Kosovo (and, in particular, for electricity generation); and (c) piloting biomass revegetation with phyto-containment on large parcels of land at the KEK site and evaluating the biomass product for valorization (energy / feedstock) for subsequent replication. The Universities of Strathclyde (phytoremediation) and Brighton (community engagement) in the U.K. have expressed an interest in taking a project design forward, and some limited U.K.-based sources of pump-priming funding may exist.

4.2.2 Subsequent Phases

Actions 1 and 2 in the first phase will likely be ongoing across the lifetime of the program; they may, therefore, need to be considered for support in the development of subsequent phases. Mid-term reviews for Themes 2 (boundary setting) and 5 (guidance), and assessment of liability outcomes, may identify additional or changing priorities for future phases of work. Whichever actions Kosovo chooses for the first and subsequent phases, the ability to phase in different aspects of the contaminated site program provides great flexibility to adjust to policy, legislative, budget, and other operational constraints.

The major thrust of future work is foreseen as support of remediation projects for priority sites where there is a high potential for synergy and added value (see Section 4.4). An initial point of focus could be to take forward feasibility studies carried out under the first phase. Sites of particular interest might include the Kosovo Energy Corporation (KEK) site around Kosovo A, B ash dumps and lignite mines, Artana Mine site and its associated tailings, Mitrovica Industrial Park, and other Trepça locations.

The first phase includes a task to provide seed funding to develop contaminated land management research projects that both develop capabilities and allow for more detailed investigation of remediation and SRBLM in the Kosovo context. There is already research capability in Kosovo (e.g., Gashi et al. 2016). The enhancement of Kosovo's contaminated land research and development capacity should improve know-how and serve to provide local support for investigation of specific land management concerns. This activity should also be continued in future phases to maintain this benefit. This task may be particularly helpful if it can leverage the involvement of Kosovo research organizations in the upcoming EC Framework 9 (FP9) program that will be put in place after H2020, which Kosovo was not able to join.

4.3 Tentative Costing for a Contaminated Site Program in Kosovo

The overall costing for the recommended program for contaminated site management in Kosovo has been considered using two different estimating approaches: top down and bottom up.

The Top-Down Approach

Under the top-down approach, estimated cost data published in 2014 by the EC Joint Research Centre with the support of the European Environment Agency's Topic Centre on Soil have been used (JRC 2014). Figure 5 shows a range of per capita annual expenditures on contaminated land management across various European countries.

While the range is very broad, JRC suggests that the average is approximately €10 per capita per year, which is met by Finland, France, Hungary, and the Slovak Republic. JRC also suggests that the average split between private and public expenditure for contaminated site management is 42 percent. Again, this masks a wide variation. Within the Slovak Republic, for example, more than 70 percent is funded by public budgets. Given that the contaminated site management regime is only beginning, and that the program will require a strong public investment push, it is safe to assume that the majority of contaminated sites spending (at least in the short term) will come from public funding, estimated at 75 percent of total costs.

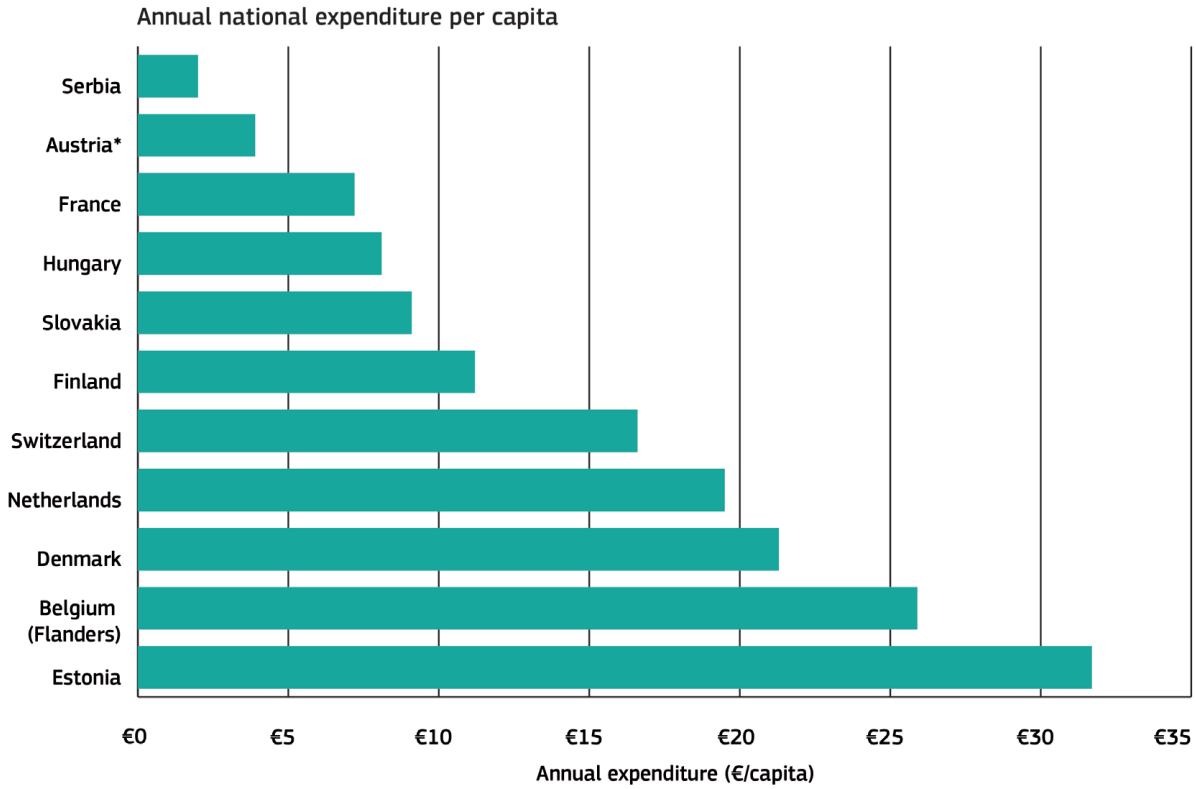

Figure 5. Per Capita Spending on Contaminated Site management for a Range of European Countries (from JRC 2014)

The 2017 population of Kosovo was reported at 1.831 million people, hence a direct annualized cost based on the reported per capita average would be in the region of €18 million (2014 prices). Allowing an annual inflation rate of 2.5 percent, this suggests the cost in the region of €20 million at 2019 prices. Assuming 75 percent of that is public money, the annualized cost to the public budget of a contaminated site management program would be in the region of €15 million per year at 2019 prices.

The Bottom-Up Approach

From a bottom-up perspective, a tentative estimate of the total assessment and remediation costs can be made using the estimated number of suspect sites identified in Section 2.2, on the assumption that the site inventory experience in Kosovo is likely to follow the same pathway as it did in Hungary. This estimate uses indicative costs for Phase 1 investigations at €3,000–€5,000 per site, fairly independent of site size; for Phase 2 investigations, €25,000–€100,000. These numbers have been reviewed by a panel of six contaminated land service providers from the Czech Republic, France, Ireland, the Netherlands, and the U.K. However, one service provider suggested that mobilization costs for international consultants to Kosovo might be substantial (in the region of €8,000 per mobilization). This would primarily impact on Phase 1 site investigation costs, unless this work was released in batches of sites to create larger projects.

The costs of remediation are less clear, with reports of several million Euros for some larger sites. These project proposals are not properly based on risk-based remediation, however, so the numbers are unreliable. Some sites in Kosovo, such as the PIMs area and adjacent dump site in Mitrovica and the KEK site encompassing mine areas, ash dumps, and industrial contamination, are megasites that are likely to cost vastly more. Conversely, the initial review of suspect sites in Section 2.2 suggests that many are relatively small and thus potentially treatable in the range of €100,000–€1 million (and thus also cheaper when it comes to Phase 2 site investigation).

The tentative bottom-up estimation uses 4,000 suspect sites in Kosovo with the following costs:

- Phase 1 investigation: €5,000 to take into account mobilization over batches of sites
- Phase 2 investigation: €62,500 (and €1,000,000 for site remediation).

These costs, particularly for remediation, have significant uncertainties as cost is determined by the nature of the contaminant linkages found, the land-use scenario for the site going forward, and how each can be mitigated within the specific site context.

Table 9 makes an additional assumption: that the screening out of sites at different inventory stages will follow a trajectory similar to Hungary's (see Section 2.2) to provide an overall site management cost of an estimated €345 million to achieve a complete contaminated sites assessment and rehabilitation across Kosovo. The largest portion of these costs is linked to remediation work. This tentative costing excludes activities related to policy, regulation, information platforms, and guidance development.

Table 9. Contaminated Sites Assessment and Remediation Costs for Kosovo[23]

Stage	Number of Sites	Costs per Stage (€ million)
Suspect sites requiring Phase 1 investigation (100% of sites)	4,000	20
Potentially contaminated sites require Phase 2 investigation (50% of suspect sites)	2,000	125
Contaminated sites necessitating action assume all require remediation eventually (10% of potentially contaminated sites)	200	200
Total cost (€ million)		345

Assuming that the annual amount spent on contaminated site management across all activities is €20 million, in line with per capita averages in Europe, then the implication is that the contaminated site management program in Kosovo would be largely completed in 19 years. This also assumes that 10 percent of the annual expenditure is required for supporting activities (regulation, databanks, guidance, and so forth).

Nineteen years is in line with the recommended 20-year program timeline. It is also relatively optimistic given that countries such as the Netherlands and the U.K. have been tackling contaminated land issues for more than 40 years.

Public spending might initially account for a high proportion of this expenditure. However, as the sector matures, that proportion should decline as brownfields become more attractive for privately funded redevelopment and industry in Kosovo improves to more typical European norms for environmental management and site rehabilitation (under polluter pays). The legacy of public ownership for many sites, however, will mean that the public liability is likely to remain relatively high compared to Western European countries.

4.4 Benefits, Synergies, Opportunities, and Wider Value

The mitigation of threats to human health, water, and ecology are direct benefits from sustainable risk-based land management of contaminated sites. There is also a substantial wider value. Table 10 highlights several benefits, synergies, and opportunities from better contaminated sites / brownfields management and, where possible, links these to a contaminated site example in Kosovo. In many

[23] Based on the progression of sites through the Hungarian inventory experience.

cases an integrated approach on a site will allow the simultaneous realization of several wider value opportunities[24] (World Bank 2010A). Two detailed benefits case studies are provided at the end of this section.

In line with concepts of circular economy for materials resources, there is an increasing interest in circular land use and circular land management to encourage the transition of land between different uses and to ensure that brownfield land is effectively transitioned back into more productive use (HOMBRE Consortium 2014). This reuse of brownfield land is one of the principle actions that can be used to reduce Kosovo's unsustainable levels of land-take for built development and urban sprawl (see Chapter 2).

In parallel, brownfields regeneration creates opportunities to realize value from previously developed real estate and degraded land for uses such as commercial and housing development, renewable energy, and the creation of urban green spaces. This creates new economic activity and improves the livability of towns and cities, which in turn creates highly visible social benefits. Proper functioning of this land recycling is contingent on a reliable regulatory and policy framework for contaminated site management integrated into both the environmental and spatial policy domains. A clear contaminated sites regime is also needed to underpin privatization and commercial merger and acquisition processes, as without it longer-term environmental liabilities cannot be estimated. International investors would regard the absence of such a regime as a major investment risk.

The dominant share of overseas investment into Kosovo goes toward real estate purchases. According to the Central Bank of Kosovo, 95 percent of the total 2018 foreign investment in Kosovo was in real estate (i.e., 202.3 out of 213.7 million Euros). Brownfield issues for formerly developed land are therefore a substantial downside risk for inward investment (i.e., that environmental liabilities lead to a perceived market risk for property values in Kosovo). Contaminated land liabilities are also a major impediment to mergers and acquisitions and may interfere substantially with the realization of value from the privatization of socially owned land. The rate of progress of privatization is regarded as low and stalled, which also limits compliance with EU market norms (EC 2019). Any attempt to accelerate privatization thus needs to take into account the management of contaminated sites and their liabilities in state holdings. It should also take heed of the privatization endeavors in countries such as Poland and Hungary, where rushed privatization programs continue to cause difficulty in managing contaminated land liabilities.

