ROMANIA GREEN BUILDING COUNCIL
RoGBC.org

Green Building Professional

Sustainable site selection & site management

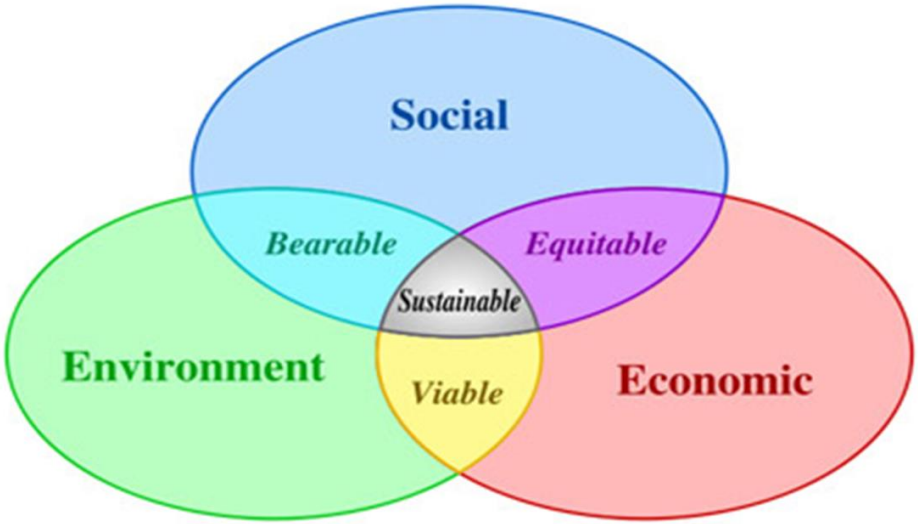
Webinar | November 16, 2023

Terms & Definitions

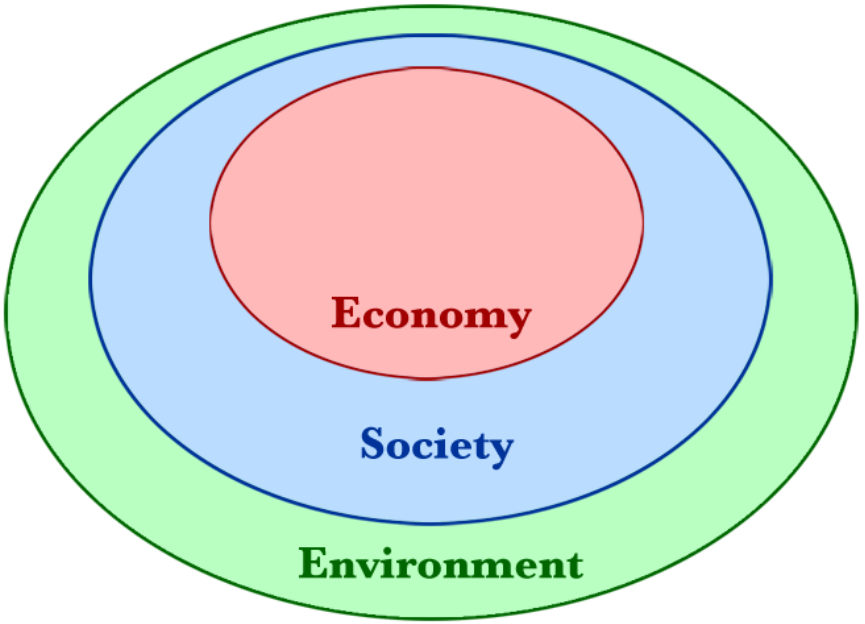
Sustainability

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

Source: United Nations commission's 1987 report, Our Common Future.



Sustainability (based on “Three Pillars” or “Triple Bottom Line”)



Sustainability (nested – “real life”)

Brownfield

According to the U.S. EPA, “brownfields” are “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contamination.”

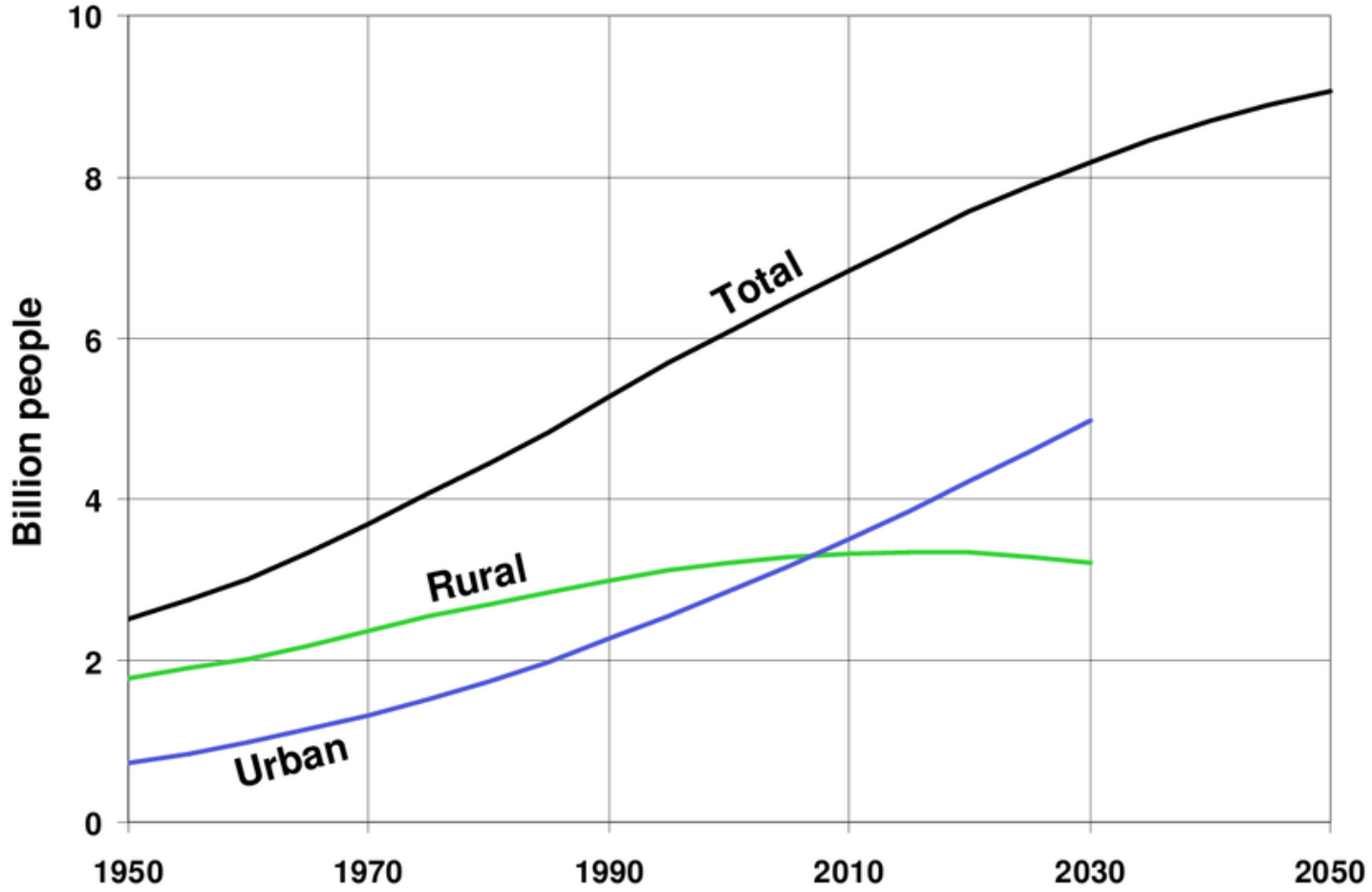
Brownfields are basically a real estate transaction with an environmental component.

Why Sustainable Site Selection?

Reclaim & Reuse

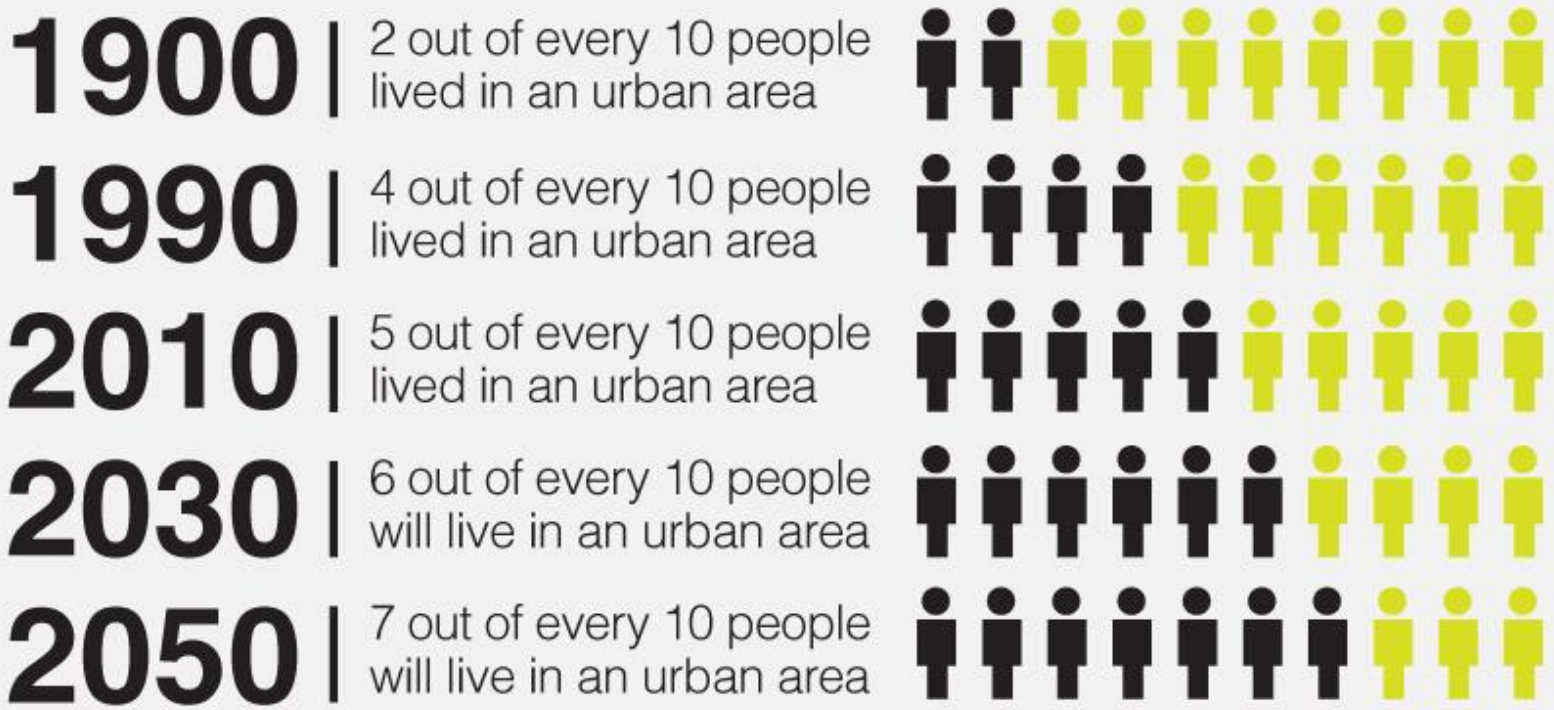
"The reclamation and reuse of Brownfield sites is a core component of Sustainable Development. It integrates a wide range of economic, social and environmental objectives. Brownfield redevelopment not only cleans up environmental health hazards and eyesores; it is also a catalyst for community regeneration, particularly when communities are brought into the consultation process of site identification and restoration. Managed effectively as a sustainable redevelopment scheme, Brownfield sites provide affordable housing, create opportunities for employment, promote conservation and wildlife, and offer a shared place for play and enjoyment. Above all, the transformation of a Brownfield site is a vision of hope for the future."

