

Appendix F. Glossary

A

Active layer

The upper layer of the soil starting at the soil/air interphase to the depth of maximum annual thaw

Adaptation (to climate change)

An adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Adaptive capacity

The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Adaptive management

A process of iteratively planning, implementing, and modifying strategies for managing resources in the face of uncertainty and change; adjusting approaches in response to observations of their effect and changes in the system brought on by resulting feedback effects and other variables.

Aerobic bioremediation

In the presence of aerobic conditions and appropriate nutrients, microorganisms can convert many organic contaminants to carbon dioxide, water, and microbial cell mass. Aerobic bioremediation uses oxygen as the electron acceptor.

Agroforestry

Land management involving the growing of trees in association with food crops or pastures.

Anaerobic biodegradation

The degradation of compounds by microorganisms in the absence of oxygen. The process whereby microorganisms use a chemical other than oxygen as an electron acceptor.

Avoided costs

Costs that are not incurred because ecosystem services are protected or preserved—for example, offsetting the costs of water treatment by protecting the watershed.

B

Beneficial reuse

The process of taking would-be waste and recycling it into a valuable commodity. Materials being recycled for beneficial reuse must be at least as safe for humans and the environment as the material they are replacing.

Biodenitrification

A microbially facilitated process in which nitrate (NO_3^-) is reduced and ultimately produces molecular nitrogen (N_2) through a series of intermediate gaseous nitrogen oxide products.

Bioremediation

The use of either naturally occurring or deliberately introduced microorganisms or other forms of life to consume and break down environmental pollutants to clean up a polluted site.

Biosparging

An in situ remediation technology that uses indigenous microorganisms to biodegrade organic constituents in the saturated zone. In biosparging, air (or oxygen) and nutrients (if needed) are injected into the saturated zone to increase the biological activity of the indigenous microorganisms.

Bioswales

Stormwater runoff conveyance systems that provide an alternative to storm sewers. They can absorb low flows or carry runoff from heavy rains to storm sewer inlets or directly to surface waters. Bioswales improve water quality by infiltrating the first flush of stormwater runoff and filtering the large storm flows they convey.

Bioventing

An in situ remediation technology that uses indigenous microorganisms to biodegrade organic constituents adsorbed to soils in the unsaturated zone. In bioventing, the activity of the indigenous bacteria is enhanced by inducing air (or oxygen) flow into the unsaturated zone (using extraction or injection wells) and, if necessary, by adding nutrients.

Boreal forest

A forest that grows in the cold regions of the northern hemisphere and is made up mostly of cold-tolerant coniferous species such as spruce and fir.

Brownfield

A brownfield is a property where expansion, redevelopment, or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Built (gray) infrastructure

See Gray infrastructure.

C**Carbon footprint**

A measurement of the amount of greenhouse gases (carbon dioxide, methane, nitrous oxide, and some fluorinated gases) emitted by something during a given period. A carbon footprint can be applied to a specific event, time frame, or area or looked at on a broad scale and measured throughout the entire life of a system, product, or individual.

Cleanup process

The process of cleaning up a hazardous waste site. The process is often described in six stages: 1) preliminary, 2) baseline, 3) characterization, 4) remedial design, 5) remediation/mitigation, and 6) postremedy.

Cleanup standards (risk-based)

Cleanup standards that are authorized under applicable environmental law for remediation of a particular property, taking into consideration the use of the property being remediated and any relevant contractual or other requirements.

Community resilience

The ability of communities to withstand, recover, and learn from past disasters to strengthen future response and recovery efforts. This includes, but is not limited to, physical and psychological health of the population; social and economic equity and well-being; effective risk communication; integration of organizations in planning, responding, and recovering; and social connectedness for resource exchange, cohesion, response, and recovery.