Table 10. Benefits, Synergies, Opportunities and Wider Value from and Drivers for Improving Contaminated Site management in Kosovo

Potential Wider Value	Outline	Example in Kosovo
Accession	Accession States are expected to move toward EU norms of environmental management and harmonize with EU legislation. An EU Soils Directive is a very real prospect in coming years.	Facilitating Kosovo accession and preparedness for any new Soils Directive.
Air Pollution	Dust blow from contaminated areas (from tailings and also as a result of historic smelting emissions) have caused widespread contamination of agricultural soils and urban areas. Dust blow from sites remains an ongoing air pollution problem.	Mitrovica Industrial Park.
Amenity	Public green spaces are relatively scarce in Kosovo and under threat from built development. Brownfields restoration offers a significant opportunity to improve green spaces. In the U.K., the Land Trust redevelops brownfields for community spaces. It estimates that for	PIMs area and adjacent dump site, Mitrovica.

[24] www.zerobrownfields.eu

Potential Wider Value	Outline	Example in Kosovo
	every £1 invested more than £30 of public health budget benefits are created and more than £20 in social cohesion benefits.[25] This is because the parks it establishes improve public health and wellbeing and create a greater sense of shared space and value.	
Urban Sprawl/Redevelopment and Land Take	Land take in Kosovo is enormous compared to the country's relatively small land area. Many countries have policies which enforce or encourage new built developments, such as offices and housing, to take place on repurposed brownfield land. This tends to have wider sustainability benefits, including reduced road transport as there are shorter distances to work or to shop. For countries facing resource constraints, initially linking site remediation to sites with existing severe human health impacts and to the reuse and redevelopment of contaminated land can harness financial drivers from the marketplace. Such an approach does not eliminate the need for other program development and funding.	Requiring the majority of new built development to be on brownfields in Kosovo would reduce urban sprawl and stimulate more brownfields rehabilitation from private as opposed to public budgets.
Engagement	Brownfield restoration can be a neutral space for positive engagement for split communities in Kosovo, as a shared and nonpolitical objective of a better place to live and a better environment.	PIMs area and adjacent dump site, Mitrovica.
Environmental Service Development	Program investment creates the opportunity for Kosovo to become a knowledge and services hub for remediation and brownfields renewal with significant export potential to surrounding countries.	Attracting international consultancies to set up regional offices in Kosovo as opposed to Belgrade or Croatia.
Greener Industry – preventing pollution	There is a close link to greener industry and the prevention of future land contamination, which is of particular importance to Kosovo given the economic significance of mining and metal processing to the country. Moreover, greening industry projects naturally integrate with legacy management (e.g., dealing with the past and managing the future) in a single environmental project package.	The promotion of zones of special interest for mining (Ministry of Economic Development 2012) is a major opportunity to link addressing a historical legacy with future pollution prevention (e.g., sustainable mining development).
Habitat	Contaminated sites can be rehabilitated to support habitat, which is of value in its own right and may also be useful for compensatory habitat from new projects on greenfields under the Environmental Liabilities Directive.	Obiliq municipality.
Privatization and Inward Investment	Environmental liabilities are a known issue for international real estate and industrial investors. Uncertainties over a contaminated land management. regime reduce both the number of potential investors and the value they place on assets in Kosovo. SRBLM optimizes the cost of site management actions while maximizing the value of their outcomes.	Supporting a more investable Trepça.
Real estate markets and regeneration	Effective contaminated site management is a prerequisite for a functional real estate market that can recycle land and reduce greenfield use. This also creates new opportunities for business and entrepreneurship.	
Renewable	Reuse of contaminated sites for renewable energy from	Biomass energy from brownfields at

[25] https://thelandtrust.org.uk/the-land-trust-charitable-aims/thebenefits/?doing_wp_cron=1560257170.8364539146423339843750 Accessed June 2019

Potential Wider Value	Outline	Example in Kosovo
energy	photovoltaics is a particular opportunity for Kosovo given its relatively high solar flux. Reuse of land for biomass may also provide remediation and biomass energy.	the KEK site facilitating a biomass stream for a new energy plant. The large tailings areas across Kosovo may be highly useful for siting photovoltaic systems after suitable remediation. Income from rental for solar power companies may pay for ongoing site maintenance and monitoring.
Reputation	Contaminated land is a source of blight damaging people's perceptions of a place. It ties people to the past and disincentivizes them to live and work there.	An effective contaminated site management program would be a bold statement by Kosovo about how it sees itself as a place to live and work in the future.
Transboundary river pollution	Contamination of rivers running from Kosovo to neighboring countries is a potential flashpoint for international liabilities and damage to international relations.	Dealing with contaminated land in Kosovo mitigates this risk (as well as facilitates compliance with the Water Framework Directive).
Urban renewal and entrepreneurship	Restoring urban brownfields can create new spaces for businesses, in particular small and medium enterprises, as well as provide benefits for public health and social cohesion from a more attractive living environment. Urban renewal also lifts surrounding property values and opportunities for higher local tax revenues.	Asbestos remediation and renewal on the waterfront at Hani I Elezit would create opportunities for small businesses in the hospitality sector, which could capitalize on the area's increasing importance as a transit hub.
Water resources	Improved protection of water resources	Remediation at Artana mine site to improve the local water shed and limit possible risks to current reservoir planning.

To maximize sustainability, cleanup and reuse options should be considered early in the planning process, enabling best management practices of SRBLM during remediation to carry forward. Early consideration of green and sustainable remediation opportunities and transparent mechanisms offers the greatest flexibility and likelihood for related practices to be incorporated throughout site investigation, remediation, and redevelopment/reuse. The regulatory initiatives on contaminated site management should actively support site remediation and redevelopment that result in beneficial reuse such as commercial operations, industrial facilities, housing, greenspace, and renewable energy development.

Case Study 1. Mitrovica Industrial Park

On June 13, 2019, a group of about 100 international contaminated land experts gathered for a NICOLE meeting in Lyon, France, discussed how the Mitrovica Industrial Park (MIP) might be managed with a view to facilitating its rehabilitation and maximizing the benefits. The experts included multinationals, small and medium-sized enterprises, site owners, consultants, and contractors from Europe and elsewhere. This case study is based on the outcomes of this discussion.

Information

The available information about the site is far too limited to put forward a reliable remediation design. The site lacks information about the subsurface (and, in particular, the hydrogeology), the behavior of aquifers, and their linkage to surface water. In addition, source terms have not been properly delineated. The regulatory and planning constraints applied to the site also need to be characterized. Where these do not properly exist, consultants often suggest alternatives from other countries. The use of the site and the local water systems also need to be properly understood. There was also some caution about setting environmental quality objectives for the river related to the site because the river is already heavily impacted upstream.

The experts also suggested that the risk management and remediation design need to be developed in parallel with a master plan for site reuse; this creates important opportunities for cost reduction and value creation. For example, part of the site may have more sensitive uses (e.g., for housing), while another parts could have a contained waste deposit, including contaminated soils and sorted demolition residuals. This part might be used for public open space or renewable energy.

The site was seen as a significant area. Therefore, the experts felt that a prerequisite for a viable masterplan for the site was to have in place an overall regeneration strategy and economic masterplan for the whole city (include, for example, identifying what zones of the city might be used for what purpose). This needs to link in with a solid understanding of what all city inhabitants, whatever their background, might see as valuable for the city. They also noted that a similar understanding should also be drawn up for the MIP site. Early and deep public and stakeholder engagement was seen as vital to accomplishing such a large land rehabilitation project, especially given the difficult and divided social context of the city.

Integrated Solutions

A broad range of ideas were suggested. Given the size of the site, a number of these might be feasible in parallel and could be mutually self-supporting. The site was seen as having social and cultural capital for all communities living in the divided city of Mitrovica, and that all should be included in any design process. The improvement in environment, health, resources, and cultural, social, and economic capital was seen as a shared asset with the potential to bring people together in a shared endeavor.

Specific suggestions included:

- Creation of a Peace Park and a Heritage Site as means of creating a shared endeavor, with the ambition of launching the completed space with a major event (such as an open-air concert with international artists). They also thought the location should be able to host major sporting events. It was suggested that a Peace Concert and local holiday could become an annual event centered on this land on a regenerated site that itself somehow symbolizes a process of renewal and hope. Were such a park to be developed, the railway link might be an important point of access. A new station could service this.
- The location and accessibility of MIP appears to lend itself to becoming a go-to retail development destination (e.g., Ikea[26]), for leisure businesses like bowling or a multiplex cinema, for distribution and warehousing services, as well as potentially for a new business park. It was suggested that there might be room for small and medium-sized retail startups for local people as well. The linkage of activities, a Peace Park, and retail and entertainment could be mutually supportive.
- Innovative means of raising private investment might also be needed to leverage public funds. One idea that was tabled was that Trepça could give land that was clean for commercial developers in exchange for investment in overall site remediation. Environmental liabilities would have to be carefully considered, and likely remain with Trepça.

[26] https://www.ikea.com. Accessed June 2019.

- Part of the site could be used for wetland rehabilitation of the river and other polluted water, which could also be linked to the need for better sewerage and water supply in the city.
- Part of the site could be used for waste management or other environmental services.
- Wastes deposits, demolition materials, and other site debris could be collected and possibly blended to reduce potential to cause harm. This colocation could also be used to create a new landform that optimized renewable energy (solar and wind). Alternatively, such a landform could be an earth sculpture that is a feature of a Peace Park or Heritage Park. "Lady of the North" in the U.K is one example of an earth sculpture made from site materials.[27]
- The scale of the area, and the possibility of linkage with renewable energy and a circular economy approach to waste and water use, creates the opportunity to create a sustainable business park that could add value and interest.

Implementation

The estimates of €3–11 million for remediation of the MIP[28] were seen as hopelessly optimistic for a project delivered to European norms. The type of regeneration this site would need, and the needed measures in the surrounding area, were considered to be in the range of over €100 million.

A large coking works in the U.K. that was largely abandoned at the end of the 1990s is now being completed as a regeneration project, with approximately half of the 98-ha site being used for housing and half for public open space.[29] The remediation included 2,200,000 m^3 of earthworks; 250,000 m^3 of complex sorting; 75,000 m^3 bioremediation; 300,000 m^3 of thermal desorption; and 250,000 m^3 of soil manufacture. The project cost an estimated £179 million over a timeline of 20 years. However, by 2033 it is anticipated that there will be 1,100 properties on the site and nearly 5 ha of business use, equating to a value of £330 million at today's prices.[30]

Benefits can, however, be realized more quickly. The development of the Eden Project[31] as a major tourist destination on the site of a former China Clay mine in the Southwest of England took five years and has bought a €800-million boost to the local economy.[32]

The scale of the work and the potential scale of the opportunity and economic asset that could be created demand that a methodical and phased approach be taken, with detailed site investigation, stakeholder/public engagement, master planning (including at outcomes), and linkages at a city scale. Thought needs to be given to the entity that would lead such an initiative and how it would be constituted. This could mean that Trepça relinquishes ownership (although it could lease back offices) both for encouraging participation of all communities and because regeneration is not its core skillset. However, the site probably has a significant negative value from Trepça in any case, so a win-win arrangement might be feasible.

Case Study 2. Hani I Elezit

Information

This case study is largely based on a detailed masterplan already drawn up by the local authority for Hani I Elezit, which they have costed at €500,000–€600,000. Hani I Elezit is a small town of around 9,000–10,000 inhabitants. The River Lepenci runs through it. Asbestos wastes are strewn along a large part of the river banks as it passes through the town. This asbestos comes from two factories in the town.

[27] https://thelandtrust.org.uk/space/northumberlandia Accessed June 2019
[28] Ernst and Young and HPC 2017
[29] https://www.tep.uk.com/project/avenue-coking-works/ Accessed June 2019
[30] The completed remediation (2019) can be seen at https://www.youtube.com/watch?v=BTRKwhBooUQ&feature=youtu.be.
[31] https://www.edenproject.com Accessed March 2019
[32] https://www.cabi.org/leisuretourism/news/15941 and https://www.bbc.co.uk/news/uk-england-cornwall-18233304 Accessed March 2019


Images from the Hani I Elezit Waterfront Masterplan

Integrated Solutions

- The municipality envisions a linear park creating public access along the waterfront and opening up new leisure and hospitality opportunities for the town (linked also to a new stadium)
- It may be appropriate to integrate the project with a program of asbestos assessment and the removal of critical risks from homes in the town. This would add considerably to the cost but would reduce a major public health risk.
- Providing a clear and exciting identity for the riverfront that is meaningful for the local population and encourages their interest and participation and linking local cultural and sporting events to use of the linear park (and maybe even creating a Hani I Elezit marathon or 5k run or cycling events for children).
- Expanding the design concept to encourage the riverfront to become a destination for road travelers between Kosovo and Macedonia while encouraging the development of leisure and hospitality services and the participation of small businesses as part of the regeneration concept.
- Partial financing from the private sector by innovative means (e.g., land swaps for riverfront project investment), which might help leverage public funds as part of a public-private partnership.
- Partial financing from sponsorship, such as construction materials from the local cement factory, which could also be seen as payment of a moral debt for the land contamination that took place as a result of the factory's activities in the past.
- The project should be expanded to include nature rehabilitation for the more rural stretches of the river bank; this should be associated with public access to expand public health and wellbeing and support leisure opportunities for the local population.
- Consideration could be given to whether the riverfront construction work is also an opportunity for the installation of other needed infrastructure (e.g., sewerage, fiber optic cables).
- The construction design could include the collection of asbestos waste and their contained deposition within the riverfront masterplan (e.g., beneath a carpark).