Source: www.sustainablebuild.co.uk



Historical and projected world population, 1950-2050, and rural-urban populations (from FAOSTAT online, November 2008)

Urbanization

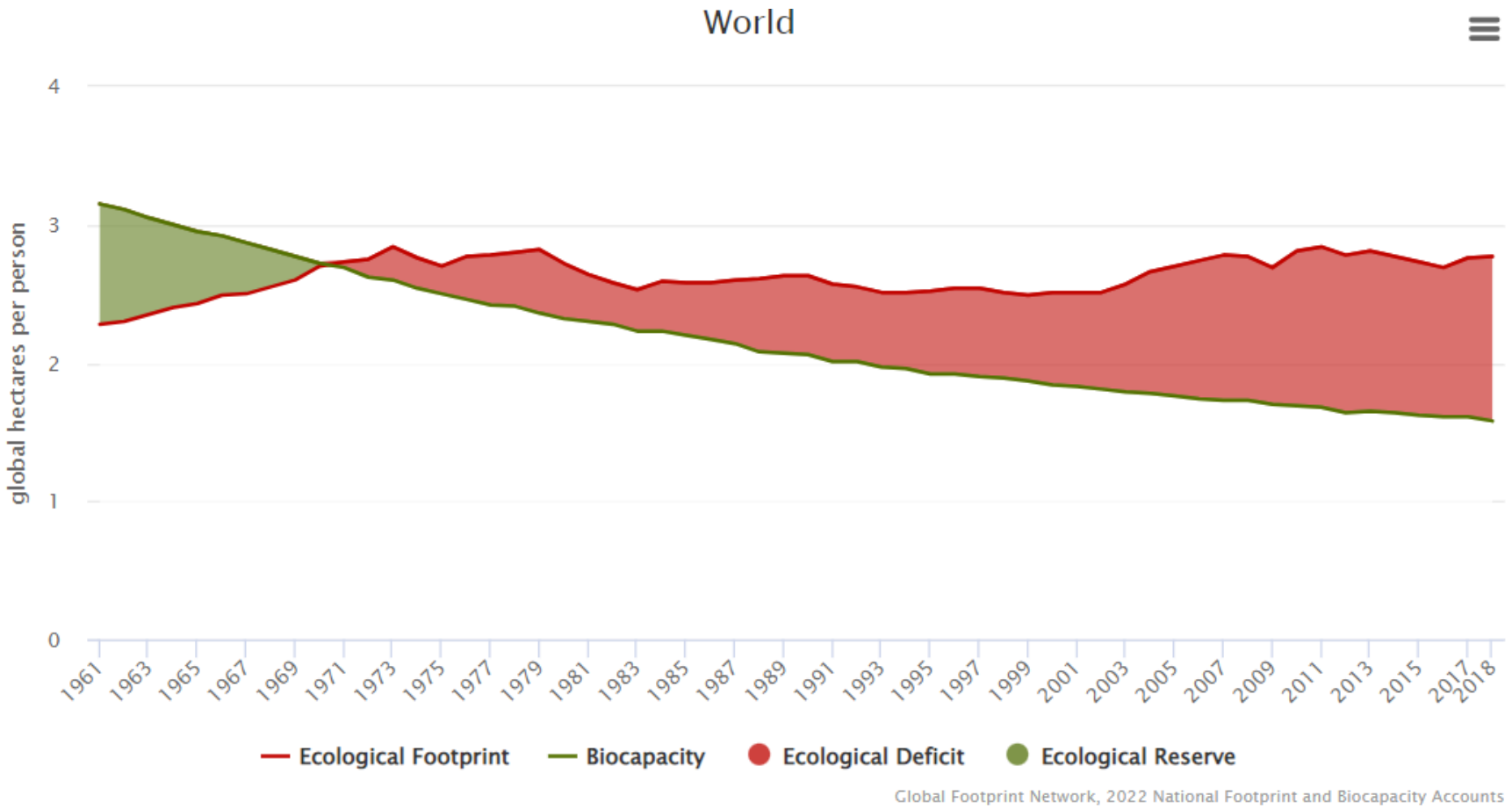


Numbers game

- Surface of the Earth: ~510,100,000 km^2
- Biologically productive land and water 2019: ~122,000,000 km^2
- World Population: 8,000,000,000 people
- Biocapacity per Person 2018: 15,800 m^2
  125 x 125 m - surface for animals not deducted!
- Ecological Footprint *) per Person 2018: 27,700 m^2
  *) food, living, mobility, consumption = required surface

Required surface almost <u>double</u> of available surface!

Ecological Deficit

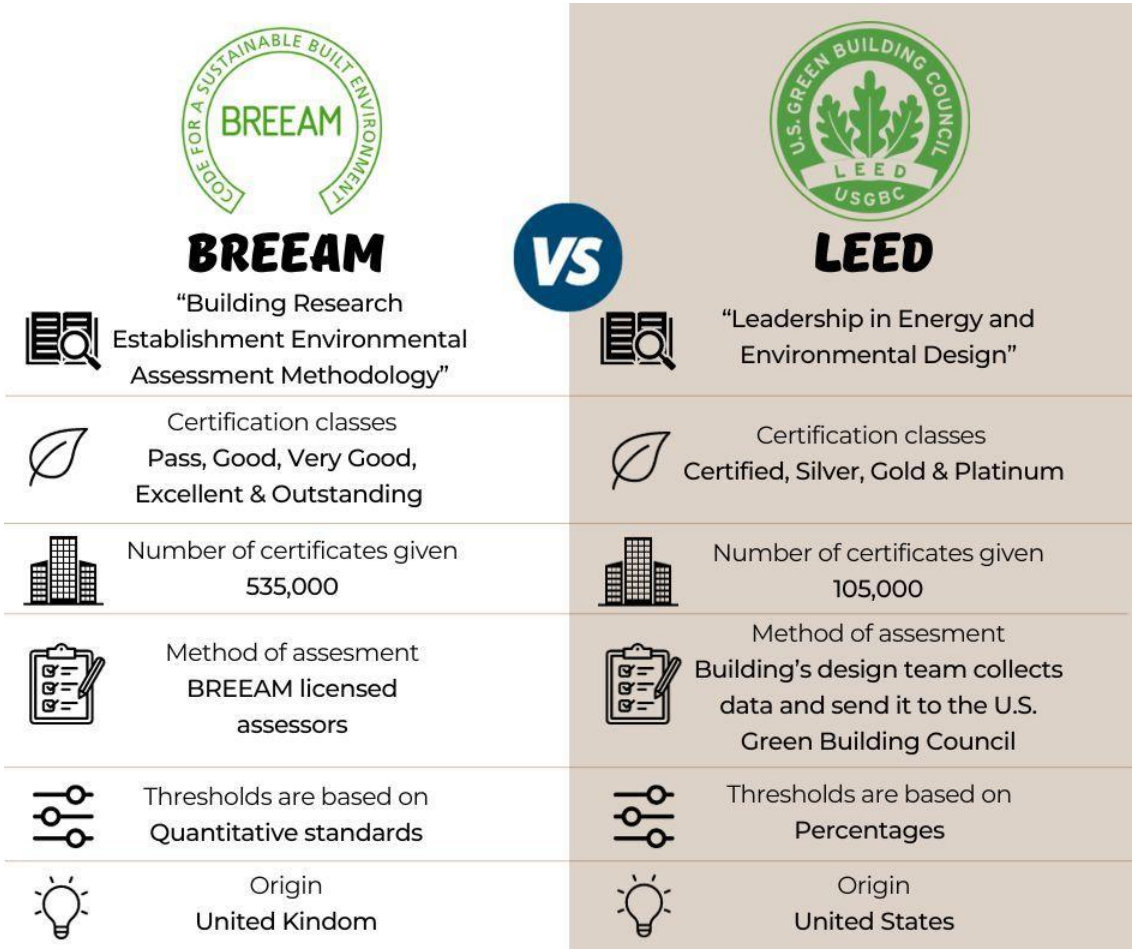


Legal, Technical & Financial Background


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

SGD 15

- Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- 15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world



Green building certificates (Source: LinkedIn, Johanna Catani)