Comprehensive Environmental Response Compensation & Liability Act (CERCLA)

Congress established CERCLA, aka Superfund, in 1980. CERCLA allows USEPA to clean up contaminated sites. It also forces the parties responsible for the contamination to either perform cleanups or reimburse the government for USEPA-led cleanup work. When there is no viable responsible party, Superfund gives USEPA funds and authority to clean up contaminated sites.

Conceptual site model (CSM)

A representation of the site that summarizes and helps project planners visualize and understand available information. The CSM is the primary planning and decision-making tool used to identify the key issues and the data necessary to transition a project from characterization through postremedy. It documents current site conditions and serves to conceptualize the relationships among chemicals in environmental media, sources, and receptors through consideration of potential or actual migration and exposure pathways.

Concomitant

Existing or occurring with something else, often in a lesser way; accompanying; concurrent.

Co-use/Cobenefit

The added uses or benefits we get when we act to control climate change, above and beyond the direct uses or benefits of a more stable climate. They are sometimes referred to as "multiple uses or multiple benefits."

Cryogenic expulsion

Displacement of petroleum by water in the soil pore space, and subsequent expulsion by the formation of ice crystal structure and resultant pressure of crystal formation.

Cultural services

The human benefits obtained through ecosystem services, such as cultural diversity, recreational opportunities, or aesthetic amenities.

D**Debris flow**

A moving mass of soil, rock, and debris made fluid by rain or melting snow.

Debt financing

Debt financing occurs when a company raises money by selling debt instruments, most commonly in the form of bank loans or bonds. This type of financing is often referred to as financial leverage.

Deconstruction

Taking a building apart piece by piece. This can range from a soft strip, in which only the highest value and easy-to-extract materials are removed intact, to a full deconstruction, in which the entire structure is “un-built” to maximize reuse of materials.

E**Economic impact**

Economic vitality, jobs, infrastructure, cost-effectiveness. The effect that an event or scenario has on the economy in the surrounding community, such as impacts on business revenue, employment, and salaries.

Ecosystem (Ecological system)

A community of living organisms in conjunction with the nonliving components of their environment, interacting as a system.

Ecosystem services

All the processes and outputs that nature provides us with. These include provisioning services (food, fuel, water), regulating services (air quality, fresh water), supporting services (soil formation, photosynthesis), and cultural services (recreation and tourism).

Engineered wetlands

Constructed wetland treatment systems that use natural processes involving wetland vegetation, soils, and their associated microbial assemblages to improve water quality.

Engineering controls

The physical barriers used or constructed to prevent exposure or isolate materials from people, animals, and the environment.

Environmental assessment

The process of identifying, estimating, and evaluating the environmental impacts of existing and proposed projects by conducting environmental studies to evaluate the relevant negative effects prior to making decisions and commitments.

Environmental footprint

The effect that a person, company, activity, etc., has on the environment—for example, the amount of natural resources that they use and the amount of harmful gases that they produce.

Environmental justice

The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental justice communities

Communities most impacted by environmental harms and risks. Communities where there is a disproportionate exposure to environmental hazards and an increased vulnerability to those hazards. These typically include minority, low income, tribal, or indigenous populations or geographic locations in the United States that potentially experience disproportionate environmental harms and risks.

Environmental optimization

Cleanup efforts that generally result in improvements to remedy effectiveness, cost reduction, technical improvement, site closure, and energy and material efficiency.

Executive order

A president’s or governor’s declaration that has the force of law, usually based on existing statutory powers. It requires no action by Congress or the state legislature.

Extreme weather events

Weather phenomena (heat waves, droughts, tornadoes, and hurricanes) that occur at the extremes of the historical distribution and are rare for a particular place and/or time, especially severe or unseasonal weather.

F**Fate and transport**

Describes how chemicals entering the subsurface from point or nonpoint sources relate to groundwater concentrations elsewhere.

Fire barriers

A network of buffer areas around the site made devoid of fuel to prevent fire spread.

Floodplain

A nearly flat plain along the course of a stream or river that is naturally subject to flooding.