The municipality may wish to model the potential for an increase in local property values that the park would create, and what increases in local tax income this might generate.

Implementation

The estimate of less than €1 million is low to achieve this broaden range of objectives; €1–10 million is seen as more realistic. It is worth costing this in more detail and also costing the potential benefits as the increasing importance of the town as a transport hub creates a strong economic value driver. This project is probably deliverable fairly quickly with a limited investment in risk assessment and remediation planning in parallel with the refinement of the master plan. This can then move forward to developing a community-supported public-private partnership proposal, and then fairly rapidly from there to project implementation should the proposal be accepted.

Annex 1 International Policy Frameworks and Good Practice in Contaminated Land Management

A 1.1 International Good Practice for Sustainable and Risk-based Land Management

Many sites have been treated, and treatment approaches have matured in many countries, over the past 20–30 years. The technical consensus is that contaminated land decision making should be made on the basis of risks to human health and the wider environment (NICOLE and COMMON FORUM 2013, Vegter et al. 2002). For a risk to be present, a source (of hazardous substance or property), a receptor (which could be adversely affected by the contamination) and a pathway (linking the source to the receptor) must be present (Swartjes 2011). These connections are sometimes referred to as a "contaminant linkage" (Environment Agency 2009). A receptor might be a human, an ecosystem, water resources, a building, or an ecological good or service provided by the wider environment.

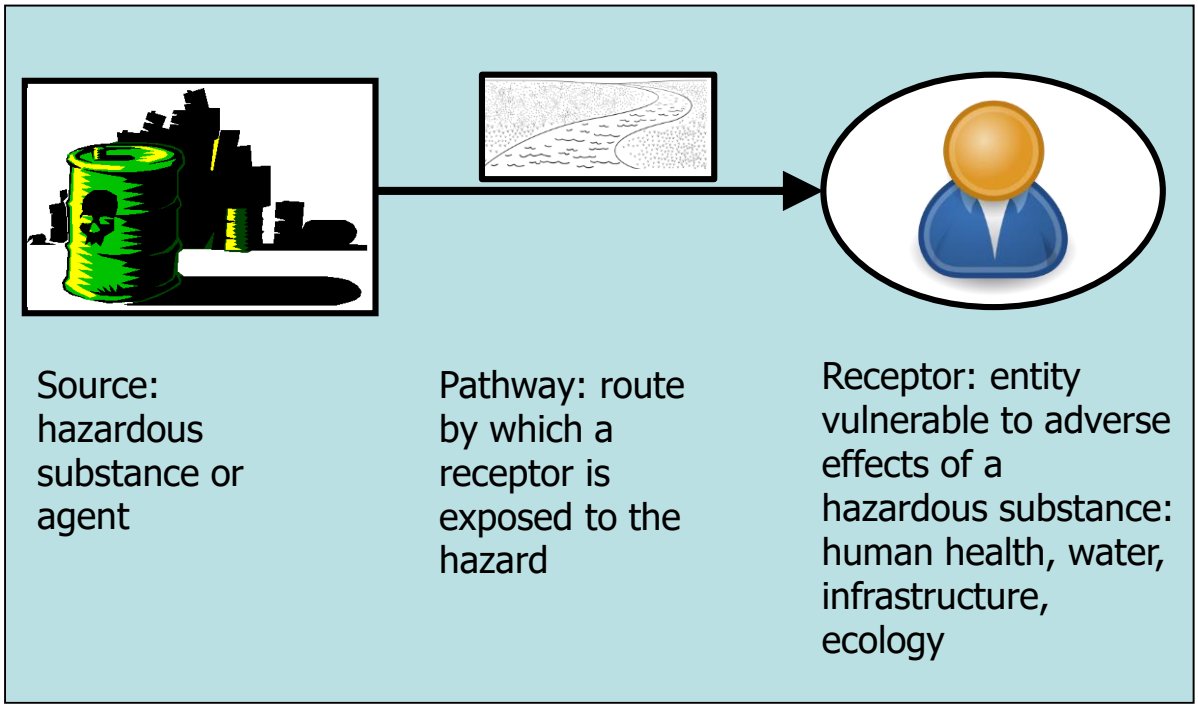

Figure A1.1 The Contaminant Linkage (source-pathway-receptor)

Their is international consensus that risk management should also meet sustainable development principles (Rizzo et al. 2016), or sustainable risk-based contaminated land management (SRBLM). Sustainability has three elements: environmental, economic, and social. Sustainable remediation considers all three elements (Bardos et al. 2016).

The sustainable remediation ISO standard 18504:2017 (ISO 2017), published in 2017, is based on a large body of work across many countries. The standard describes and summarizes an increasing global consensus that the overall benefit of risk management / remediation should be positive and take into account its wider impacts—and that decision making should be inclusive and transparent. The concept of sustainable remediation is based on ensuring that any approach to risk management is optimized to ensure that its sustainability outcomes are fully considered (across environmental, economic, and social indicators) and provide a net benefit (Bardos et al. 2018).

Contaminated site management typically proceeds in the following sequence: identification, investigation, risk assessment, risk management (option appraisal, remediation), verification, and

aftercare (Environment Agency and Department for Environment, Food and Rural Affairs, 2004). Conceptual models can also be useful in sustainability assessment, sustainability-based comparisons of remediation options, and assessing the overall value of the options available.

The use of conceptual site models is widely recognized as being of key importance in understanding and communicating site information, risk assessment, and evaluation, and in determining and verifying the best remedial approach. A conceptual site model (CSM) is a representation which sets out the critical site and risk assessment information of concern for a particular land contamination problem at a site (e.g., sources, pathways, receptors, their linkages and the principle features of the site). CSMs should be developed as site investigation, risk assessment, risk management, verification, and aftercare activities proceed (ASTM 2008, Gibbs *et al.* 2010).

Identification describes how sites come to be suspected as contaminated or otherwise managed through the contaminated land process. There are several triggers. Underpinning all of them is the perception that there may be risks from land contamination. Inventorying is used in many countries to provide a strategic and exhaustive approach to the identification of sites suspected of being contaminated (see Section 2.1 for information on their further evaluation). Inventorying processes need to be designed so that they also pick up sites emerging on an *ad hoc* basis from the triggers listed in Table A1.1.

Table A1.1 Triggers for Contaminated Land Management

Trigger	**Description**
Regulatory Demand	Sites where an environmental or human health impact triggers a remediation requirement from the regulator (this may include situations where the site owner decides to take preemptive action).
Planning Regime	Change of land use or land redevelopment (The planning regime usually includes consideration of contaminated land issues as a compulsory requirement). This includes change of use of an already remediated site.
Economic Triggers	Economic drivers (mergers and acquisitions – including privatization, liability management, and divestments) are a common trigger for site assessment (and remediation if necessary). These can trigger remediation work on operating sites.
Repair	Where previous remediation work may not have been fully effective.
Crime	Managing illegally deposited waste.
Water	Improvement of water quality (e.g., as required under the Water Framework Directive (2000/60/EC)).
Operating Processes	Spills or emissions from permitted operating facilities fall under the Industrial Emissions Directive. Polluters are required to clean-up to the baseline. This is more stringent than policy requirements for historic land contamination.

Site investigation (also known as site assessment) is the process of collecting information about a site to understand:

- Whether a suspected contaminated site is potentially contaminated. That is whether there are credible contaminant linkages present on the site (qualitative risk assessment). This is usually a preliminary stage of site investigation (sometimes described as Phase 1).
- Whether a potentially contaminated site is contaminated. That is whether it poses an unacceptable threat of harm to key receptors, such as human health or the wider environment (quantitative risk assessment). This usually requires more in depth and intrusive site investigation, including the collection and analysis of various environmental samples (sometimes described as Phase 2). The process may be iterative as more information becomes available to make risk management decisions.

Risk assessment is a process for understanding the level of harm from land contamination and how likely that harm is to happen. It provides an objective, technical evaluation of the likelihood of unacceptable impacts to human health and other receptors (e.g., ecological systems, water resources, construction materials) (ITRC 2015). The general steps (Environment Agency and Department for Environment, Food and Rural Affairs, 2004) are summarized in Table A1.2.

Table A1.2 Risk Assessment Processes

Preliminary (qualitative) Risk Assessment	Hazard Identification	Identifying contaminant sources (source terms).
	Hazard Assessment	Analyzing the potential for harm: what pathways and receptors could be present, and what contaminant linkages might result.
	Risk Estimation	Predicting the magnitude of the possible consequences from a hazard (the degree of harm and to which receptors), and how likely they are (which pathways).
Quantitative Risk Assessment	Risk Evaluation	Deciding whether a risk is unacceptable, which is typically via one of two mechanisms: • Comparison of an environmental sample with a generic threshold, such as a soil or water quality guidance value (generic quantitative risk assessment). • Comparison with a threshold value that has been calculated specifically for the site using a recognized methodology (site-specific quantitative risk assessment).

Risk management is an approach to decision making for historically contaminated sites where the need for action, and the nature of any possible actions, is decided on the basis of risk assessment (also known as *risk-based decision making*). Risk-based decision making provides a transparent, logical and evidence-based framework for those involved in contaminated land decisions to consider the acceptability of risks posed by contaminants at a site, either before or after treatment, and how any necessary risk reduction can be achieved efficiently and cost effectively. It also assists in making decisions among sites (e.g., prioritizing which sites need action most urgently). Site management decisions are usually predicated as follows:

- Where risks are evaluated as unacceptable, some form of mitigation action is necessary.
- Where no further action is necessary *providing the use of the site remains the same*.
- Where mitigation is needed, it is *only needed* for those contaminant linkages where the risk evaluation outcome is that the risk from that linkage is unacceptable.

Risk management decisions are based in almost all cases on achieving fitness for purpose (Nathanail et al. 2013): risks should be reduced to a level suitable for their ongoing or planned use, but further risk reduction is not strictly necessary (e.g., a site that will be sealed under asphalt for a carpark need not be treated in the same way as a site that will be used as a garden). Risk management decisions are usually given effect by a series of environmental quality thresholds (e.g., limit values for soil and water analyses for substances of concern) that have to be achieved before the site is accepted as treated or remediated.

For risk management policies that are predicated on "fitness for purpose," proper governance and planning control are prerequisites. Fitness for purpose necessarily limits the range of potential future uses a site may have. Thus if its use later changes, then a new site assessment process would need to be triggered.

For those linkages that need to be mitigated, the source-pathway-receptor relationship indicates how risk management can be achieved (see Figure A1.2):

- Source management – removal or immobilization of the source of the pollution in that linkage (the "source term").

- Pathway management – prevention of the migration of contaminants along pathways (e.g., groundwater flow).
- Receptor management – action to prevent receptor access to a pathway. A common approach is an institutional control (e.g., as a temporary prohibition of use of water from an impacted well).