LEED v4.1 BD+C Location & Transportation

0	0	0	**Location and Transportation**		16
			Credit	LEED for Neighborhood Development Location	16
			Credit	Sensitive Land Protection	1
			Credit	High Priority Site and Equitable Development	2
			Credit	Surrounding Density and Diverse Uses	5
			Credit	Access to Quality Transit	5
			Credit	Bicycle Facilities	1
			Credit	Reduced Parking Footprint	1
			Credit	Electric Vehicles	1

LEED v4.1 BD+C Sustainable Sites

0	0	0	**Sustainable Sites**		10
Y			Prereq	Construction Activity Pollution Prevention	Required
			Credit	Site Assessment	1
			Credit	Protect or Restore Habitat	2
			Credit	Open Space	1
			Credit	Rainwater Management	3
			Credit	Heat Island Reduction	2
			Credit	Light Pollution Reduction	1

LEED v4.1 BD+C Materials & Resources

0	**0**	**0**	**Materials and Resources**		**13**
Y			Prereq	Storage and Collection of Recyclables	Required
			Credit	Building Life-Cycle Impact Reduction	5
			Credit	Environmental Product Declarations	2
			Credit	Sourcing of Raw Materials	2
			Credit	Material Ingredients	2
			Credit	Construction and Demolition Waste Management	2

EU Taxonomy

- The Taxonomy Regulation was published on 22 June 2020 and entered into force on 12 July 2020
- The Taxonomy Regulation establishes six environmental objectives
  1. Climate change mitigation
  2. Climate change adaptation
  3. The sustainable use and protection of water and marine resources
  4. The transition to a circular economy
  5. Pollution prevention and control
  6. The protection and restoration of biodiversity and ecosystems

EU Taxonomy cont.

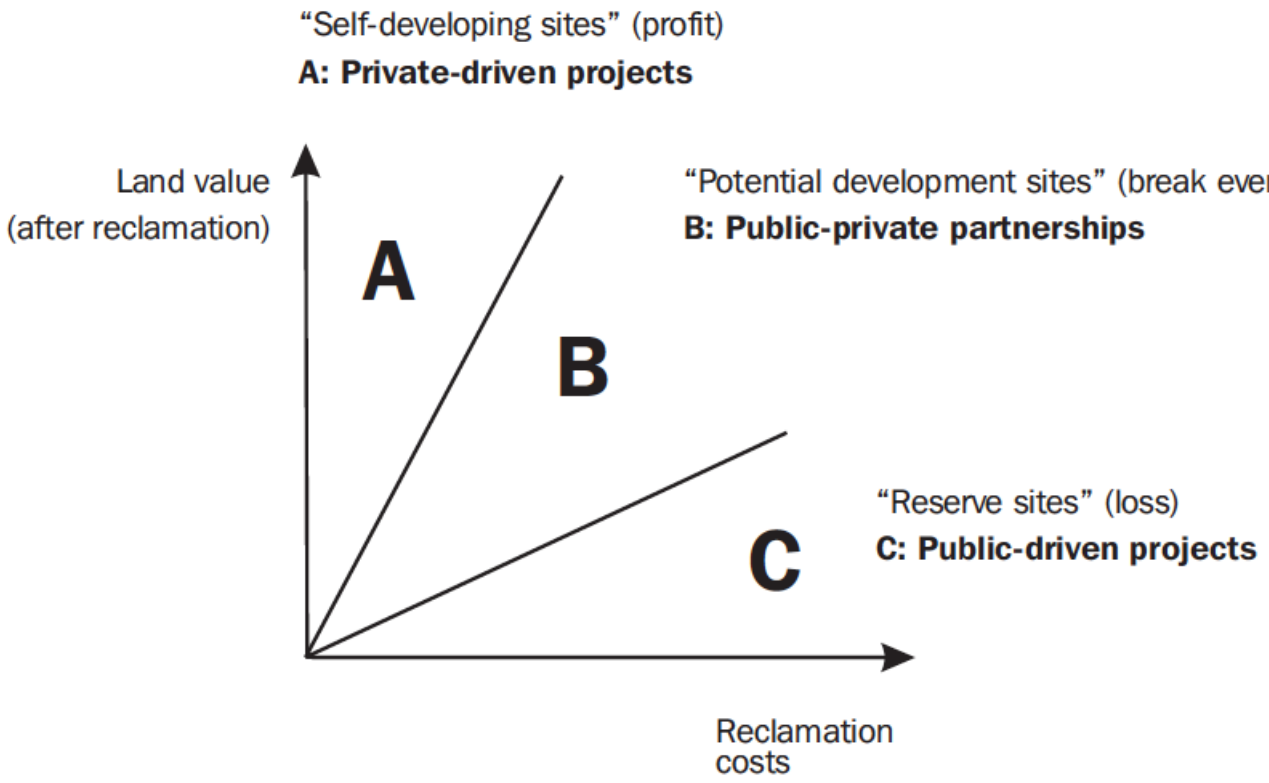
How are sustainable economic activities defined?

An activity must:

1. Contribute to at least one of six environmental objectives listed in the Taxonomy; and

2. Do no significant harm to any of the other objectives, while respecting basic human rights and labor standards.

Figure 1 **The A-B-C Model**



Categorization of Brownfield Sites

Source: Dokic, Sumpor (2010)

EU Funding Instruments

Funding instruments	
European Regional Development Fund	For the sustainable development and structural adjustment of regional economies
Cohesion Fund	Aims to decrease the differences between the EU's regional economic development, focusing on improving the urban environment, decontaminating brownfield sites and reducing air pollution
LIFE+ programe	The EU's funding instrument for environment and climate actions
Horizon 2020 actions	A funding mechanism for pan-European projects
Common agricultural policy	Set of legislation and practices adopted to provide a common, unified policy on agriculture
European Social Fund	The EU's main financial instrument for supporting employment in the Member States

Legal & Financial Challenges

- No international or EU brownfield policy
- Lack of proper tax incentives
- Unclear legal and regulatory policies towards remediation and investigations
- Potential liability issues in the future
- Lack of local expertise with creative remediation solutions in an urban environment

Site Challenges

- Lack of Available Site Information
- Environmental Contamination
- Surface Structures
- Subsurface Structures
- Underground Utilities
- Unsuitable Soils

Liability, Costs & Time

Environmental Liability

- The liable entity is either the polluter or the holder of the land.
- The exact extent of the liability is further marked by uncertainty, because of the unknown degree of contamination, in the absence of a contamination assessment studies data base.

Remediation Costs

- Clean-up costs can reach very burdensome amounts.
- Costs cannot be easily and precisely predetermined because of:
  - vast surface area Brownfield sites usually occupy and
  - unknown degree of contamination.

Remediation Costs (cont.)

- Clean-up costs are to be borne by the entity that generated the pollution or
- Clean-up costs are to be borne by the current holder of the plot of land in question for both historical and current pollution.
- Moreover, plots of land neighbouring the contaminated site which were affected by pollution are also the financial liability of the entity that generated the pollution on the contaminated site.

Remediation Costs - Solutions

- Property tax incentives for a determined period after the site has been clean-up and developed
- Further capital gain tax exemption for developers remediating contaminated sites
- Government could initiate collaboration with banks to encourage them to offer loans at subsidized rates for private investors looking to develop a brownfield site
- Public authorities could create a revolving loan fund: once the initial loan is paid back, new projects can be financed

Time

- Remediation can take a long time to be performed
- Many times, remediation takes longer than initially projected, exceeding the estimated budget
- Causes, e.g.:
  - lack of exact information regarding degree and type of contamination
  - unforeseen issues arising during remediation
  - lack of expertise in dealing with such issues

Time - Solutions

- Fast track permitting – brownfield projects should benefit from a significantly shorter permitting process
- Authorities could initiate partnerships with foreign environmental agencies, for the latter to offer their expertise in connection with brownfield redevelopment