G

Gabion

A basket or cage filled with earth or rocks and used in building a support or abutment.

Gray (built) infrastructure

The human-engineered infrastructure for water resources such as water and wastewater treatment plants, pipelines, and reservoirs. Gray infrastructure typically refers to components of a centralized approach to water management.

Gray water

All wastewater generated in residential dwellings or office buildings from streams not containing fecal material. These streams include sinks, showers, baths, dishwashers, and washing machines. Gray water may be reused for purposes such as toilet flushing, irrigation, or gardening.

Green and sustainable remediation (GSR)

The site-specific employment of products, processes, technologies, and procedures that mitigate contaminant risk to receptors while balancing community goals, economic impacts, and environmental effects.

Green infrastructure

The preservation or restoration of ecological systems or use of engineered systems with ecological processes to increase resilience to climate change, manage other environmental hazards, or both.

Green remediation

The practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup.

Greenfield development

The creation of planned communities on previously undeveloped land. This land may be rural, agricultural, or unused areas on the outskirts of urban areas.

Greenhouse gases

Atmospheric gases (for example, carbon dioxide, water vapor, methane, nitrous oxide, ozone, and fluorinated gases) that allow sunlight to pass through the atmosphere but prevent the heat from leaving the atmosphere.

Greenwashing

Situations where there is a claim that GSR approaches have been implemented, but where GSR options have not been evaluated and backup documentation is lacking.

H

Hazard mitigation

Any sustained action taken to reduce or eliminate the long-term risk to life and property from hazard events. It is an on-going process that occurs before, during, and after disasters and serves to break the cycle of damage and repair in hazardous areas.

Hazardous material

Any item or agent (biological, chemical, radiological, and/or physical) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.

Hazardous waste site

A property with hazardous chemicals and waste that make it dangerous or capable of having a harmful effect on human health or the environment.

Hidden benefit

An advantage or profit gained from something that is not initially apparent or originally intended.

Holistic planning

A decision-making framework that integrates all aspects of planning from social, economic, and environmental concerns.

Hydrogeology

The area of geology that deals with the distribution and movement of groundwater in the soil and rocks of the earth's crust (commonly in aquifers).

I

In situ treatment

Treatment technologies involving the application of chemical, biological, or physical processes to the subsurface to degrade, remove, or immobilize contaminants without removing the bulk soil or groundwater.

Institutional controls

Institutional controls (ICs) are legal or administrative restrictions on the use of or access to a site or facility to eliminate or minimize potential exposure to chemicals of concern (such as proprietary controls or governmental controls). Institutional controls are used when contamination is first discovered, when cleanups are ongoing, and when residual contamination remains on site at a level that does not allow for unlimited use and unrestricted exposure after cleanup.

Integrated project planning

The collection of processes that ensure various elements of projects are properly coordinated. It establishes and manages the involvement of all relevant stakeholders and resources, according to defined processes devised from the organization's set of standard processes.

Intentionality

Being deliberate or with purpose in actions.

Intergenerational equity

The principle of intergenerational equity states that every generation holds the earth in common with members of the present generation and with other generations, past and future. The principle articulates a concept of fairness among generations in the use and conservation of the environment and its natural resources

Invasive vegetation

A plant(s) that is both nonnative and able to establish on many sites, grow quickly, and spread to the point of disrupting plant communities or ecosystems.

J

K

L

Land use restrictions (controls)

Land use controls may consist of non-engineered instruments, such as administrative and legal controls, or engineered and physical barriers, such as fences and security guards. Land use controls help to minimize the potential for exposure to contamination and/or protect the integrity of a response action and are typically designed to work by limiting land and/or resource use or by providing information that helps modify or guide human behavior at a site.

Life cycle assessment

A compilation and evaluation of the inputs, outputs, and potential environmental impacts of a product or system throughout its life cycle.