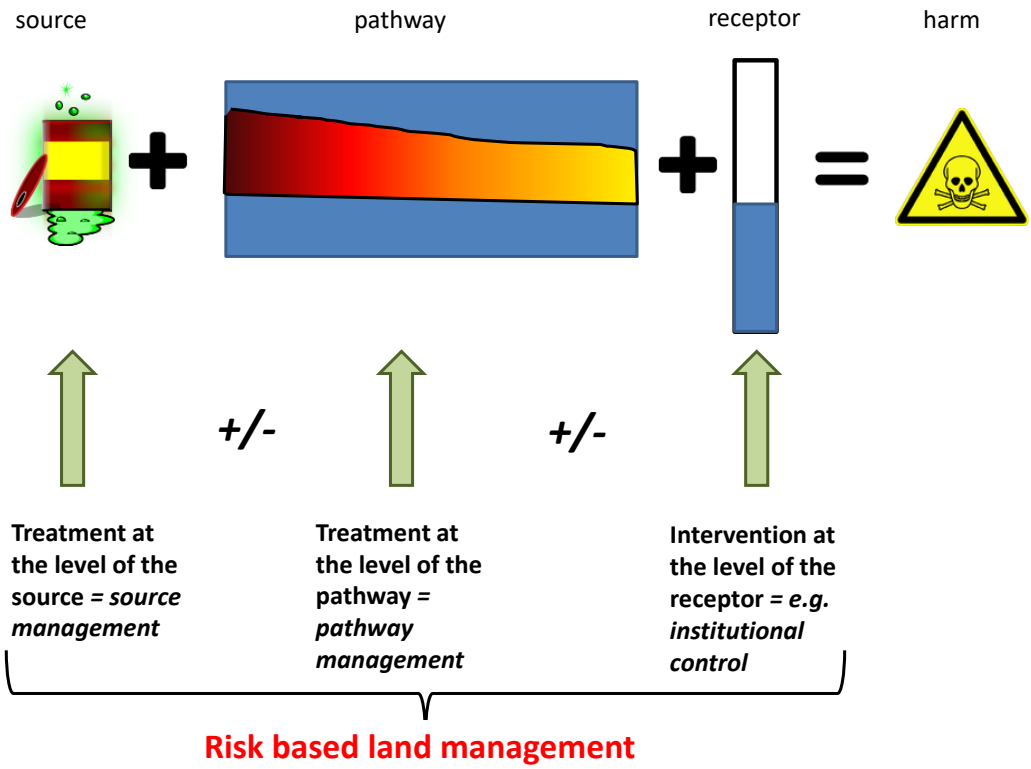

Figure A1.2 Risk Management Along a Contaminant (S-P-R) Linkage (courtesy of r3 Environmental Technology, Ltd.)

Often interventions should be combined along a contaminant linkage. One example is source removal from an impacted aquifer, combined with pathway management to mitigate the risks from any residual contamination and receptor management (i.e., an institutional control, such as temporary prohibition on groundwater use from impacted wells until groundwater quality meets agreed thresholds). Once risk management goals have been set and these indicate remediation should take place, the delivery of remediation has four broad phases: option appraisal; implementation; verification and monitoring; and aftercare and stewardship

Remediation is used to describe the processes that are used to achieve source and/or pathway management (Bardos and Nathanail 2004). Remediation includes excavation and removal as well as containment and treatment-based approaches. Excavation and removal are where a source term, as far as possible, or volume of contaminated soil is simply dug up for offsite disposal or treatment. Containment (including pump and treat) describes a measure where groundwater flow is prevented from reaching a contaminated zone, and water within a contaminated zone is prevented from escaping. This may be achieved by the placement of impermeable barriers or pumping out groundwater that is then treated aboveground and discharged to a sewer of surface water, an approach known as pump and treat or hydraulic containment. Treatment-based techniques extract, transform, or destroy contamination either within the subsurface (*in situ*) or above ground (*ex situ*). They involve a combination of biological, chemical, physical, solidification/stabilization. or thermal processes. The remediation work alone may not deliver the complete risk management process, as the risk assessment process may also rely on a series of interventions at the receptor level.

There are strategic considerations for selecting among remediation options. Process integration considers how to combine options to maximize effectiveness. *In situ* treatment zones use the idea of selecting where to treat contamination to optimize outcomes (rather than, for example, treating an entire plume using a permeable reactive barrier). Low input or "gentle" approaches are technologies that operate relatively quickly on pathways and but have a slower (but less resource intensive) impact on sources. These may be particularly appropriate for diffuse contamination problems, and/or where the soil needs to remain in a functional state—for instance, for a parkland or for agricultural after-use (Cundy et al. 2016).

Option appraisal describes the process of identifying potential risk management strategies for contaminant linkages of concern; shortlisting those that appear optimal for the site in question; and, subsequently, identifying the most appropriate remediation strategy to be planned in detail and implemented on a site. It is often iterative and may require additional site investigation work to take place (for example, to determine whether a particular remediation intervention is feasible for a particular site's circumstances, such as its hydrogeological conditions). Option appraisal primarily considers the technical suitability and feasibility of available remediation options to meet the risk management objectives agreed upon for a site.

The key consideration for option appraisal decisions is whether or not an approach is appropriate. The key determinants of appropriateness relate to:

- Drivers: the triggers driving the remediation project, which in turn impact urgency, the timeline, and ongoing / planned site use.
- Achieving effective risk management to the extent agreed upon as acceptable for the site.
- The technical suitability of the risk management / remediation to be deployed. For example, can it deal with the particular contaminants and circumstances of a particular site? Does it address technical feasibility (which relates to confidence in the solution given its track record)? Who is implementing it?
- Whether the risk management approach planned is sustainable in a way that is broadly acceptable to site stakeholders. The earlier in a management process sustainable remediation can be considered, the greater the potential sustainability gains.
- Ensuring that the stakeholders have been engaged and included in the site decision-making process.
- Cost effectiveness, which in an SRBLM context deals with the overall value delivered by the project (and whether or not it is acceptable).

Verification is a series of activities and measurements that enable the effectiveness of a particular operation on a site to be assessed to confirm the delivery of risk management and sustainability objectives or to identify where failures in compliance have occurred. Verification will typically need to comply with guidance set out by regulatory agencies (Nathanail, et al. 2013).

Monitoring of soil, water, and air is a process that occurs during remediation as a part of process control and optimization. It is also needed before, during, and after remediation to provide lines of evidence as part of any verification that risk management / remediation objectives have been met. Monitoring may be used as a means of demonstrating compliance against the agreed-upon objectives and as an early warning of adverse impacts.

Aftercare is used to describe the site management needed after the completion of remediation (including monitoring). It also includes maintenance, especially for containment-based remediation and pump and treat. Some *in situ* remediations, especially gentle remediation, may have protracted periods of operations (up to several decades for pump and treat). These long periods of operations and maintenance need to be explicitly incorporated in remediation planning, as remediation systems may fail if not properly cared for. Aftercare requirement, verification, and reporting all critically depend on sound governance and institutional controls; they are often included in planning consent requirements

for a site, and in some countries' inventories, to ensure the availability of information over the long term.

A 1.2 International Trends in Developed Industrial Contaminated Land Management Policy with England as a Case Study

The United Kingdom's Department of Food, Environment and Rural Affairs (Defra) published a study in 2013 of contaminated land management policy across 14 countries (Australia, Belgium, Canada, Czech Republic, France, Germany, Republic of Ireland, Italy, Japan, Netherlands, Poland, Spain, U.K. (England) and the United States). The research was conducted from 2010–2012 and crosschecked with national specialist contributors in each country during 2012–2013. Consideration of mechanisms to prevent future contamination or to deal with ancillary issues (such as waste management and pollution prevention) was outside the scope of the project—unless they directly impinged on the management of contaminated land (Nathanail et al. 2013).

While there have been some policy refinements since this review, these are primarily incremental. This report remains the most comprehensive benchmarking of international contaminated land policy. Its key findings are summarized in Table A1.2.

Of particular note when benchmarking European approaches for contaminated land management is the prospect of a Soils Directive. A Soils Directive was previously proposed, then withdrawn in 2014,[33] as drafting could not achieve majority agreement. However, the Common Forum, which is a European platform for European Environmental Agency Member State regulators and policy advisors, did develop a draft that would have achieved agreement in all Member States[34]—but the European Commission declined to accept it. The European Commission has released a number of consultancy projects since 2016 that strongly signal its interest in resuming a Soils Directive development. The previous drafting (and its suggested revision by the Common Forum) offers an indication of the likely direction of travel for any future European legislation for contaminated sites.

[33] http://ec.europa.eu/environment/soil/index_en.htm

[34] https://www.commonforum.eu/eusoilstrat_SoilDirectiveAlternative.asp

Table A1.2 Overview of policy framework and sectoral themes across 14 countries (adapted from Nathanail *et al.* 2013)[35] with notes on the U.K. (England)

Theme	Benchmarking Across 14 Countries
Boundary between "contaminated" and "not contaminated" land	Approaches vary between countries. Common concepts are as follows. • Typically, the boundary is based on an unacceptable degree of harm, or loss of functionality, being caused by the presence of hazardous substances. • Most regimes considering historic contamination are based on a source-pathway-receptor pollutant linkage paradigm. Most regimes considering new contamination adopt more stringent approaches (e.g., treatment to background). • Decisions are made based on former / current land use (see Section 2.2) and comparison of analyses of environmental samples (soil, water) with thresholds. Different thresholds are applied for different receptors (human heath, water, ecology). There is greater variation in how these concepts are implemented in practice. • The type of threshold (e.g., whether it triggers detailed risk assessment, whether it leads to some form of listing, whether it obliges remediation). • The basis on which thresholds are determined, and the use of generic versus site specific thresholds. • The exact definitions of contaminated land and its equivalents, and the scope of their use. • Whether there is some form of date boundary, before which contamination is regarded as historic versus new, and the rationale for the date used. The U.K. (England) uses the concept of significant possibility of significant harm (SPOSH) to determine if there is a legal requirement for remediation and the site is to be designated as contaminated. Governmental generic thresholds are used to identify if sites are of concern. However, consultants are expected to determine SPOSH on a site-specific basis (see below). Even if the site is not legally designated as contaminated land, owners and developers may be required to address any contamination problems present (e.g., as part of a site redevelopment).[36] Where the contamination occurs as a breach of an existing environmental permit the regulator can require clean-up to background.
Implementation and effectiveness Implementation and effectiveness *Continued*	There is wide but not universal consensus around taking a risk-based approach to tackling the legacy of contaminated land. However, some jurisdictions take different approaches to human health and water protection. In Poland, the rationale is not specified. There is general recognition that the underpinning science for risk assessment should be transnational. In practice, tools such as exposure models or technical decisions on toxicological decisions may vary between countries. In the early 1990s there was a major policy divide between countries that sought a multifunctional approach to remediation (i.e., a once and for all remediation that made a site suitable for any future use) as opposed to the fit-for-purpose approach. The latter is now seen as prohibitively expensive, although it remains a possible consideration for sustainability assessment. On the whole, industrially contaminated land exists as a specific policy issue. However, it may be formulated as part of a wider legal regime. *Within the EU, while there is a Soil Thematic Strategy, there is no specific soils legal regime, although soils may be impacted by many other legal regimes (Darmendrail 2014). In EU Member States, the Water and Waste Framework regimes in particular affect contaminated land management. The achievement of Water Framework Directive targets may necessitate the management of land contamination. Excavated materials from contaminated land (for example soils treated ex situ on site) are defined as wastes under the Waste Framework Directive.*

[35] Supplementary comments in italics

[36] https://www.gov.uk/contaminated-land Accessed June 2019

Theme	Benchmarking Across 14 Countries
Implementation and effectiveness *Continued*	Typically, a sequential approach to inventorying is adopted. It starts with the identification of sites where current or past uses are considered to be potentially contaminative (See Section 2.2). Countries may either implement proactive regimes requiring a nominated organization to actively seek out sites or reactive regimes requiring the discovery of contamination to be reported and the regulator to consider the response to that disclosure (see Box A1-1). No country is close to claiming it has identified and remediated all contaminated sites, although the Netherlands suggest that all serious and urgent cases have been identified and are under management. In many countries, sites continue to be discovered or added to national inventories. Ongoing structural change is creating new brownfields even as others are being redeveloped. The phased approach of desk study/ walkover (Phase 1) investigation, intrusive (Phase 2) investigation, risk assessment, and remediation has been widely adopted. The use of conceptual site models is central to several national approaches (*as well as endorsed by the two main European practitioner networks, www.nicole.org and www.commonforum.eu*). Some countries have adopted existing measures from other countries as an interim measure pending development of a national (*or EU*) policy. Overly prescriptive evaluation criteria have been criticized by contaminated land practitioners in both Germany and Italy, while their absence has been criticized by some in the U.K. There is a widespread desire for simplicity in determining contaminated land boundaries, for example the use of a single concentration threshold that obliges remediation for any site whatever the circumstances. Regulatory authorities often resist this demand as it does not meet reality, where needs for remediation are usually highly site specific. Indeed, in France no generic threshold numbers are provided. This may result in some sites being in a grey area where they are sufficiently contaminated to be a cause for concern, but not sufficiently so that remediation is obligatory within a regulatory regime. *In practice, the needs of the market and/or a planning process will determine that some form of remediation will be required for development sites in this position. The status for an operational site may be harder to determine, although liability management is also likely to be a driver for some form of remediation intervention.* *An additional complication is that consultants may apply thresholds beyond the purposes for which they were derived (e.g., using a human health threshold) when fit for purpose also requires some form of ecological function (ecological thresholds tend to be far lower than human health thresholds).* Verification of the successful completion of remediation is explicitly required in many countries. In some countries this may take the form of a consultant's report. However, some jurisdictions (notably Australia) require external accreditation for the sign-off of remediation. Within the U.K. (England), a range of detailed statutory and procedural guidance documents are available[37] that set out expectations of good practice for contaminated site management. These are supported by access to Phase 1 relevant information online at a post-code level.[38] Risk based thresholds for screening contaminated sites have been made available by the Environment Agency to enable identification of sites of concern (i.e., where more detailed assessment of human health risks is required), called Category 4 Screening Levels or C4SLs.[39] Many practitioners (e.g., consultants, regulators) use thresholds from nongovernmental providers to provide a simple SPOSH-based rationale for remediation decision making,[40] but this is seen as contentious.