Sustainable
Site Management

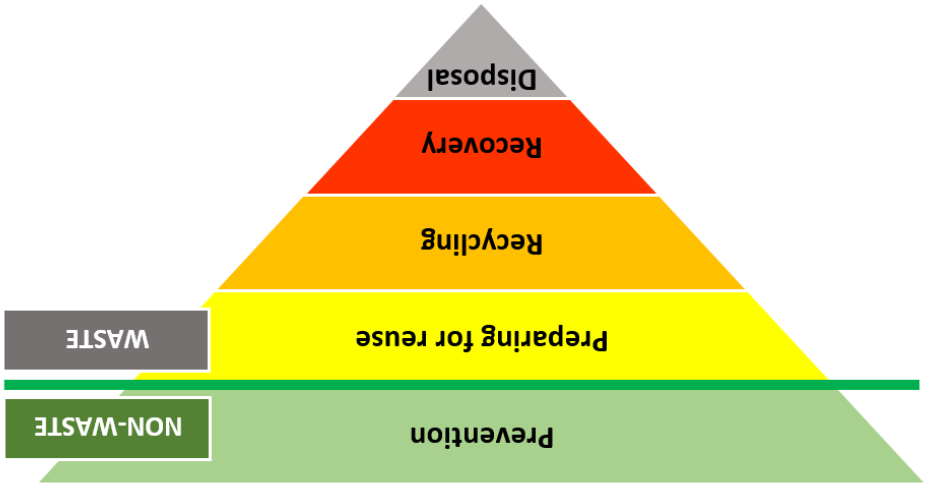
Storm Water Runoff – Erosion Protection

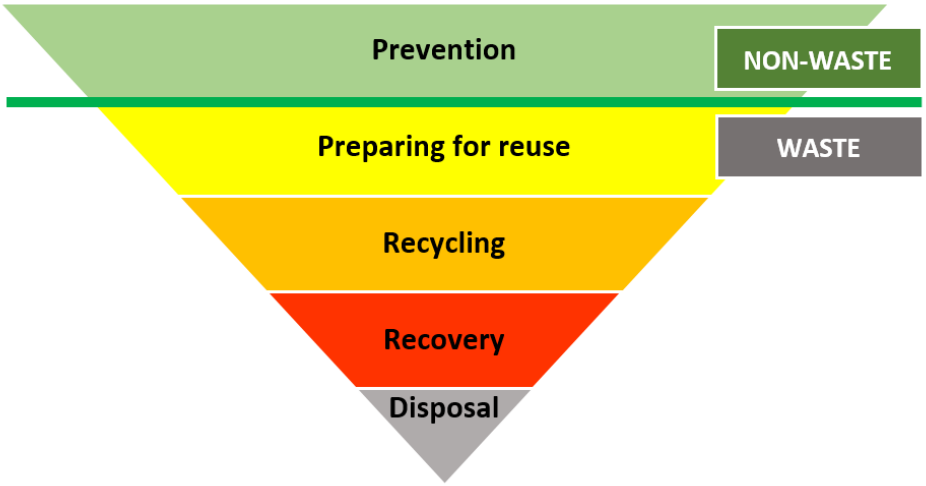
Storm Water Runoff – Erosion Protection

Storm Water Management

Storm Water Management

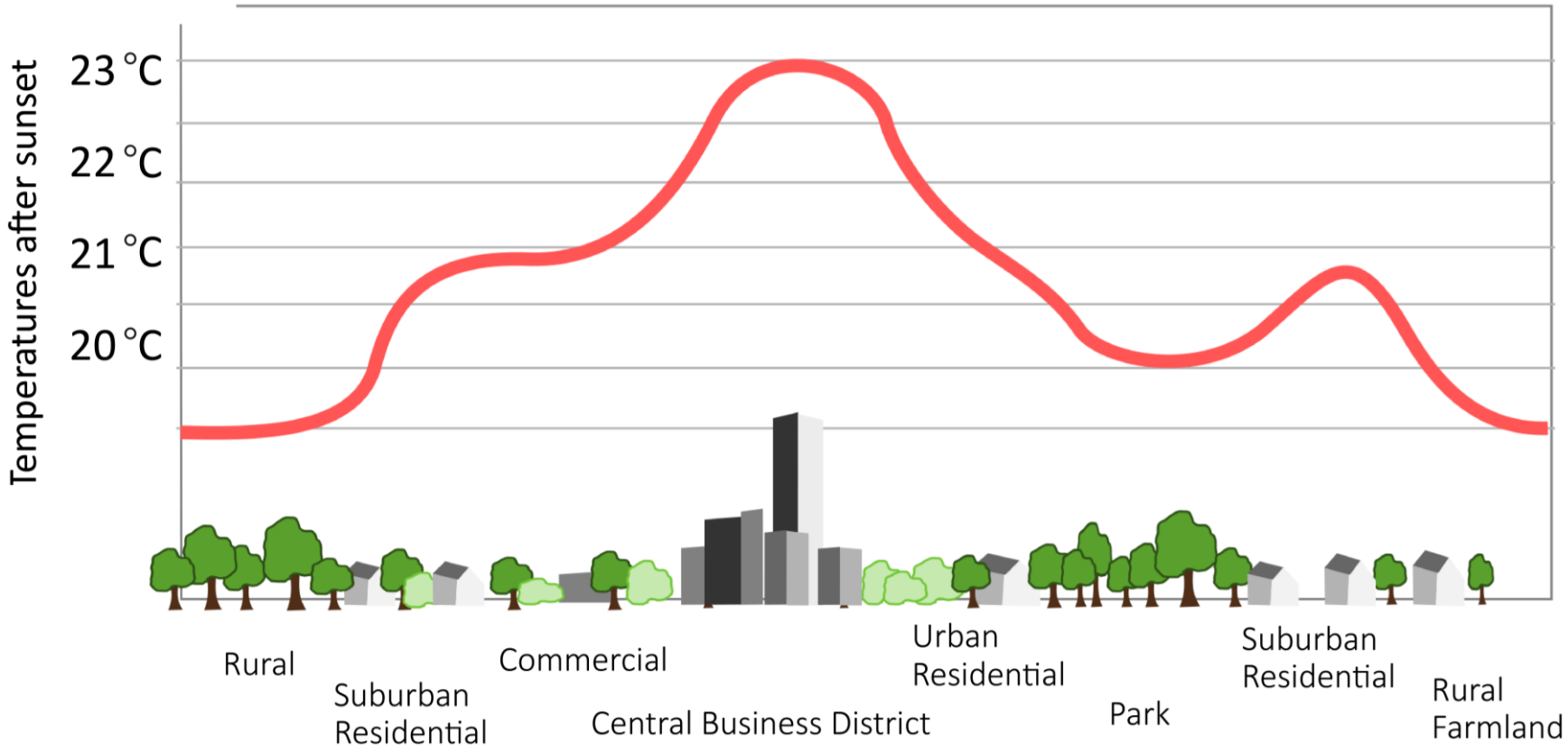
Waste Management Hierarchy (Pyramid)





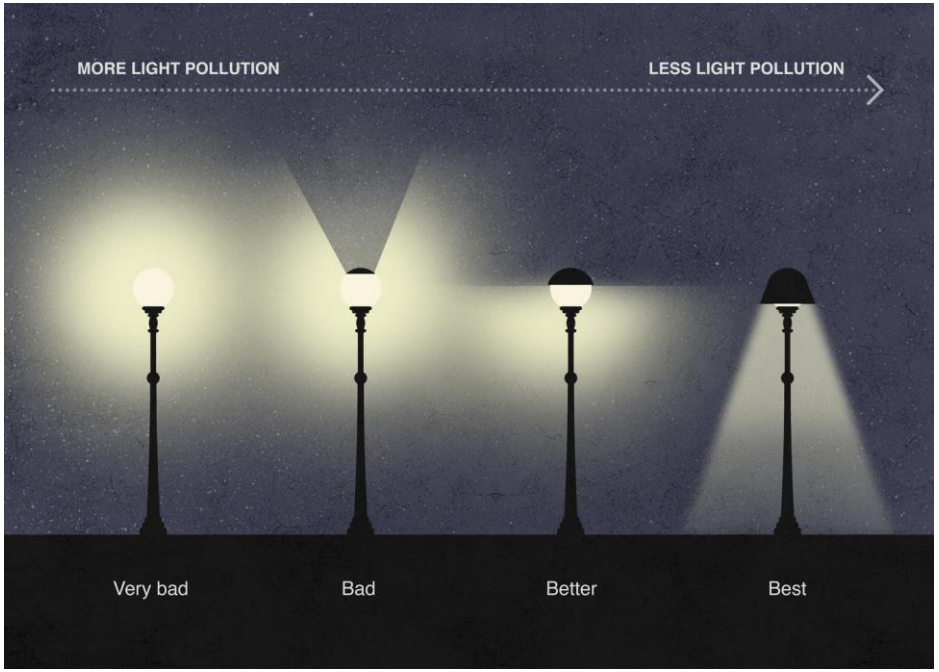
Alternative Transportation

Urban Heat Island Effect



Light Pollution

- Eliminate light projecting offsite & reduce the height of light fixtures
- Light on-site only areas necessary
- Minimize light from buildings (lighting control/shading)



© Valeria Montjoy (ArchDaily)

Sustainable
Site Solutions

Case Study #1 – Aramark (Source: Epstein)

- Location
  - Chicago, Illinois
- Type
  - Light Industrial – Commercial Laundry
- Site Area
  - 5.4 Ha (13.4 Acres)
- Building Area
  - 14,958 sm (161,000 sq ft)
- Employment / Operation
  - 300+ jobs / 24/7 Processing 500mt/wk

- Site History
  - International Amphitheatre
  - Built 1935 – Demolished Late 1990s
  - Large Exhibition Hall with Heavy Structure
  - Open Central Hall – Columned Side Halls

Case Study #1 – Aramark

Source: Epstein

Case Study #1 – Aramark

Source: Epstein

Case Study #1 – Aramark

Source: Epstein

Case Study #1 – Aramark

Source: Epstein

Case Study #1 – Aramark

Source: Epstein

Case Study #1 - Aramark (Source: Epstein)

- Site Challenges
  - Surface Contaminated Soils
    - PCBs from Elec. Transformer Oil
    - Dumped Waste Oil on Site
  - Extensive Sewer Vaults & Tunnels at Site Perimeter
  - Multiple Concrete Foundations at Side Halls
  - Large Concrete Foundation at Main Hall
  - Surface Concrete Pavement

- Site Solutions
  - Surface Contaminated Soils
    - Tested & Defined Area of Contamination
    - Removed & Disposed Off-Site
  - Surface Concrete Pavement
    - Stripped from Surface
    - Crushed On-Site for Parking Base
  - Sewer Vaults & Tunnels
    - Avoided Perimeters of Site
    - Avoided Utility Locations
  - Concrete Foundations
    - Planned Buildings in Clear Zone so as to not interfere or remove
    - Placed Parking over Foundations - no removal required

Case Study #2 – Triumph Foods (Source: Epstein)

- Location
  - St. Joseph, Missouri
- Type
  - Industrial – Meat Processing (Pork)
- Site Area
  - 24.3 Ha (60 Acres)
- Building Area
  - 58,066 sm (625,000 sq ft)
- Employment / Operation
  - 1200+ jobs / 24/7 Process 19,000 pigs/day

- Site History
  - Originally Part of Missouri River Flood Plain
  - Multiple Meat Processing Buildings Previously
  - Demolished Building Foundations from 1900s – Bldg Fire
  - On North End Former Meat Plant from 60s & 70s era
  - Site abandoned for approx. 8 years

Case Study #2 – Triumph Foods

Source: Epstein

Case Study #2 – Triumph Foods

Source: Epstein

Case Study #2 – Triumph Foods

Source: Epstein

Case Study #2 – Triumph Foods

Source: Epstein

Case Study #2 – Triumph Foods

Source: Epstein

Case Study #2 – Triumph Foods (Source: Epstein)

- Site Challenges
  - Unsuitable Soils
    - River Bottom Silty Soil
    - Fire Debris
    - Old Demolition Debris
  - Extensive Old Buried Foundations
  - Multiple Existing Buildings
  - Surface Concrete Pavement
  - High Water Table from River