Living shoreline

Are a green infrastructure technique using native vegetation alone or in combination with low sills to stabilize the shoreline. Living shorelines provide a natural alternative to "hard" shoreline stabilization methods like riprap or bulkheads, and provide numerous benefits, including nutrient pollution remediation, essential fish habitat structure, and buffering of shorelines from waves and storms. Research indicates that living shorelines are more resilient than bulkheads in protecting against the effects of hurricanes."

M

Metrics

Measurable outcomes that can be used as a basis for evaluating actions (environmental, social, or economic) being considered throughout the site cleanup and redevelopment process.

Minimally invasive drilling techniques

Drilling techniques that minimize ground disturbances.

Mitigation (of disaster risk and disaster)

The lessening of the potential adverse impacts of biological, chemical, physical, and radiological hazards (including those that are human induced) through actions that reduce hazard, exposure, and vulnerability.

Monitored natural attenuation (MNA)

An important, groundwater remediation technology used for treating some dissolved groundwater contaminants. MNA relies on natural attenuation processes, coupled with a monitoring program, to achieve site-specific remediation objectives within a reasonable time frame compared to more active approaches.

N**Natural attenuation**

Natural attenuation relies on natural processes to decrease or “attenuate” concentrations of contaminants in soil and groundwater.

Natural resources capital

The world’s stock of natural resources, which includes geology, soils, air, water, and all living organisms. Some natural capital assets provide people with free goods and services, often called ecosystem services. Two of these (clean water and fertile soil) underpin our economy and society, and thus make human life possible.

Natural source zone depletion

Naturally occurring processes of biodegradation, volatilization, and dissolution of dense or light nonaqueous phase liquid petroleum hydrocarbon products in the subsurface.

Numeracy

The ability to understand and work with numbers.

O**Optimization**

See Remedial optimization/remedy optimization.

P**Passive survivability**

Refers to a building’s ability to maintain critical life-support conditions in the event of extended loss of power, heating fuel, or water.

Perceived risk

The subjective judgment that people make about the characteristics and severity of a risk.

Permafrost

A thick subsurface layer of soil that remains frozen throughout the year.

Permeable reactive barrier wall

A wall created belowground to clean up contaminated groundwater. The wall is “permeable,” which means that groundwater can flow through it. Water must flow through the wall to be treated. The “reactive” materials that make up the wall either trap harmful contaminants or make them less harmful.

Phytotechnologies

Plant-based technologies that use plants and trees to remediate contaminated soil, groundwater, surface water, and sediments.

Pingo

Ice cored hills that exist withing the permafrost.

Project life cycle

See Remedial project life cycle.

Project management

The process of leading the work of a team to achieve goals and meet success criteria within a specified time frame.

Project planning

A procedural step in project management, in which required documentation is created to ensure successful project completion. Documentation includes all actions required to define, prepare, integrate, and coordinate additional plans. The project plan clearly defines how the project is executed, monitored, controlled, and closed.

Provisioning services

The production by ecosystems of products that are used by or directly impact human populations, including food, fuel, and fresh water.

Q

R

Rainscreen

An exterior wall detail in which the siding (wall cladding) stands off from the moisture-resistant surface of an air/water barrier applied to the sheathing to create a capillary break and to allow drainage and evaporation.

Regulating services

Ecosystem processes which temper natural phenomena. Regulating services include processes such as decomposition, erosion and flood control, water purification, climate, and pollination.

Regulations

Rules and administrative codes issued by governmental agencies at all levels (municipal, county, state, and federal) that are not statutes but have the force of law because they are adopted under the authority granted by statutes and often include penalties for violations.

Remedial alternatives

Solutions used in place of original remediation strategies to ensure that site cleanup objectives are met.

Remedial optimization/remedy optimization

A systematic process of evaluating the performance and effectiveness of existing site remediation systems and identifying recommendations that will move the site toward closeout more quickly and/or cost-effectively. Incorporating GSR into remedy selection maximizes environmental, economic, and social benefits and minimizes environmental impacts throughout the remedy life cycle.