[37] https://www.claire.co.uk/information-centre/water-and-land-library-wall Accessed June 2019

[38] For example information on contamination is required for all residential property transactions, which can be readily obtained on line from several service providers such as https://www.sourceforsearches.co.uk/products/residential/landmark-envirosearch-residential Accessed June 2019

[39] https://www.claire.co.uk/projects-and-initiatives/category-4-screening-levels Accessed June 2019

[40] Most frequently https://www.lqm.co.uk/publications/s4ul Accessed June 2019

Theme	Benchmarking Across 14 Countries
	Separate criteria are applied for assessing risks to ecology[41] and water.[42] Regulators require a formal verification process to ensure that agreed-upon remediation (risk management) objectives are met (Environment Agency 2010). Sustainability is now a routine consideration in remediation design, which is a shift since the publication of Nathanail et al. 2013.[43] Another new development is an industry scheme (supported by a regulatory position statement from the Environment Agency) to facilitate the reuse of materials excavated from development sites, including contaminated sites.[44]
Size of the contaminated land sector	National public sector spending on remediation varies enormously and is discussed below. Some countries do not have national programs for supporting remediation. Land remediation is both a response to a significant European and global challenge and also a substantial area of economic activity, estimated as at least €3 billion in Europe (Ernst and Young 2013) and worldwide at U.S. $65 billion.[45] The number of contaminated sites is overwhelming, with estimates for Europe alone (excluding many diffuse land contamination problems) ranging from 2.5–4.5 million sites (JRC 2014). For example, the Dutch estimated a €12-billion cost by 2030 to deal with the putative 56,000 remaining seriously contaminated sites.
Liability	Most countries (but not all) aim to apply the polluter pays principle, with U.S. legislation being some of the most stringent worldwide in this regard. In practice, however, the polluter does not always pay for several reasons: a site developer may pay (although the polluter may well have discounted the value of the land); the site may not have a recognized owner (orphan sites); or for several (but not all) former communist states the government has taken liability for contamination caused during the communist regime. Liability for the remediation of orphan costs typically falls to the public purse. Attributing responsibility and financial liability is often seen as the most complicated and contentious aspect of dealing with land contamination. Liabilities under the polluter pays principle affect company valuations. The avoidance of any form of liability leads some large companies, in particular some multinationals, to avoid treatment-based approaches to remediation because of concerns over residual contamination, even if acceptable in terms of risk assessment. The U.S. Environmental Protection Agency has sought to address this by providing letters of "no further action" to provide long-term reassurance for site owners. In the U.K., the person who caused or knowingly permitted the contamination is liable; in their absence, the present owner or occupier is liable for most remediation under Part 2A Environmental Protection Act 1990, Appendix 13. In practice, however, the polluter usually does not pay since most remediation is paid for by developers. Cases in the English courts suggest identifying the polluter is complex. National Grid successfully argued, on the basis of the Sid-creating Gas Act 1986, that they were not liable for the remediation at the former Bawtry gasworks. Redland Minerals Ltd. and developers Crest Nicholson Ltd. were found by the courts and Secretary of State to be jointly liable for groundwater pollution at St Leonards Court – the U.K.'s largest point source contaminant plume.

[41] https://www.gov.uk/government/publications/contaminants-in-soil-assessing-the-ecological-risk Accessed June 2019
[42] https://www.gov.uk/government/collections/land-contamination-technical-guidance Accessed June 2019
[43] www.claire.co.uk/surfuk Accessed June 2019
[44] https://www.claire.co.uk/projects-and-initiatives/dow-cop
[45] Global Markets for Environmental Remediation Technologies 2017 https://www.reportlinker.com/p02584389/Global-Markets-for-Environmental-Remediation-Technologies.html

Box A1-1. Inventory Approaches

Countries vary in their inventory approach and rationale. Prior to 2005, remediation in the Netherlands was triggered by incidents / concerns over contamination, or because of the planning regime when site use changed. Sime 30,000 sites were remediated prior to 2005. The Dutch government then wanted a more programmatic approach for several reasons: (a) to have an overview of the extent of the problem in terms of both the extent of risks and the extent of costs for risk management; (b) to ensure, rigorously, that the remediation effort was focused on the most serious sites; and (c) to provide a coherent and strategic basis for spatial planning across different regions.

This inventory approach was expensive. Nathanail et al. (2013) report that the Dutch contaminated land inventory cost €100 million. The land area of the Netherlands is 42,500 km^2, and it is not a country rich in metalliferous mining sites or with a post-communist legacy. The land area of Kosovo is 10,887 km^2. Simply based on area alone, one could expect a contaminated site inventory in Kosovo to cost in the region of €26 million. This would be for a comprehensive process, including tiered risk assessments across all four of the stages described above (although excluding actual remediation costs).

In Britain (excluding Northern Ireland), local authorities collate records of contaminated sites in a simpler inventorying approach. Nathanail et al. (2013) estimate a low-range cost estimate for this process at £3.8 million (the true cost is likely much more). Using a land area of 230,000 km^2 for Britain excluding Northern Ireland, this £3.8 million figure equates to €198,000 for a similar process in Kosovo. It should be noted, however, that the original proposal for legislation in the 1990s included a more strategic inventory. That proposal was removed following pressure from financial donors to the political party then in power as the donors feared it might damage the value of their property portfolios. Ironically, in the U.K. information about potentially contaminative use of land is commercially available online for just about any postal code in the country. This has not appeared to have had a major downward impact on real estate markets in the U.K.

The 2010 (last available) iteration of the withdrawn Soils Directive proposal accommodates some of the Common Forum concerns. The draft Directive (European Commission 2010) defined:

- **Potentially soil-contaminating activities** as "human activities which have the potential to damage soil significantly due to the use, handling or storage of hazardous substances and which could result in contaminated sites."
- **Contaminated sites** as "sites where there is a confirmed presence, caused by human activities, of hazardous substances at such a level that Member States consider that they pose a significant risk to human health or the environment, including groundwater. Such risk is to be assessed taking account of the current or approved future use of the land, all known relevant contaminant pathways and the extent of exposure."

The Directive would have required the identification of priority areas requiring special protection from soil degradation processes (erosion, organic matter decline, compaction, salinization through the accumulation in soil of soluble salts, landslides, and acidification) and limited soil sealing. It further would have required Member States to establish action programs to mitigate these threats for the priority areas identified. A specific chapter of the draft Directive related to soil contamination which was to establish Member State duties to:

- Identify and inventory contaminated sites and, within seven years from the transposition date, identify the location of at least those sites where potentially soil contaminating activities have been taking place. (See Section 2.2 for a description of suspected sites.)

- Assess the risks to human or environmental receptors from any potential contamination on the identified sites.
- Establish operating installations with potential industrial emissions, as defined in the directive, which have been granted a permit to operate that includes obligations to prevent soil contamination and to periodically monitor the state of the soil are excluded from this requirement.
- Make their inventory public, and update it at least every five years to include new contaminated sites that have been identified. When updating the inventory, Member States could exclude sites which have undergone complete remediation.
- Ensure that a soil status report is made available by the owner of the site to the prospective buyer when the site is sold. The report was also to be made available to any other party to the transaction when there were relevant land-use changes (including land development).
- Ensure that the contaminated sites listed in their inventories are remediated (actions on the soil aimed at the removal, control, containment, or reduction of contaminants so that the contaminated site, taking account of its current use or approved future use, no longer poses any significant risk to human health or the environment).
- Give due consideration to social, economic, and environmental impacts, cost-effectiveness, and technical feasibility of the proposed remediation actions (where these are disproportionate risks that could be managed by restricting access).
- Establish mechanisms to ensure funding for the remediation of orphan sites.
- Draw up remediation strategies (renewable every five years) across their entre territory.

In addition, the draft directive would have required that the public be given early and effective opportunities to participate in the preparation, modification, and review of the action programs and the territorial remediation strategies. It also included a series of national reporting and data-sharing requirements with the European Commission.

The Common Forum identified substantive differences of opinion with the European Commission's 2007 draft, which are summarized in Table A1.3.

Table A1.3. Indicative Issues of Concern from the 2007 Soils Directive Draft

Issue	**Concern Expressed by the Common Forum[46] (and *possible consequence*)**
Insufficient consideration of risks in decision making	Requirements for site prioritization and intervention were not based properly on consideration of risks to human health, water, ecology. or other receptors. ***Potential for over/under design of remediation, failure to address sites causing the most serious harm first.***
Lack of flexibility	Fails to take into account to take into account the very different soil and socioeconomic conditions in the EU member states, that some Member States have more than 25 years' experience in contaminated land management policy whereas others are just starting. Requirements for prioritization did not sufficiently allow for influence by differing national contexts. ***Possibility that Kosovo addresses contaminated land on an agenda that does not meet national needs or priorities***
Defining actions on a prescribed set of soil contaminating activities	The idea of blacklisting a set of activities at an EU level was not seen as helpful. It is useful to look at risks of contamination from different types of activities in setting out preventative measures and identifying potentially contaminative uses. ***Potential for curtailment of business, potential for over/under design of remediation, failure to address sites causing the most serious harm first.***
Defining actions based on prescribed concentrations	The idea that an EU list of threshold concentrations should define actions is likely to be misleading in a number of situations (a risk-based approach is preferred). ***Potential for over/under design of remediation, failure to address sites causing the most serious harm first.***
Soil status reports	The draft directive proposed a harmonized approach to reports about site contamination suspicions and management called *soil status reports*. The basic concept was agreeable, but

[46] Taken from the Common Forum commentary downloadable at https://www.commonforum.eu/Documents/SFD/sfdcomfordraft5.pdf Accessed June 2019

	different countries should be free to develop their own methodologies. ***Potential for unpredictable (and also possibly unfair) impacts on real estate markets and homeowners.***
Prioritization of site remediation	This should be left to Member States and not defined at an EU level. P***ossibility that Kosovo addresses contaminated land on an agenda that does not meet national needs or priorities***.
Liabilities	There is some concern that liabilities are not adequately defined and that liability regimes in other directives may be conflicting. ***Potential for unpredictable (and also possibly unfair) impacts on real estate markets and homeowners.***
Other directives	In particular, the Groundwater and Environmental Liability Directives are not properly connected in the proposed Soils Directive text. ***Potential for conflict / confusion in implementation at a national level.***
Ambition	Member states should be allowed to use their existing national approaches if they achieve the same or more ambitious goals than the proposed Soils Directive.
Insufficient consideration of sustainable development	This concern was not flagged by the Common Forum in its commentary. However, since the commentary was agreed upon, the need for sustainable and risk-based land management has been increasingly recognized by European regulators, industry, academics, and other stakeholders (NICOLE and Common Forum 2013). ***Potential for over/under design of remediation, failure to address sites causing the most serious harm first.***

A 1.3 Policy Framework Example from the United Kingdom

In the United Kingdom, contaminated land legislation is delegated to the Scottish parliament and the Assemblies of Wales and Northern Ireland, so each of the four countries enacts its own legislation for land contamination management. A 2005 estimate suggests that there are 300,000 possible suspect sites in England and Wales, accounting for some 2 percent of total land area. This section focuses on England and develops the U.K. policy review provided in Nathanail et al. (2013).

There are two significant legal regimes relating to land contamination: Part 2A of the Environmental Protection Act 1990 (the Part 2A regime) and the planning regime under a range of legislation that forms the Town and Country Planning system. These legal regimes are set out in Acts of Parliament, which cannot be substantively changed by the government without recourse to Parliament. They are described as primary legislation. These acts may also confer powers on ministers to enact a range of secondary legislation,[47] such as statutory instruments, within limits set by the primary legislation (e.g., to set out and amend statutory guidance on how legislation is to be implemented).

The Part 2A regime requires local authorities [48] to inspect their areas regularly to identify contaminated land that that meets the statutory definition of contaminated land, that is land where there is a significant possibility of significant harm to human health, water, or ecological receptors (primarily protected sites). Part 2A subsequently requires local authorities to ensure that suitable risk management actions are taken to control any significant risks to prescribed receptors, including human health, the water environment, specific ecosystems, and property.