- Site Solutions
  - Existing Buildings
    - Demolished all but one
    - Crushed all Concrete & Reused
  - Surface Concrete Pavement
    - Stripped from Surface
    - Crushed On-Site for Parking Base
  - Concrete Foundations
    - Planned Buildings in Clear Zone so as to not interfere or remove
    - Placed Parking over Foundations - no removal required
    - Saw-cut and selectively removed where needed for Buildings or Utilities

Case Study #3 – Testa Produce (Source: Epstein)

- Location
  - Chicago, Illinois
- Type
  - Light Industrial – Refrigerated Produce Distribution
- Site Area
  - 5.2 Ha (12.86 Acres)
- Building Area
  - 8,482 sm (91,300 sq ft)
- Employment / Operation
  - 200+ jobs / 24/7
- Other
  - Create GREEN Facility
  - **LEED Platinum Certification**

- Site History
  - Old Manufacturing Site
  - Buildings Demolished
  - Used Recently as Parking for Trucks & Trailer/Container Storage
  - **Incentives from City for Redevelopment**
  - **Shorter Permit Process for LEED Building**

Case Study #3 – Testa Produce

Source: Epstein

Case Study #3 – Testa Produce

Source: Epstein

Case Study #3 – Testa Produce

Source: Epstein

Case Study #3 – Testa Produce

Source: Epstein

Case Study #3 – Testa Produce

Source: Epstein

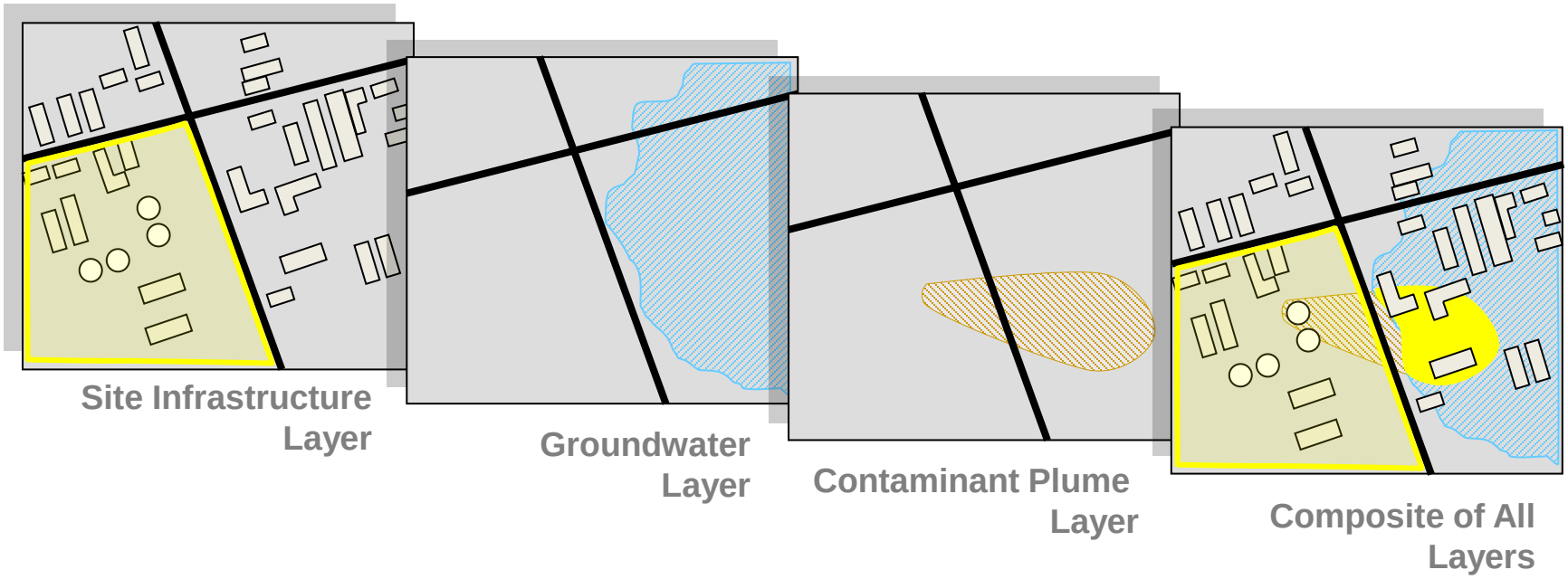
Case Study #3 – Testa Produce (Source: Epstein)

- Site Challenges
  - Many Previous Uses
  - Contaminated Soils
    - Lead
    - Arsenic
    - Chromium
  - Cinders, Brick, RR Ties & Misc. Debris
  - Surface Concrete Pavement

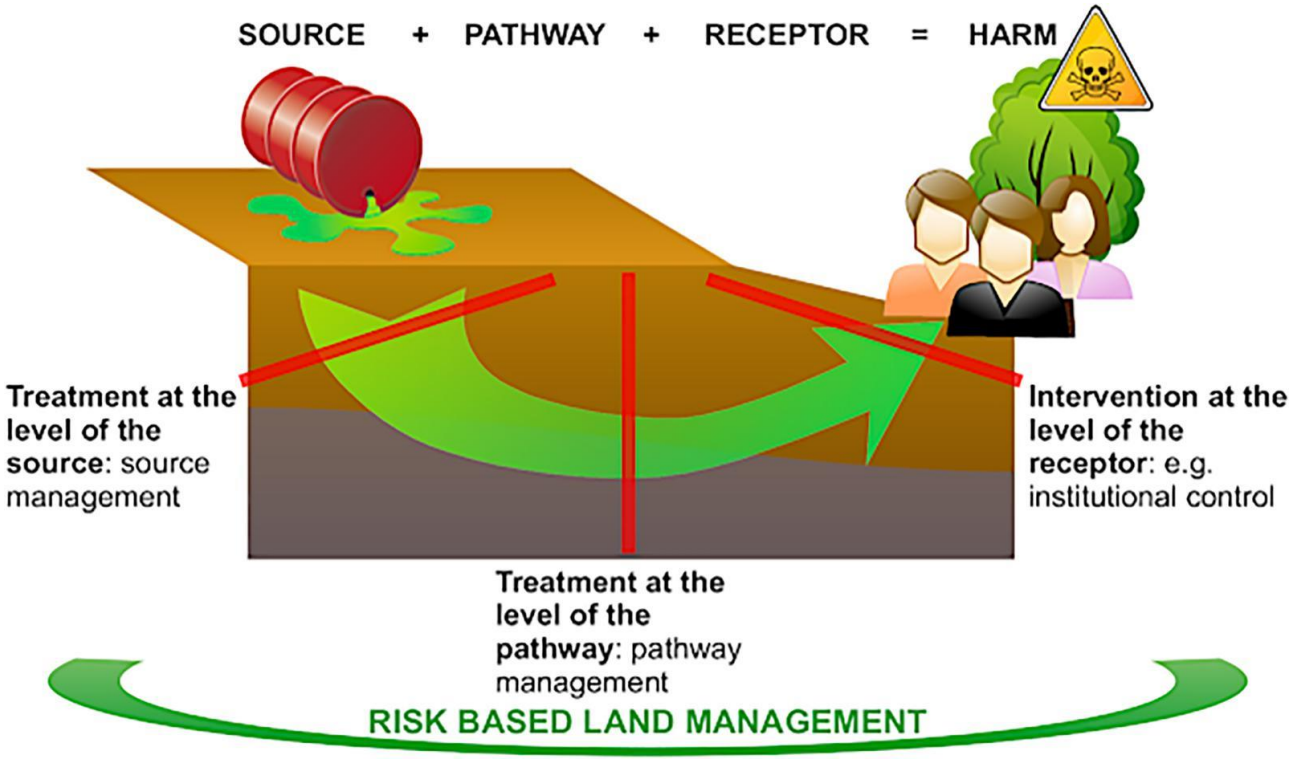
- Site Solutions
  - Contaminated Soils
    - Stripped & Stockpiled
    - Buried in Borrow Pit
    - Capped with 1m of clay
  - Surface Concrete Pavement
    - Stripped from Surface
    - Crushed On-Site for Parking Base
  - Misc. Debris Placed in Borrow Pit
  - Some Materials Reclaimed & Used on Site