Remedial project life cycle

The progression of environmental cleanup process often described in six stages: 1. preliminary, 2. baseline, 3. characterization, 4. design, 5. remediation/mitigation, 6. postremedy.

Remediation

The act or process of abating, cleaning up, containing, or removing a substance (usually hazardous or infectious) from an environment.

Remediation risk management

An approach that identifies and assesses site investigation and remediation activity risks.

Replacement cost

The cost of engineered systems to replace ecosystem services.

Resilience

The capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption.

Resilience measures

Potential measures to achieve a climate- and weather-resilient site remedy. Resilience measures may involve, but would not be limited to, actions such as physically securing one or more remediation systems, providing additional barriers to protect the systems, safeguarding access to the site and individual systems, and alerting project personnel of system compromises.

Resilient design

The intentional design of buildings, landscapes, communities, and regions in response to vulnerabilities to disaster and disruption of normal life.

Resilient development

The intentional design and construction of buildings, landscapes, communities, and regions in response to vulnerabilities to disaster and disruption of normal life.

Resilient risk management

Taking actions to minimize the effects of climate impacts and other future vulnerabilities. These actions fall generally into four categories: 1) mitigation, 2) adaptation, 3) geoengineering or climate engineering, and 4) knowledge-base expansion.

Resource Conservation and Recovery Act (RCRA)

The federal public law that creates the framework for the proper management of hazardous and nonhazardous solid waste.

Return on investment (sustainable)/Sustainable return on investment (S-ROI)

A methodology for identifying and quantifying environmental, societal, and economic impacts of investment in site remediation or contaminated site redevelopment (for example, factories, new product development, civil infrastructure, efficiency, and recycling programs, etc.).

Risk management

The process that evaluates how to protect public health by deciding whether and how to manage risks. This process requires consideration of legal, economic, and behavioral factors, and the human health and welfare effects of each management action and alternatives.

S

Salt-water intrusion

The displacement of fresh or groundwater by the advance of salt water, usually in coastal and estuarine areas.

Scarify

Breaking up, loosening, or roughening a surface.

Sea-level rise

An increase in the level of the world's oceans due to the effects of global warming.

Site closeout

A remediation life-cycle milestone signifying that all active management and monitoring at a site has been completed, the remedy is protective of human health and the environment, contaminant levels at the site allow for unlimited use and unrestricted exposure, and there is no expectation of expending additional funds at the site to maintain protectiveness.

Social justice

Fair treatment of all people in a society, including respect for the rights of minorities and equitable distribution of resources among members of a society.

Social license

Exists when a project has ongoing approval or acceptance within the local community and among other stakeholders.”.

Sociocultural

Of, relating to, or signifying the combination or interaction of social and cultural elements.

Socioeconomic

Refers to society-related economic factors. The socioeconomic factors that determine health include employment, education, and income.

Soft strip deconstruction

Intact removal of the most valuable and easy-to-extract building materials.

Source containment

A range of actions (for example, removal, treatment in place, containment) designed to protect human health and the environment by eliminating or minimizing migration of or exposure to significant contamination.

Stakeholder

A person, group, or organization that is affected, potentially affected, or has any interest in a project or a project's outcome, either directly or indirectly.

Stormwater controls

Practices designed to both control stormwater volume and settle out particulates for pollutant removal. Stormwater controls may include gathering runoff in wet ponds, dry basins, or multichamber catch basins and slowly releasing it to receiving waters or drainage systems.

Straw wattles

Human-made cylinders of compressed, weed-free straw (wheat or rice). Also known as straw worms, bio-logs, straw noodles, or straw tubes.

Supporting services

Those ecosystem services not used directly by people, but that are necessary for all other ecosystem services, such as soil formation, photosynthesis, and nutrient and water cycling.

Supra-permafrost groundwater

Water in the active layer of thawed permafrost soil.