The planning system regulates the development and use of land, and it is far broader and also implemented by local authorities. Within this scope, land contamination is an obligatory consideration in both the development of local and neighborhood plans (for example setting out a local authority's priorities over its area) and in the consideration of individual applications for planning permission.

The boundaries between what is or is not regulated as legally defined contaminated land, and the planning requirements, are different. Part 2A requires the demonstration that unacceptable risks as defined in Part 2A (SPOSH) exist, whereas the planning regime must ensure the development is safe. While the two boundaries seem similar, in practice demonstration of SPOSH is rather difficult to achieve under the specific criteria of the Part 2A regime; local authorities have considerably more

[47] https://www.parliament.uk/about/how/laws/secondary-legislation/ Accessed June 2019.

[48] Where water resources are impacted, and for a limited number of special sites, the Environment Agency is a statutory consultee is the lead regulator.

discretion in agreeing on what is safe enough to allow approval of a planning application. Moreover, under the Part 2A regime the onus is on the local authority to prove that a site is contaminated land. Under the planning system the onus is on the developer / owner to prove to the local authority that the site is safe. The costs to the local authority are therefore substantially different.

The costs of showing a site is contaminated land under Part 2A and the prospect of an ensuing appeal to Defra (and the potential legal battle) are high. Most local authorities have only limited technical and financial resources. The costs of adjudicating on a planning application are considerably lower. Perhaps unsurprisingly, the vast majority of contaminated site decision making in the U.K. (an estimated 90 percent of contaminated sites) takes place within the planning system rather than the purpose-built Part 2A system.[49] Most of the sites dealt with under planning, where a duty of remediation is placed on the owner/developer, are never legally designated as contaminated land. The procedures that must be followed are set out in obligatory statutory guidance,[50] which sets out how local authorities should implement the regime on contaminated land.

Neither Part 2A nor the planning regime is prescriptive in the use of number-based thresholds to determine the boundary between contaminated and not contaminated. However, Part 2A Statutory Guidance does identify a role for generic assessment criteria (GAC) and has been supported by the publication of the CASLs (see Table A1.2) and an underpinning methodology for how they were derived, which can also be applied for derivation of site specific assessment criteria (SSAC).

- GAC are used as screening values to identify levels of contamination that do not warrant further consideration as they are negligible and unlikely to pose any appreciable risk. The Part 2A statutory guidance is clear that this is their role, and they are not intended to be triggers for interventions. As the GAC are generic for all sites, they are necessarily cautious
- SSAC are used in more detailed risk assessment (e.g., where a GAC threshold may be unnecessarily cautious given the site's context, or to determine if levels of contamination warrant remediation). There is a considerable desire from some practitioners for the development of GAC that can be used to determine the need for and endpoints of remediation (see Table A1.2).

Part 2A also sets out a liability regime for who would be required to pay contaminated land management costs. In broad terms, this is first the polluter; if the polluter cannot be found then liability passes on to the site owner. Where neither can be identified, liability passes to either the local authority or, for some special sites, the Environment Agency. In practice, liability decisions are more complex as a number of exclusions are allowed for (and because there can be significant technical difficulties in determining who allowed for a historic environmental release). Under the planning regime, contaminated land management costs are factored into the scheme being brought forward for a planning application and typically met by the site owner and/or the developer.

A range of non-statutory guidance has been developed by public agencies to further elaborate contaminated site management practice. Of particular importance is a guidance document called the Model Procedures, which was originally published in 2004 and is currently under revision. This guidance sets out a detailed framework for contaminated site management from identification and site assessment, through risk assessment, option appraisal, implementation of remediation, verification, and aftercare (Environment Agency and Department for Environment, Food and Rural Affairs 2004). This is supported by a range of other guidance, mapped across the various activities set out in the Model Procedures and collated by the contaminated land expertise charity CL:AIRE[51]. Non-statutory guidance provides advice from public agencies which can be followed on a voluntary basis. However, if an alternative approach is followed, the practitioner concerned will have to be able to demonstrate a higher standard of practice to avoid legal, regulatory, or financial liabilities.

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[49] Around 650 sites were designated as "contaminated land" under Part 2A between 2000 and 2007.

[50] https://www.gov.uk/government/publications/contaminated-land-statutory-guidance Accessed June 2019.

[51] https://www.claire.co.uk/information-centre/water-and-land-library-wall/45-model-procedures/187-model-procedures Accessed June 2019.

The Environment Agency, as a national regulator, may also issue regulatory position statements (RPS) that set out what conditions it is likely to act under or prosecute under. Of particular importance to the contaminated land sector is an RPS issued under the waste legislation regime. Under the EU Waste Framework Directive, while contaminated soil *in situ* is not considered waste, once any material is excavated it is liable to be considered waste. Large volumes of excavated soil used to flow to landfills in the U.K. as this was a readily available disposal route. Landfill is now taxed and landfills are shrinking in availability. In England, the Environment Agency has set out an RPS which allows the reuse of excavated materials, such that they are not considered wastes, through an industry compliance scheme called DOW-COP (and managed by CLAIRE).[52]

Budgetary measures may also affect contaminated sites and brownfields management (for example, there is tax relief available on spending associated with contaminated sites remediation). There is very little central government funding to support contaminated land management and remediation. Where a local authority is liable, it must meet its own costs—although a limited amount of money is available to them as loans. Local authorities are also expected to meet their own budgets for the Part 2A and planning regimes. The central government does support local authorities across all of their activities via a block-grant mechanism,[53] which supports local property value-based taxation (the Council Tax). Block grant settlements are becoming smaller as the government reduces expenditures under austerity measures.

A recent budget measure has had a strong influence on the contaminated land sector in England.[54] The U.K. taxation body, Her Majesty's Revenue and Customs, will now tax illegal deposits of excavated materials (or other wastes) at the full active rate of landfill tax plus a 100-percent premium, which would currently amount to around €200 per ton. This ruling is retrospective, so any deposit identified as illegal by the regulator will trigger this liability in England (and Wales). To put this into context, the landfill tax liability for a cube of illegally deposited wastes 10 m by 10 m by 10 m is €200,000. This tax liability is in addition to any fines that might be imposed for breach of environmental regulations, and is likely to greatly exceed them in amount.

Remediation practice requires permitting under the waste management and industrial emissions regimes.[55] There are three broad classes of permitting approaches within waste management: exemptions for low volume low risk operations; standard permits for regularly used operations where permit conditions are broadly similar; and bespoke permits, which apply to more complex scenarios that require a deeper level of regulatory scrutiny. Permitting is required both generically for remediation treatment systems and in the context of operations carried out on site (e.g., stockpiling or mobilizing a radiation technology onto a specific site).[56] Under the waste regime a mechanism known as quality protocols can be used to demonstrate at a site has met end-of-waste criteria as set out in the EU Waste Framework Directive. The Environment Agency manages these permitting processes, but may delegate that power (e.g. the DOW-COP scheme) or the management of quality protocols (such as for aggregates[57]). Permitting, or at least exemptions, may also be required for some site investigation activities (e.g., excavating trials pits, temporary stockpiling).

An ecosystem of other information, support, and guidance is available to support contaminated site management in the U.K.:

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[52] https://www.claire.co.uk/projects-and-initiatives/dow-cop Accessed June 2019
[53] http://www.council-tax.com/blockgrant.html Accessed June 2019
[54] https://www.gov.uk/government/publications/landfill-tax-disposals-not-made-at-landfill-sites/landfill-tax-disposals-not-made-at-landfill-sites
[55] https://www.gov.uk/topic/environmental-management/environmental-permits Accessed June 2019
[56] https://www.gov.uk/government/publications/deployment-form-for-land-and-groundwater-remediation/land-and-groundwater-remediation-deployment-form-guidance Accessed June 2019
[57] https://www.gov.uk/government/publications/quality-protocol-production-of-aggregates-from-inert-waste Accessed June 2019

- ***Standards***: A wide range of relevant standards are available (e.g., on site investigation[58], sustainable remediation, or a developing standard on conceptual models). These are enacted by the British Standards Institution, typically in conformity with ISO and/or CEN. Compliance with standards may be voluntary or may be a regulatory requirement, and is almost always seen as an indication of good practice. Some standards regimes and quality management systems are effectively obligatory, as regulators can only accept data produced in compliance with them. This applies particularly for analytical services.[59]

- ***Professional practice***: A number of contaminated land services are limited to practitioners who hold accepted qualifications, charterships, or memberships (e.g., DOW-COP auditors or producers of land condition reports),[60] and there is increasing interest in enhancing the role of professional qualifications. However, a lack of funding has meant less rigorous regulatory enforcement so there is some concern about a race to the bottom in terms of professional practice taking place in the U.K.. Professional organizations and institutions usually require a demonstrable program of continuing professional development (training and practice) for membership to be maintained.

- ***Ancillary guidance:*** Guidance issued by professional networks, associations, and consultants is often used to benchmark good practice. Examples include design guidance,[61] thresholds guidance,[62] and technical guidance.[63] Only a limited number of decision support tools are widely used, typically for specific purposes (such as deriving environmental quality objectives for water).[64] However, the use of in-house decision support tools from templates to PC-based systems is widespread among service providers in the U.K..

- ***Databanks***: A number of public bodies have responsibilities to maintain national information. For example, the British Geological Survey provides, among other things, geological and hydrogeological maps.[65] Another example is the Ordnance Survey, which provides digitized geographical maps[66] at a range of scales. The Environment Agency provides maps related to past and historic permitting.[67] Several businesses have developed online information systems to support site investigation based on combining digitized information from these various sources.[68] Still important for many brownfields sites in England are the risks from unexploded ordnances notably from the World War 2. A range of mapping services is available to assess these risks.[69]

- ***Training and technical qualifications.*** These are provided via coursework by universities, public agencies, research organizations, industry associations and networks, professional bodies, and technical consultancies. Some of these are highly specific, such as the training needed to be able to audit under the DOW-COP scheme; others may provide contaminated land knowledge within a wider remit.

- ***Knowledge exchanges:*** Knowledge development is also facilitated by a number of sectoral conferences specific to contaminated land management or including contaminated land management. There are also a range of industry and professional networks to support the

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[58] https://shop.bsigroup.com/ProductDetail?pid=000000000030362551 Accessed June 2019
[59] https://www.gov.uk/government/collections/land-contamination-technical-guidance Accessed June 2019
[60] https://www.silc.org.uk/ Accessed June 2019
[61] E.g. https://www.ciria.org/Resources/Free_publications/containment_systems.aspx Accessed June 2019
[62] https://www.lqm.co.uk/publications/s4ul Accessed June 2019
[63] E.g. on sustainable remediation: www.claire.co.uk/surfuk Accessed June 2019
[64] http://www.consim.co.uk/ Accessed June 2019
[65] https://www.bgs.ac.uk/research/groundwater/datainfo/hydromaps/home.html Accessed June 2019
[66] https://www.ordnancesurvey.co.uk/ Accessed June 2019
[67] E,g, https://data.gov.uk/dataset/17edf94f-6de3-4034-b66b-004ebd0dd010/historic-landfill-sites. Accessed June 2019
[68] E.g. https://www.landmark.co.uk/envirocheck Accessed June 2019
[69] https://www.landmark.co.uk/envirocheck Accessed June 2019

exchange of knowledge and ideas.[70] Practitioners, particularly those at a higher level of expertise or responsibility, also need to exchange knowledge on an international basis. Many consultancies are multinational and have in-house programs for knowledge exchange. However, at a European levels, Common Forum (which caters to regulators) and NICOLE (which caters to the wider sector) are the standout networking venues for the contaminated land sector. The most significant international conferences used by U.K. practitioners are the AquaConSoil series,[71] the Sustainable Remediation Conference series,[72] and the Battelle conference series.[73]

A number of other legal regimes, arising from both national and EU legislation, interact with contaminated land management in the U.K:

- The industrial emissions regime.
- The waste regime.
- The Water Framework and Groundwater Directives, which set out goals for water quality and which are implemented in the U.K. These, and national legislation on water, impact contaminated land management as a potential trigger for remediation and also in regulating allowable remediation process impacts on water.
- The health and safety regime governs safe working practices for contaminated site management.
- The Environmental Liabilities Directive and other legislation impose specific requirements and liabilities for dealing with contamination related to protected sites.

Table A1.4 provides a broad summary of institutional roles within the framework and regime outlined above, and also includes where there might be a possible Kosovo equivalent. Regarding institutional roles, a key difference between England and Kosovo is that Kosovo passed through the "Socialist Yugoslavia" period. There is no requirement for the privatization of state-owned land and enterprises in the U.K., so no direct equivalent activity for the Privatization Agency of Kosovo (PAK). However, there is periodic divestment of publicly owned land, such as former defense sites, through a variety of processes. These sites may be affected by contamination, in which case the agency that owns the land will make the decision on how it sells—without knowledge; with site and risk assessment information; or in a remediated condition. These conditions affect the price for the land. The decision is typically based on a judgement on where the best economic advantage lies for the government. This is actually quite a substantial ongoing activity[74] and, unlike in Kosovo, is not universally regarded as a good thing.