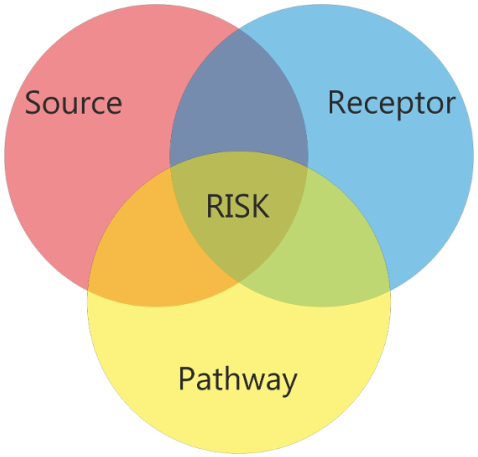
Sustainable Remediation

Remediation Design

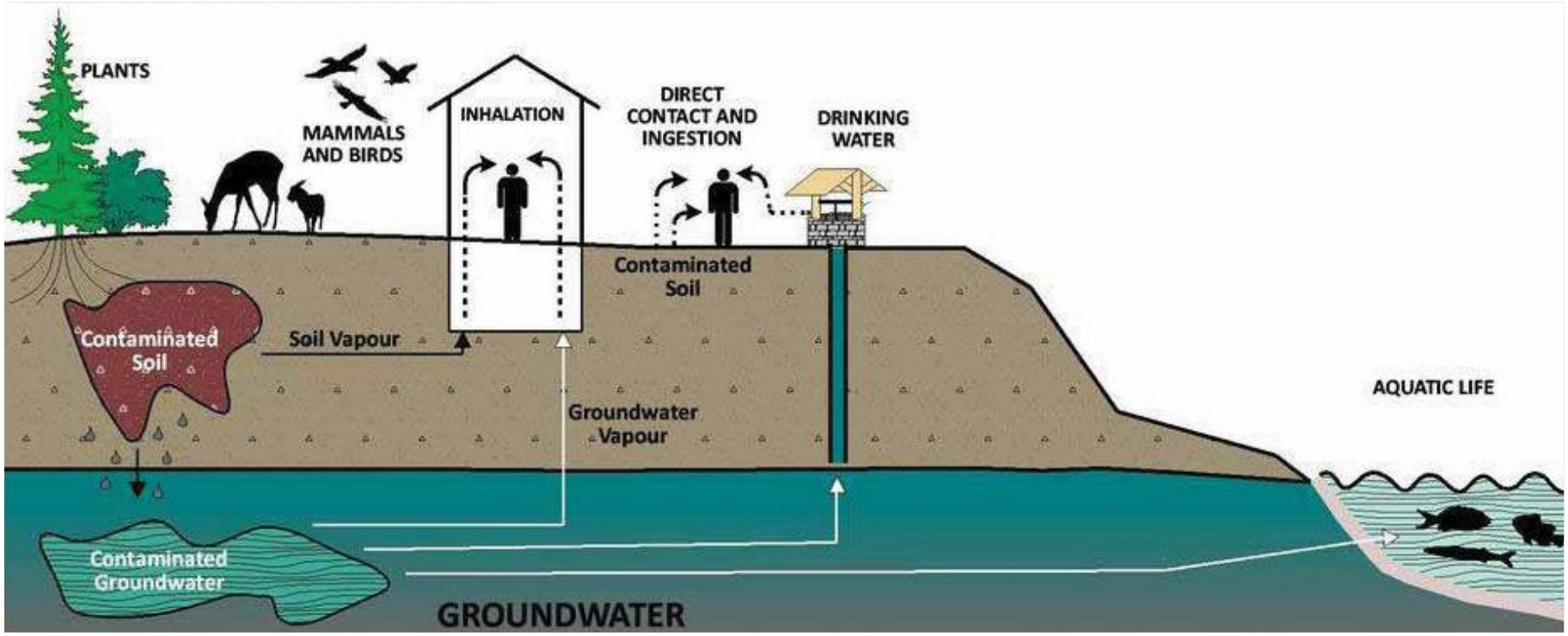


Source-Pathway-Receptor Model





Source: FIGURE 2. Risk management along a contaminant (S-P-R) linkage (Tack and Bardos, 2020)



Source-Pathway-Receptor Concept

Source: Canadian Ministry of Municipal Affairs and Housing

Environmental Risk Assessment

Hazard: is the inherent potential for something to cause harm. Hazards can include substances, machines, energy forms, or the way work is carried out.

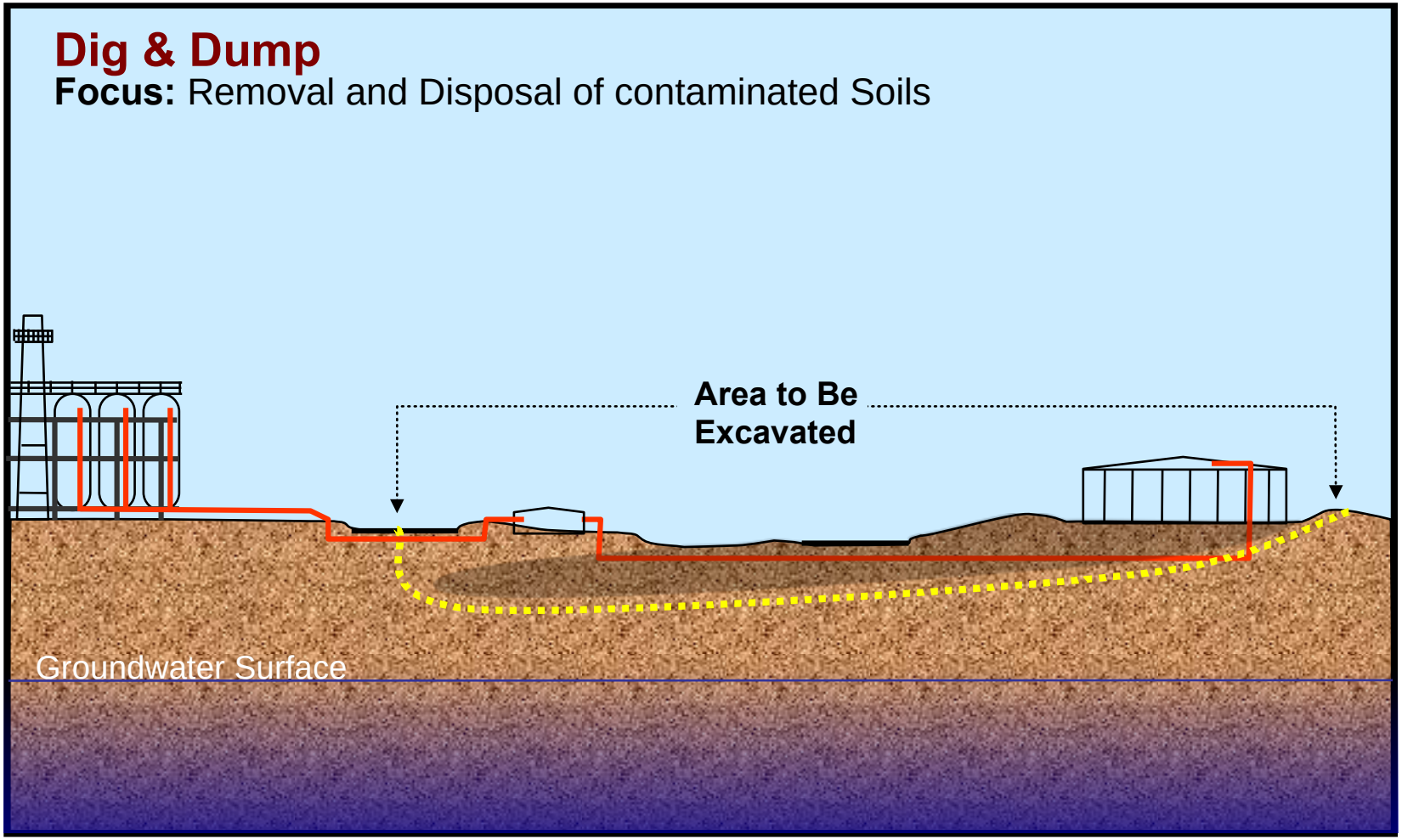
Risk: is the likelihood that harm will actually be done by the realization of the hazard during the work being carried out or by the way something is used.

Risk = Hazard × Exposure

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Severe
Almost certain	M	H	H	E	E
Likely	M	M	H	H	E
Possible	L	M	M	H	E
Unlikely	L	M	M	M	H
Rare	L	L	M	M	H