Sustainability

The holistic consideration of environmental, social, and economic impacts of an activity and evaluation of these impacts on future generations.

Sustainability assessment

An evaluation that considers environmental, economic, and social impacts throughout the life cycle of an environmental remediation project.

Sustainable best management practices (SBMPs)

Best management practices for green remediation that holistically address a cleanup project's energy requirements; air emissions; impacts on water; impacts on land and ecosystems; material consumption and waste generation; and long-term stewardship actions. SBMPs can be used for sustainable removal or cleanup activities at contaminated sites under Superfund, corrective action, underground storage tank, and brownfield cleanup programs. In other guidance these may be referred to simply as BMPs.

Sustainable demolition

Minimizing waste to landfill by deliberately and carefully removing all salvageable material before razing a structure.

Sustainable materials management

A systemic approach to using and reusing materials more productively over their entire life cycle. This approach considers local waste streams and socially conscious sourcing.

Sustainable resilient remediation

An optimized solution to cleaning up and reusing hazardous waste sites that limits negative environmental impacts, maximizes social and economic benefits, and creates resilience against the increasing threat of extreme weather events, sea-level rise, and wildfires.

Sustainable risk management

The process of identifying, evaluating, selecting, and implementing actions that mitigate unintended environmental, social, and economic impacts from cleanup and restoration activities.

Sustainability

Refers to efforts to align economic development with environmental protection and human well-being.

Systemic bias

The inherent tendency of a process to support particular outcomes. Also called institutional bias and is related to structural bias.

T**Talik**

A layer or body of unfrozen ground occurring in a permafrost area due to a local anomaly in thermal, hydrological, hydrogeological, or hydrochemical conditions.

Thermal erosion

Permafrost degradation resulting from flowing water.

Thermokarst

The process of massive ice degradation that creates large voids leading to subsidence.

Thermosiphon

A gravity-assisted heat pipe.

Three pillars of sustainability

The three pillars of sustainability are economic (for example, profit/economic health), environmental (for example, green cities/pollution/energy) and social (for example, safety/mobility/quality of life). If any one of the pillars is weak then the system as a whole can become unsustainable.

Traditional ecological knowledge (TEK)

The knowledge held by indigenous cultures about their immediate environment and the cultural practices that build on that knowledge. TEK includes an intimate and detailed knowledge of plants, animals, and natural phenomena, the development and use of appropriate technologies for hunting, fishing, trapping, agriculture, and forestry, and a holistic knowledge, or worldview, that parallels the scientific discipline of ecology.

Triple bottom line

Balancing the three pillars of sustainability—economic, environmental, and social—to optimize environmental cleanup projects.

Tundra

The vast, flat region in the northern hemisphere where the subsoil is permanently frozen and vegetative growth is hindered by low temperatures and a short growing season.

U

United Nations sustainable development goals

The sustainable development goals or global goals are a collection of 17 interlinked goals designed to be a “blueprint to achieve a better and more sustainable future for all.” The United Nations General Assembly set the goals in 2015; they are intended to be achieved by the year 2030.

V

Value of benefit

Values of social, economic, or environmental benefits that may be considered in remedial options for a cleanup site.

Vulnerability

The degree to which a system or site is susceptible to or unable to cope with adverse effects of climate change, including climate variability and extremes.

Vulnerability assessment

Assessing the degree to which a system or site is susceptible to or unable to cope with, adverse effects of climate change, including climate variability and extremes. This includes:

- evaluating the remedy’s exposure to climate or weather hazards of concern (such as high floodwater or soil subsidence).
- evaluating the remedy’s sensitivity to the hazards of concern (likelihood for the hazards to reduce remedy effectiveness).

W

Watershed

The land area that channels rainfall and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as reservoirs, bays, and the ocean.

Wildfire

A sweeping and destructive conflagration especially in a wilderness or a rural area.

X

Y

Z