Table A1.4 U.K. (England) Institutional Roles in Contamination Management

Institution / Type	Role
Department for Environment, Food and Rural Affairs - Defra, Ministry of Housing, Communities & Local Government ***Government departments***	Lead policy roles: land contamination, planning, and publication of guidance (especially statutory guidance)
Environment Agency	Lead agency for contamination of water and for special sites, wastes from sites, permitting of remediation processes and operations, and enforcement. Also producers of internally oriented guidance.
Local authorities	Contaminated sites designation and planning

[70] E.g. www.claire.co.uk, http://www.sagta.org.uk, https://www.ciria.org/CIRIA/Membership/Local_authority_contaminated_land_forum/Memberships/LACL.aspx, https://sobra.org.uk, https://www.remsoc.org. All accessed June 2019

[71] https://www.aquaconsoil.org/ Accessed June 2019

[72] Most recently http://seminario.ekosbrasil.org/en/ Accessed June 2019

[73] https://www.battelle.org/newsroom/conferences Accessed June 2019

[74] https://www.theguardian.com/society/2019/mar/05/public-land-sell-off-none-left-2050 Accessed June 2019

Institution / Type	Role
	controls (subject to appeals to Defra).
Her Majesty's Revenue and Customs - HMRC	Government revenue raising authority, taxes landfilled materials.
Health and Safety Executive - HSE	Health and safety.
Government data / information agencies	British Geological Survey, Ordnance Survey, and others – data, maps and knowledge, and guidance.
Homes and communities agency	Facilitating development and regeneration, including brownfield sites.
Land Trust	Manage land for public open space and take on brownfield liabilities in exchange for an upfront payment.
Knowledge organizations and networks	CL:AIRE is the U.K. knowledge center for contaminated land; CIRIA is the construction industry research and information association
Universities, professional institutions and consultancies	Ecosystem of guidance, training, and other outputs as described above.
Delivery organizations	Private and public sector (the remediation market in the U.K. is estimated to be in the region of €1.2 billion per year).

A 1.4 Contaminated Site Management in Chongqing, China

Chongqing, an industrial mega-city in southwestern China, is a pioneer in the country, with strong commitment and ownership for managing contaminated sites in the city. Its industrial sectors cover bulk and fine chemicals, metallurgy, machinery, and instrumentation, among others. Since 2002, the city has been relocating old and polluting industries from central urban areas for environmental management and urban development purposes. Most of these former industrial lands were reused for urban redevelopment. However, long-term accumulation of contaminants resulting from industrial production and operation has polluted large amounts of soil and groundwater. Based on past studies, it is estimated that contaminated soil amounts to several million cubic meters, and at least $2 billion is needed for site cleanup and remediation (World Bank 2010B).

The city has recognized the importance and urgency of brownfield management. It has introduced various policies and regulations, clarified institutional responsibilities, conducted a baseline study on brownfield management, and piloted several demonstration projects. The city has also developed strategic action plans, including establishing a city-wide prevention and response system, and established a specialized fund for contaminated land cleanup and remediation.

Chongqing municipal government has clarified the principles regarding liability for brownfield management, based on Chinese environmental protection law, civil law, and land law. Three key principles include:

- Polluter Pays Principle.
- Investor Benefits Principle.
- Land Owner Takes Responsibility Principle.

Since 2004, government bodies have issued a series of contaminated sites (mainly brownfields) management policies and regulations (see Box A1-2). Chongqing was selected as a demonstration city under the Global Environmental Facility (GEF) financed China Contaminated Site Management Project supported by the World Bank. The project was approved by GEF and the World Bank in 2015 and is under implementation until the end of 2021. The project supported Chongqing (asterisked in Box A1-2) on the development of technical guidelines, policy recommendations, and financing

options for contaminated site cleanup. The project also finances development of an Early Warning and Prevention and Control System for soil and groundwater pollution in Changshou Industry Park.

Box A1-2. Local Policies and Regulations on Contaminated Site Management in Chongqing

(1) City People's Congress: Chongqing City Environmental Protection Regulations (2007 and 2017 updated), regulating that before switching production or relocation, factories should conduct brownfield treatment; environmental risk assessment must be carried out for contaminated land/sites or suspected sites; contaminated land/sites confirmed after risk assessment, before their land use change and transfer, they must be remediated.

(2) Municipal Government Documents

- Recommendations on Speeding up the Relocation of Key Polluting and Unsafe Factories in the Core Urban Areas (2004).
- Notification on Strengthening the Remediation of Contaminated Former Industrial Sites (2008).
- Work Plan for Implementation of the National Action Plan for Soil Pollution Prevention and Control (2016).
- Environmental Risk Screening Levels for Contaminated Sites in Chongqing (2016).*
- Technical Guidelines for Environmental Supervision during Contaminated Site Remediation in Chongqing (2016).*
- Administration for Prevention and Control of Soil Contamination for Development Land in Chongqing (2019, under consultation before issuance)**.***
- Study on Green Finance for Cleanup of Contaminated Sites and Promotion of Circular Economy for Pollution Prevention in Chongqing (ongoing).*
- Study on Public Participation Mechanisms for Cleanup of Contaminated Sites in Chongqing (ongoing).*

(3) Municipal EPB Documents:

- Forwarding SEPA Notification on Implementing Pollution Control during Factory Relocation (2004).
- Notification on Implementing Soil Contamination Control and Treatment after Factory Relocation (2005).
- Notification on Strengthening the Management of Solid Waste Left from Closed, Shut-down, Bankrupt and Relocated Factories (2006).
- Request for Further Regulating and Strengthening the Supervision of Contaminated Sites Left from Closed, Stopped, Bankrupted and Relocated Factories (2008).
- A List of Contaminated Sites as of June 2018 issued by Chongqing Environmental Protection Bureau (2018).
- Publicity of Information Filing on Environmental Investigation, Risk Assessment and Remediation of Industrial Enterprises' Contaminated Sites in the third quarter of 2018 in Chongqing (2018).
- List of Chongqing Contaminated Site Assessment Consulting and Remediation Companies (as of July 8, 2019).

These regulations show that the municipal government attaches great importance to the issue of contaminated sites. It considers addressing contaminated sites as an integral part of realizing the city's development objective: to build a livable and ecological Chongqing. Chongqing also requires that site environmental assessment be incorporated into the existing general environmental assessment mechanism. It also stipulates that priority should be given to prevention; that remediation should be combined with prevention; that new contamination should be avoided; and that remediation of existing contaminated sites should be conducted gradually.

At the institutional level, Chongqing Ecology and Environment Bureau (CEEB, was the Environmental Protection Bureau) plays a leading role in supervising baseline surveys of the contaminated sites of relocated factories. A specialized Division for Soil was set up in CEEB in 2018 and follows the institutional structure of the Ministry of Ecology and Environment. The city also

provides policy explanations and publications to factories on a regular basis, and has gradually strengthened the enforcement of its regulations.

As a result of these regulations and guidelines, as well as institutional strengthening, the remediation and redevelopment of contaminated sites in Chongqing City has made substantial progress. Meanwhile, the municipal government has provided a specialized subsidy fund for contaminated site environmental risk assessment, which has been increasing every year. As of June 2018, 56 contaminated sites had been confirmed, among 390 suspected sites, which will require remediation. Chongqing has carried out remediation of several sites for brownfields redevelopment. The city, however, is facing a huge financing gap for cleanup of contaminated sites. The city is looking for technically suitable and cost-effective remediation technologies and green financing mechanisms as well as better application of international sustainable risk-based land management.

Annex 2 Current Contaminated Site Management in Kosovo

A2.1 Legislation and Institutions

Kosovo has sought to develop its environmental policy and legislation to be generally in line with EU standards. There is no specific national law (primary legislation) on land contamination in Kosovo. However, there are a number of instruments of secondary legislation (Administrative Instructions - AIs) which relate to contaminated site management deriving from the Kosovar Waste Law:

- AI on Limited Values of Emissions of Polluted Materials into Soil No. 11/2018 (which supersedes the January 2009 Administrative Instruction on Utmost Permitted Levels of Discharging and Dispersal of Pollutants in Soil)
- AI for Waste Management from the Extractive Industry and Mining No. 21/214.
- Law on environmental protection (Law No. 03/L-025);
- Law on integrated prevention pollution control – IPPC- (Law No. 03/L-043);
- Law on waste management (Law No.04/L-060);
- Law on chemicals (Law No. 04/L-197); Law on water Law No.2004/24

Table A2.1 lists all administrative instructions related to environmental management and protection. While there is no specific EU contaminated sites directive, a number of directives do have relevance. Table A2.3 outlines the transposition of some of the EU legislation relevant to contaminated site management in Kosovo.

Table A2.1. Administrative Instructions related to environmental management and protection

Kosovo Laws	Administrative Instructions Related to Environmental Management and Protection
Waste Law	- AI in allowing norms of hazardous substances and harmful presence in soil 2009 - AI on management of disposed and waste tires; No 23/2012 - AI on management of end-life vehicle and their components; No 19/2012 - AI of register for the plants on which is verified presence of hazardous substances; No. 17/2012 - AI n on the contents and manner of holding the register of integrated issued permits no. - AI on the management of medical human and veterinary waste; No 22/2013 - AI on the cadastre of environmental pollution discharge; No 17/2013 - AI on the limit values of concentration of hazardous components in waste; No 16/2013 - AI on state waste catalogue; No 13/2013 - AI No. 29/2014 "on sludge management by treatment of polluted waters - AI on waste management for batteries and accumulators; No 26/2014 - AI for waste management from the extractive industry and mining; No 21/2014 - AI for biodegradable waste management; No 20/2014 - AI for management of wastes containing asbestos; No 22/2015 - AI no. 05/2015 "for management of biphenyls and triphenyl polychlorinated and wastes from PCB and PCT - AI on waste management of fluorescent tubes containing mercury; No 15/2015 - AI for determining the criteria on protected areas of strategic goals; No 13/2015 - AI for waste treatment of medical products; No 10/2015 - AI for determining, manner and procedures for the protection of erosive areas; No 11/2016 - AI for circulation of hazardous chemicals, storage conditions and procedures for obtaining the permit and license; No 8/2016 - AI on criteria and procedures for the protection of the water flows coats and accumulations; No 4/2016 - AI for medical pathological waste management; No 13/2017 - AI on criteria of determining sanitary protection zones for water resources; No 15/2017 - AI on waste management containing persistent organic pollutants (POP); No 14/2017 - AI No. 08/2017 of waste landfills management - AI on limited values of emission polluted material into soil 2018 - AI for penalties with mandatory fines; 6/2018

Kosovo has adopted the polluter pays principle in its legislation related to waste, environmental protection, and integrated prevention pollution control. In Kosovo this is interpreted as "[the] polluter causing environmental pollution shall be responsible for the damage causing and shall be responsible for evaluation and elimination of the damage; Legal and natural entity that through their illegal or inadequate acting has enabled or allowed environmental pollution shall also be responsible; and in the cases when [those] responsible for pollution cannot be noticed than the rehabilitation costs and pollution decrease shall be under the responsibility of state institutions."

The Law on Waste requires that municipalities identify contaminated sites (defined as a certain area where contamination of the soil is confirmed, and the risk of possible impacts on the ecosystem and human health is significant, so that remediation measures are required) on their territory and develop projects for their rehabilitation. In an earlier report to the EU (JRC 2014), Kosovo suggested an approach for initial site identification for a cadastre starting with suspected contamination (see Section 2.2). The status of implementation of this identification of contaminated sites, or cadastre process, is however somewhat uncertain.

An AI on Limited Values of Emissions of Polluted Materials into Soil applies to harmful soil inputs and contaminated sites. It therefore addresses in more detail the issues of contaminated land, and its purpose is to define the standards of emissions and quality of soil. The AI defines and set the boundaries between contaminated and not contaminated land, and it defines in qualitative terms:

- **Suspected sites,** which are sites suspected to contain harmful substances.
- **Sites suspected of being contaminated**, which are former waste disposal sites and former industrial sites that are suspected of containing harmful soil changes or other hazards for individuals or the public.
- **Contaminated sites**, which are closed-down waste management installations and other real properties in or on which waste has been treated, stored, or landfilled (former waste disposal sites), real properties that include closed-down installations, and other real properties on which environmentally harmful substances have been handled.