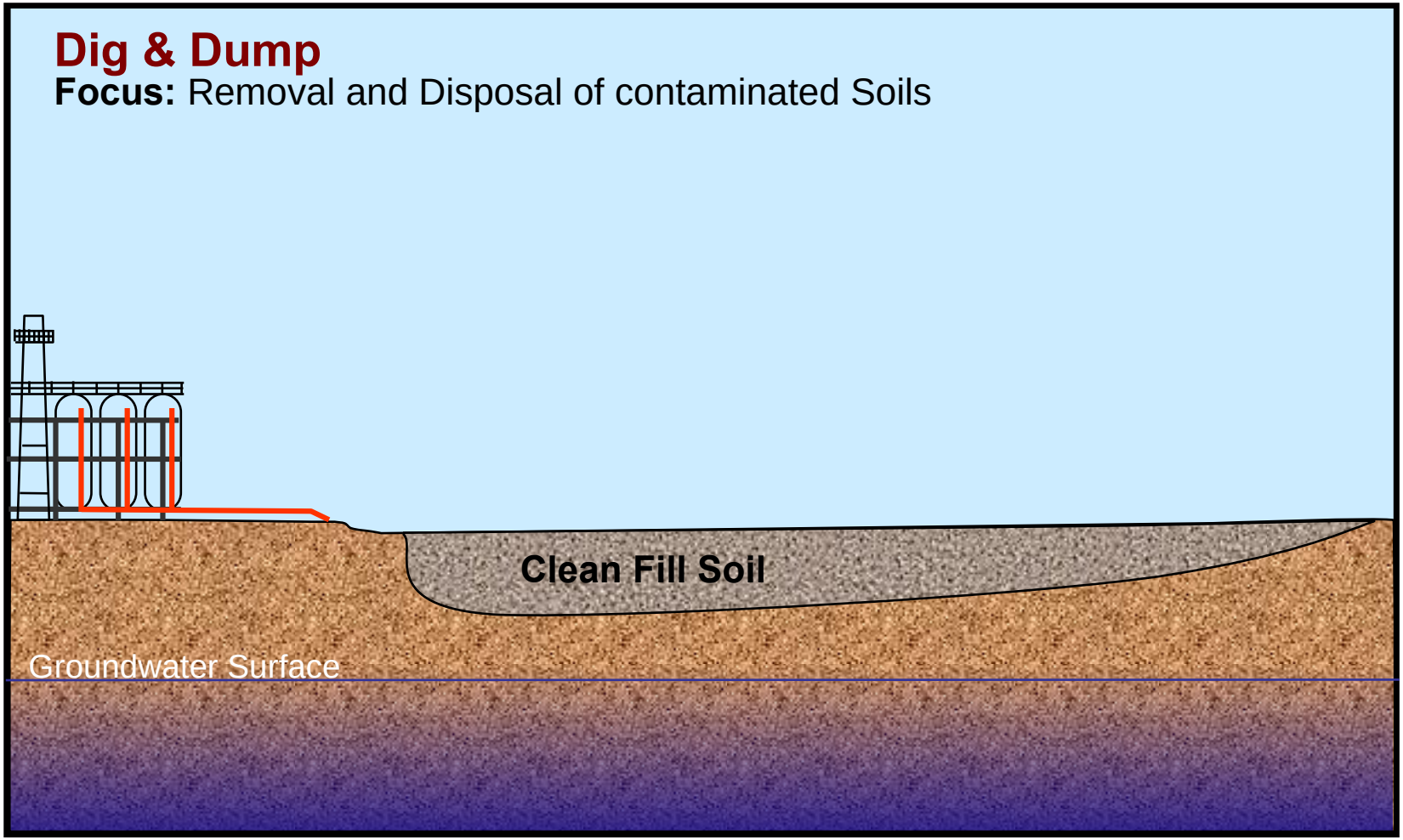
Standard Risk Matrix

Remediation Strategies



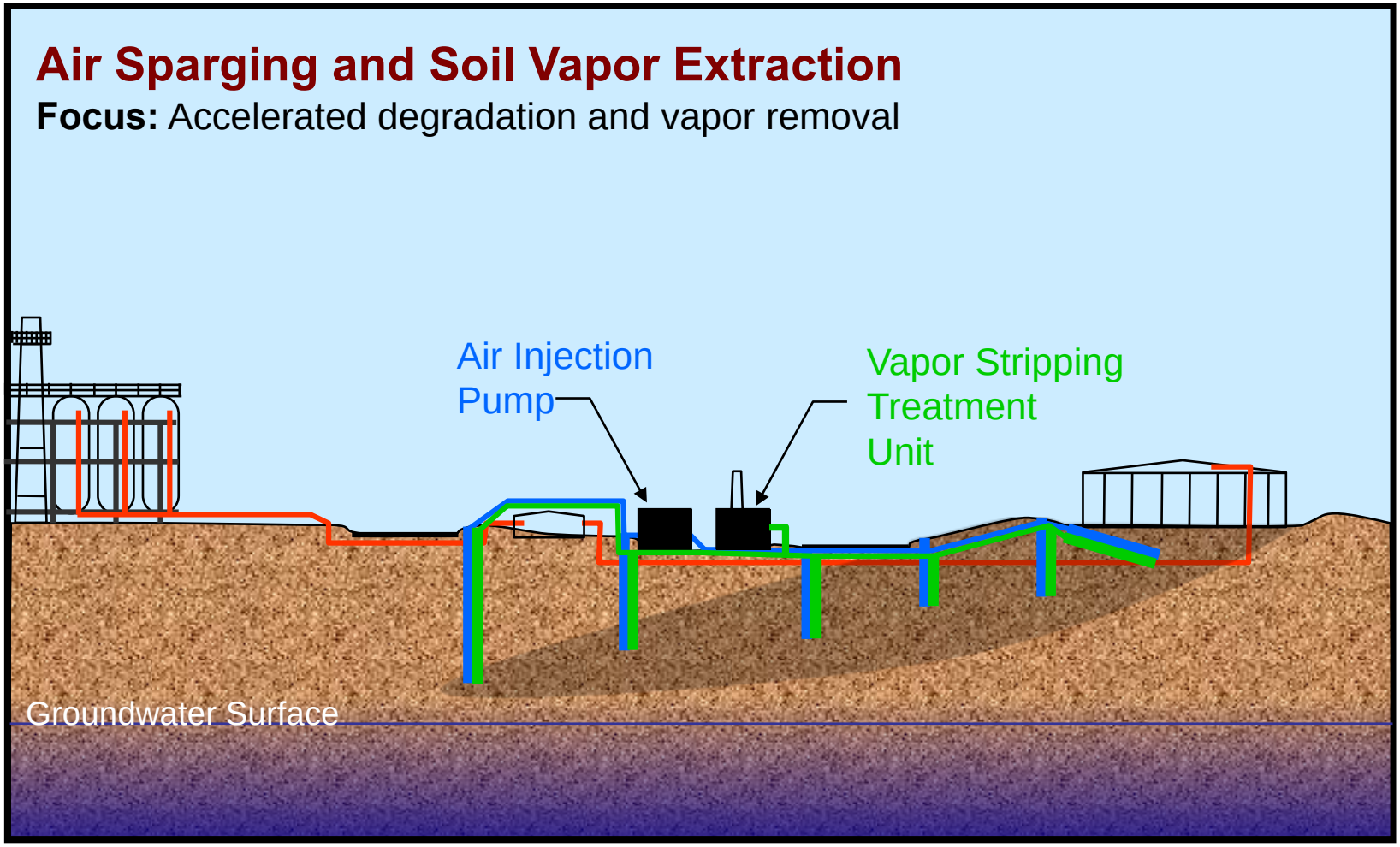
Excavation type remediation

Source: F&R Worldwide



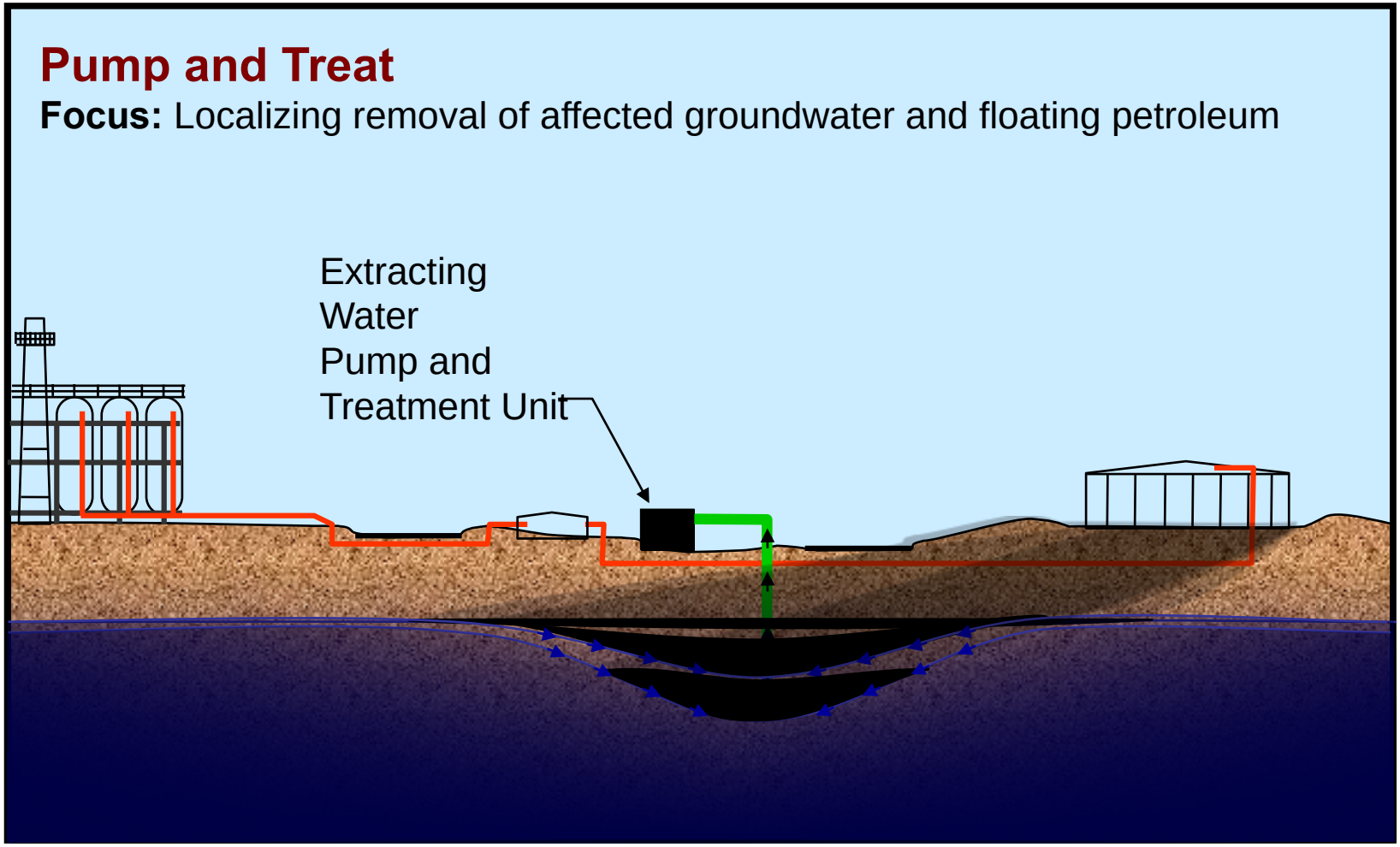
Excavation type remediation (cont.)