Compared to other European jurisdictions, these definitions lack clarity and do not convey the idea of potential harm being a determinant of the seriousness of any particular contamination problem. They also define sites on the basis of type—but exclude many potentially contaminative activities.

The limit values used are the soil contaminant standards that define threshold concentration levels for hazardous substances that may be present in the soil (see Table A2.2).

Based on the limited values, there are three levels of thresholds:

- Hazardous substances in the soil do not cause disruption of the functions of the soil and pose no threat to the environment and/or human health
- Maximum permissible concentration for hazardous substance(s) in the soil
- Intervention concentration, which is when the hazardous substances in the soil lead to disruption of its functions and pose a danger to the environment and/or human health.

The AI is not complete in its coverage of potential contaminants, and its technical basis is unclear. Moreover it does not address risks in a strongly explicit way, nor impacts to groundwater. It may have been modelled on the old Dutch "ABC" system which has now been superseded by a more explicitly risk-based approach. A particular problem in the Netherlands was the "B" values, which identified a soil as somehow unacceptable but less contaminated than the "C" intervention values, which created a grey zone for sites where the need for action was unclear.

Table A2.2. Limited Values of Soil Contamination

No	Chemical Element	Soil (mg/kg of the dry soil)		
		A	B	C
1	Arsenic (As)	30	55	80
2	Barium (Ba)	200	625	2000
3	Cadmium (Cd)	3	12	25
4	Chromium (Cr)	300	600	800
5	Cobalt (Co)	20	240	300
6	Nickel (Ni)	300	600	800
7	Lead (Pb)	200	300	600
8	Mercury (Hg)	1.5	5	10
9	Molybdenum (Mo)	10	40	200
10	Tin (Sn)	20	50	300
11	Zinc (Zn)	300	500	1000
12	Selenium (Se)	2	100	200

The AI for waste management of extractive industry and mining set out measures, procedures, and guidelines to prevent or reduce negative effects on the environment, land, air, water, and so forth.

This AI defines how extractive industry wastes and mining should be managed. Under this AI, the holder of the waste is responsible for maintenance and handling of waste. If the waste is sold or there is some other transfer of assets, the responsibility for management of extractive waste should also be transfered. Responsibility stays with the previous holder if the waste cannot be transferred.

Article 6 of this AI defines the measures to be taken by industrial operators, and states that the operator should develop a plan for waste management and the mining industry that takes into account the principle of sustainable development.

This AI was adopted by the Ministry of Environment and Spatial Planning in 2014. It does not cover historic contamination land.

Table A2.3. Progress in Transposition of EU Law Relevant to Contaminated Site management (based on ECRAN 2016)

EU Legislation	**Kosovo Legislation**	**% of Transposition**
Waste Management		
2008/98/EC Waste Framework	Law on Waste (No.04/L-060 on waste)	80%
86/278/EEC Sewage Sludge	AI No. 29/2014 “on sludge management by treatment of polluted waters	100%
96/59/EC PCB/PCT	AI No. 05/2015 “for management of biphenyls and triphenyl polychlorinated and wastes from PCB and PCT	93%
1999/31/EC Landfill	AI No. 08/2017 of waste landfills management	100%
2006/21/EC Mining Waste	AI for waste management from the extractive industry and mining; No 21/2014	100%
Environmental Protection		
2001/42/EC SEA	Law on Strategic Environmental Assessment (Law No.03/L – 230)	100%
2004/35/EC Environmental Liability	Law on Environmental Protection, No. 03/L-025	80%
2008/99/EC Environmental Crime	Partially transposed in the Kosovo Criminal Code Nr.2003/25 – Chapter 24. Full transposition remains scheduled	50%
Industrial Pollution Control		
2010/75/EU IED	Law No. 03/L-043 on IPPC, AI on rules and standards of the discharges on air by the stationary sources of pollution No. 06/2007, AI of GoK no. 11/2018 on limited values of emissions of polluted materials into soil the Law on Waste and the Law on Environmental Protection	100%

2012/182/EU Seveso III	AI No 10/2011-MESP "for preventing quantity accidents involving hazardous substances"	27%
2004/42/EC VOCs from Paints and Varnishes	Law No. 03/L-043 on IPPC, AI on rules and standards of the discharges on air by the stationary sources of pollution No. 06/2007, the Law on Waste and the Law on Environmental Protection	25%
Chemicals		
87/217/EEC Asbestos	AI for management of wastes containing asbestos; No 22/2015	82%
Water Management		
2000/60 /EC Water Framework	Water Law No.2004/24	57%
2006/118/EC Groundwater	Water Law No.2004/24	32%

A2.2 Policies and Strategies

Kosovo does not have a specific strategy, plan, or special program for the treatment of land contamination. Up until now this issue has been addressed through other strategies, plans, and programs, such as the Draft Strategy for the Mining Sector, the Kosovo Environment Strategy (KES) 2005–2010, and the Draft Strategy on Waste Management.

The Kosovo Strategy for Mines 2012–2025 describes in Objective IV.1, "mitigation of past environmental problems." The matter of environmental legacy is set out as follows:

> "Environment management process should distinguish legacy environmental liabilities and current environmental impacts generated by current and future mining activities. The former is usually a burden for the society, as their perpetrators cannot be adequately identified."

The Kosovo Environment Strategy tackles the problem of land contamination from depleted uranium and ash from power plants, soil loss caused by illegal constructions, the impact of industry, erosion, mined surfaces, sanitary municipal landfills and industrial wastes, and soil contamination in urban areas. The strategy sets the objectives for land/soil protection as primarily the responsibility of the government to complete and harmonize soil legislation with the EU *acquis*; to prevent and reduce further degradation of soil from pollutants and erosion; to engage in interagency coordination to protect agricultural land; to eliminate the existing problems regarding soil administration; and to include NGOs and all of society in soil protection.

A2.3 Institutional Framework

The main institutions involved with contaminated site management are:

- **The Ministry of Environment and Spatial Planning and the Kosovo Environmental Protection Agency.** They have lead policy roles and responsibility for land contamination, planning, identification of contaminated sites, inventory preparation, and publication of environmental reports. They also issues licenses and permits for monitoring and inspection.

- **Local governments and municipalities.** They have responsibility for identification of contaminated sites in their territory and the development of projects for their rehabilitation (including notes on location, spatial geometric characteristics, type of pollution, waste quantity, timelines for rehabilitation and other key factors for project implementation)

- **The Ministry of Economic Development/ Geological Service of Kosovo.** Among other duties, the Geological Service is responsible for geological studies data, sampling, maps, research data, and maps and knowledge.

- **The Independent Commission for Minerals and Mines.** They have responsibility for the issuance, transfer, extension, suspension, and revocation of licenses and permits; and for the

establishment and maintenance of a mining cadastre and a GIS database containing geographical data, geological data, and other relevant economic data.

- **The Privatization Agency of Kosovo (PAK).** PAK is the trust agency and owner of the Social Owned Enterprises. Main land contamination operators are owned by KPA.

Hence many key institutions are also in place but their capacity to implement and enforce a contaminated sites regime at central and local levels needs to be strengthened.

A2.4 Liability and Liability Transfer Mechanisms

The government agencies in Kosovo have tended to perceive the contamination of land as being primarily associated with (former) state-owned entities. These entities were socially owned enterprises (SOEs) that were either entirely state-owned, municipally owned, and/or (partly) employee owned. Most of the SOEs have been privatized, although some are still under the administration of the Privatization Agency of Kosovo.

Their historic liabilities have been mainly managed by the government, which, together with donors, has initiated actions for some problem areas with historic levels of contamination.

During the privatization process a prospective buyer negotiated with the government on the allocation of liabilities. In some cases, ministries agreed that the government should retain some liability. In others, responsibility was shared between the government and the future owner(s). In recent privatizations, the government has tended to accept liability for the remediation of preexisting environmental pollution. For example, the environmental liabilities for the Trepça, based on the Trepça Law, are defined as follows: "[The] Trepça JSC shall inherit the right of valorization of technological remains from the past and treating them in compliance with environment standards and feasibility study."

Under the Kosovo Mining Strategy, historic liabilities from mining are managed by the government, which has been supported by donors. For contamination incidents occurring after 2009, liability is governed by the polluters pay principle. This mechanism for funding the remediation of the contaminated sites is elaborated in the following Kosovar Laws:

- **Waste Law, Article 59** — Rehabilitation of contaminated and polluted sites will be through financing funds from waste management (payments by operators, producers, holders; municipal budget; donations; budget of the Republic of Kosovo; other financial funds).

- **Mining Strategy of Kosovo** — the historic liabilities should be managed by the Government of the Republic of Kosovo, which, together with donors, have initiated actions for full elimination of problem areas, and to minimize other historic pollutions.

- **AI on Limited Values of Emissions of Polluted Materials into Soil** — The person or persons causing degradation of the soil or who pollutes the soil with hazardous substances, the owner of real estate, and their successors, or the legal entity in whose possession is the real property shall perform the required soil remediation of the contaminated soils.

- **Law on Environment Protection, Article 77** — A Fund for Environmental Protection shall be established and the ministry with special law shall regulate competencies, administration, financial resources, and means.

A2.5 Funding for Contaminated Site Remediation

International partners and donors have been active in supporting projects for remediation and re-cultivation of contaminated sites in Kosovo. Donors involved include the European Commission, the Netherlands, the Czech Republic, Sweden, Denmark, the World Bank, and the United Nations Development Programme.

The projects include:

- World Bank support on the clean-up and stabilization of an ash dump near two power plants and removal of toxic chemicals from an old gasification plant.
- Government of the Netherlands support for partial restoration of wasteland in Zhitkovc; solid waste management in PIM; chemical safety in PIM; safety of walls around tanks of sulphur acid in PIM; and liquid waste treatment in PIM.
- Swedish Government support for cleaning the Kishnica riverbed; transfer of soils for coverage; and reprofiling of Kishnica tailing.
- European Commission support for the restauration of landfill in Zhitkovc and closure of illegal dumpsites.

A few remediation projects have been supported by Kosovo government (e.g., the treatment of asbestos waste in Hani Elezit, and cleaning of waste dump sites). The funds for these projects are provided through direct support to municipalities rather than via a special fund for remediation of land contamination.

There are examples of remediation for privatized sites being paid by the operator. For example, Sharrcem (a factory for cement production) has dealt with previous pollution and introduced an environment management, system. There are also cases where the future operator of a site being sold during privatization was not informed of potential land contamination or hazardous waste problems (e.g., hazardous chemicals stored in a former car parts factory in Peja).

A2.6 Contaminated Land Management Approaches

Kosovo has not developed detailed statutory and procedural guidance documents that set out the expectations for good practice for contaminated site management, nor have they any deep experience in sustainable risk-based management for contaminated sites. However, the AI on Limited Values of Emissions of Polluted Materials into Soil to some extend defines some measurements for contamination land management. These include:

- The identification of contaminated sites is a mandate of the Ministry of Environment and Spatial Planning and municipalities are obliged to submit to MESP a proposal for identifying contaminated sites.
- During the identification of contaminated sites, it is mandatory to identify those areas where certain activities and actions are performed or were performed in the past that contributed to the degradation of soil and to measure the concentration of hazardous substances of concern (i.e., potentially contaminative uses).
- Lists of the identified sites must be published on the MESP website and updated with each newly identified contaminated site, and at least once every three years. As yet, however, no information is available.
- Contaminated sites are to be recorded and regularly update in the Cadastre of Contaminated Sites (which is managed by the MESP).
- According to the list of identified risk areas, MESP is to prepare a program for the protection of soil functions in cooperation with the Ministries of Infrastructure, Agriculture, Forestry and Rural Development, Infrastructure, and Local Government Administration.
- The program must specify minimum targets in reducing the risk of soil degradation, appropriate measures to achieve the objectives, the timeframe for implementation of these

measures, and evaluation of necessary means and financial resources, as well as the responsible entities for implementation of the measures to protect soil functions.

- Remediation by the owner or user of land is obligatory. In areas where activities have historically been carried out and where the owner of the land cannot be determined, the state or the municipality (based upon the land ownership) where the contaminated site is located is responsible for remediation. Remediation within the meaning of this AI refers to measures; decontamination measures; prevention or reduction of the spread of pollutants in a permanent manner without eliminating the pollutants themselves; and elimination or reduction of harmful changes in the soil's physical, chemical, or biological characteristics.

- MESP must carry out regular monitoring every five years for each parcel of land and develop annual programs for soil monitoring (to be implemented by the Institute of Hydrometeorology). Operators and farmers must also conduct monitoring and submit monitoring data to the Kosovo Environmental Protection Agency for consolidation of environmental information.

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Note: this reference list also includes citations made in the report annexes.

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