Source: F&R Worldwide



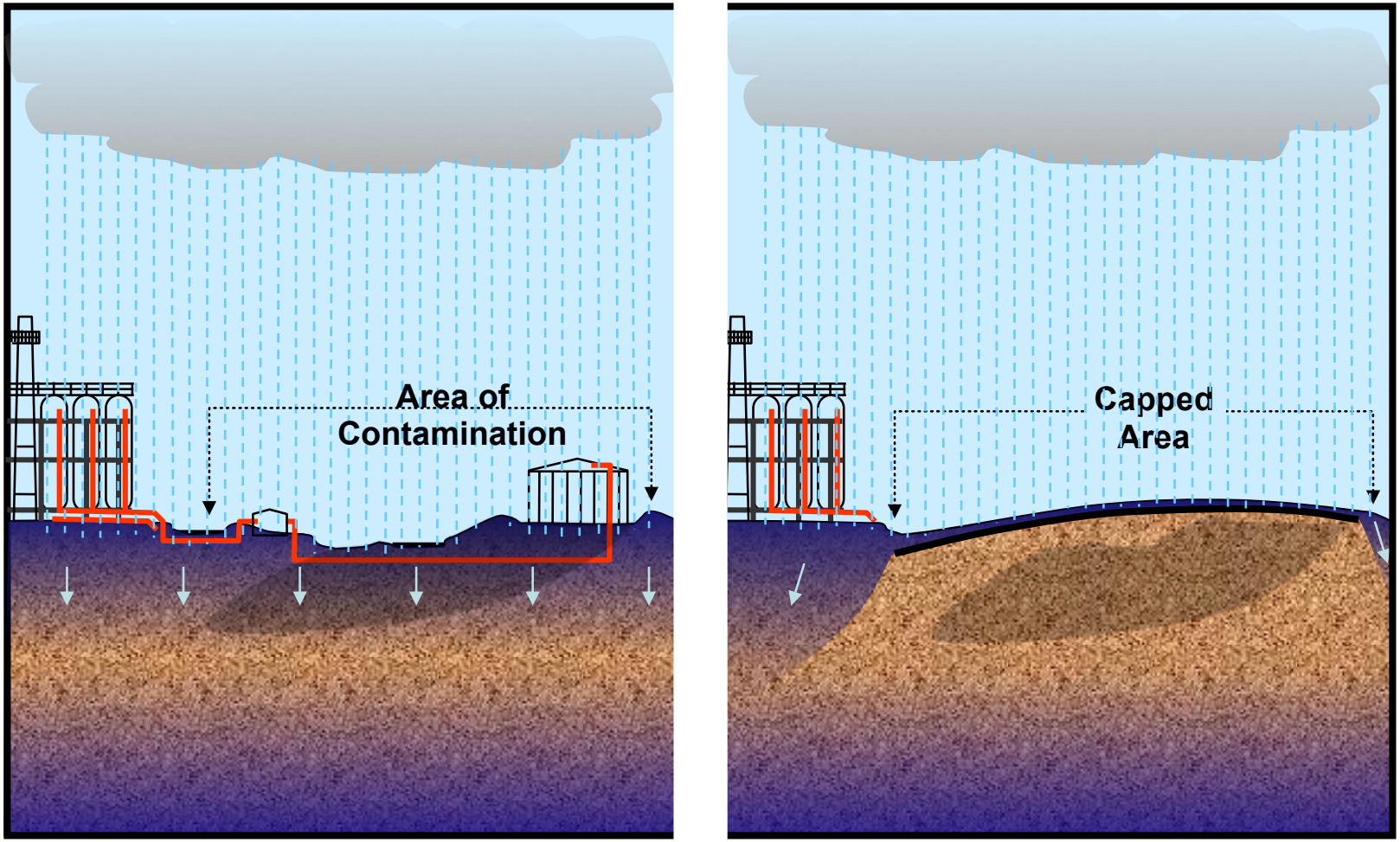
Extraction type remediation

Source: F&R Worldwide



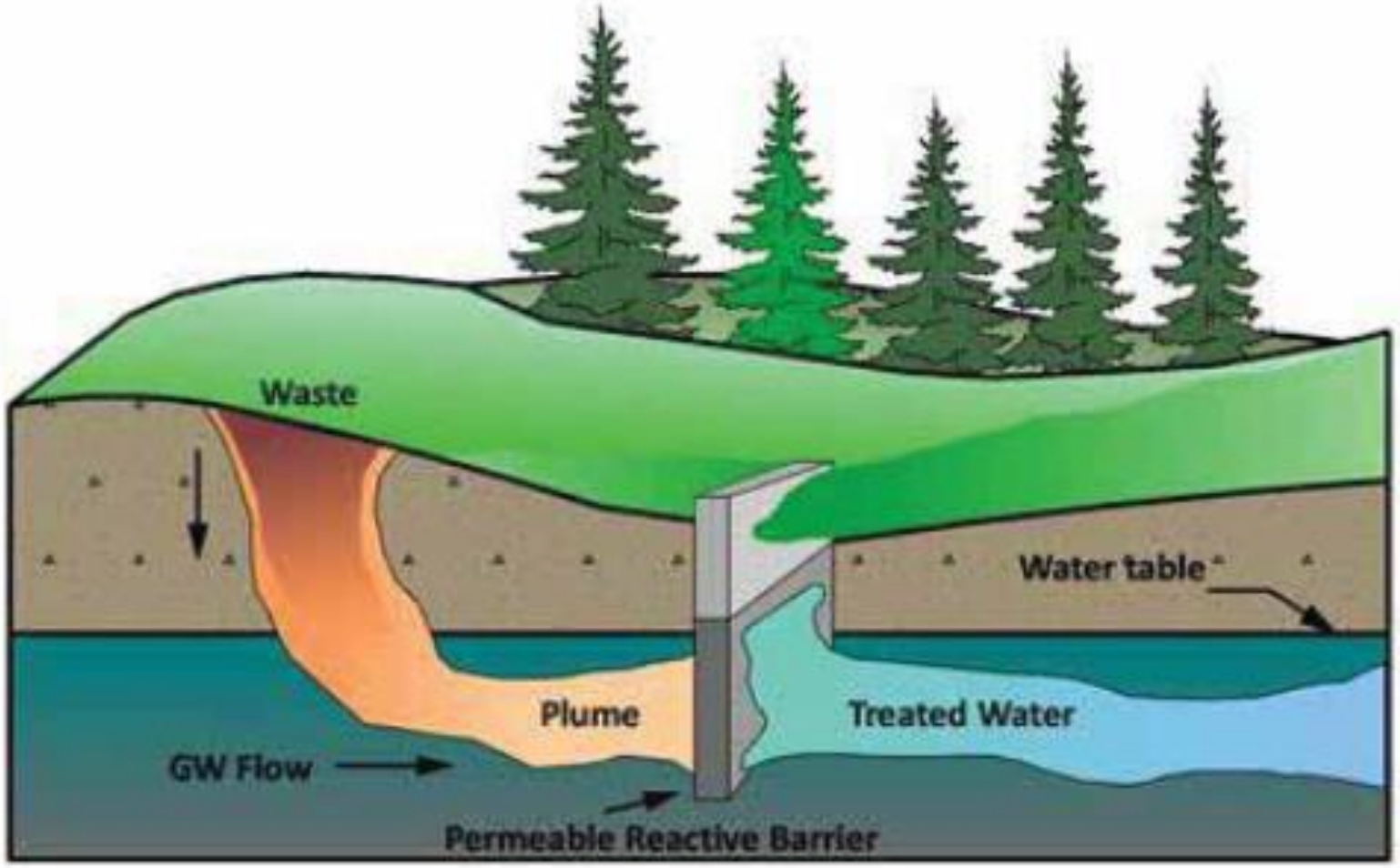
Extraction type remediation (cont.)

Source: F&R Worldwide



Capping type remediation

Source: F&R Worldwide



Permeable Reactive Barrier

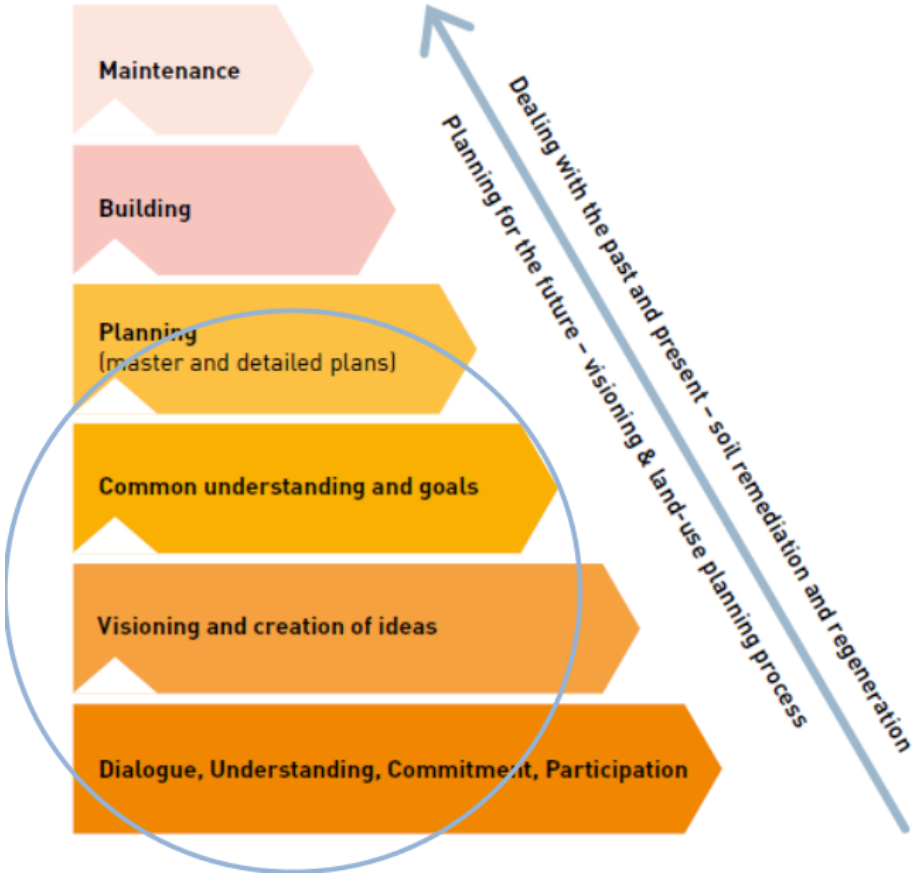
Source: adapted from US-EPA

Communication & Remediation

Communication & Remediation

Clarity	communicate clearly & respectful
Openess	be open and honest
Management	take full responsibility
e**M**otions	realize that is not just a technical issue
c**U**lture	take cultural and local differences into account
e**N**sure	ensure the well-being of the community
Involvement	involve stakeholders
Credibility	build-up trust before it is needed
pl**A**n	think ahead
Timing	be pro-active
Evaluate	learn from mistakes made in other projects

Urban Planning Pyramid



Close cooperation and partnerships between different actors from the beginning of the redevelopment process are key to tackling challenges.

Source: Based and elaborated on City of Oulu, Detailed planning Department (2013)

Public-Private-People Partnerships

- Critique for Public-private partnerships for lack of transparency and handover of planning and design to private developers
- Adding the 4th P - people & offering them possibilities to participate
- In Baltic Urban Lab, Norrköping, Turku, Tallinn & Riga tested different 4P approaches for planning their brownfields sites
- Result → common vision & development plans for brownfield sites developed in cooperation with citizens and other stakeholders

10 Components of 4P Planning Process

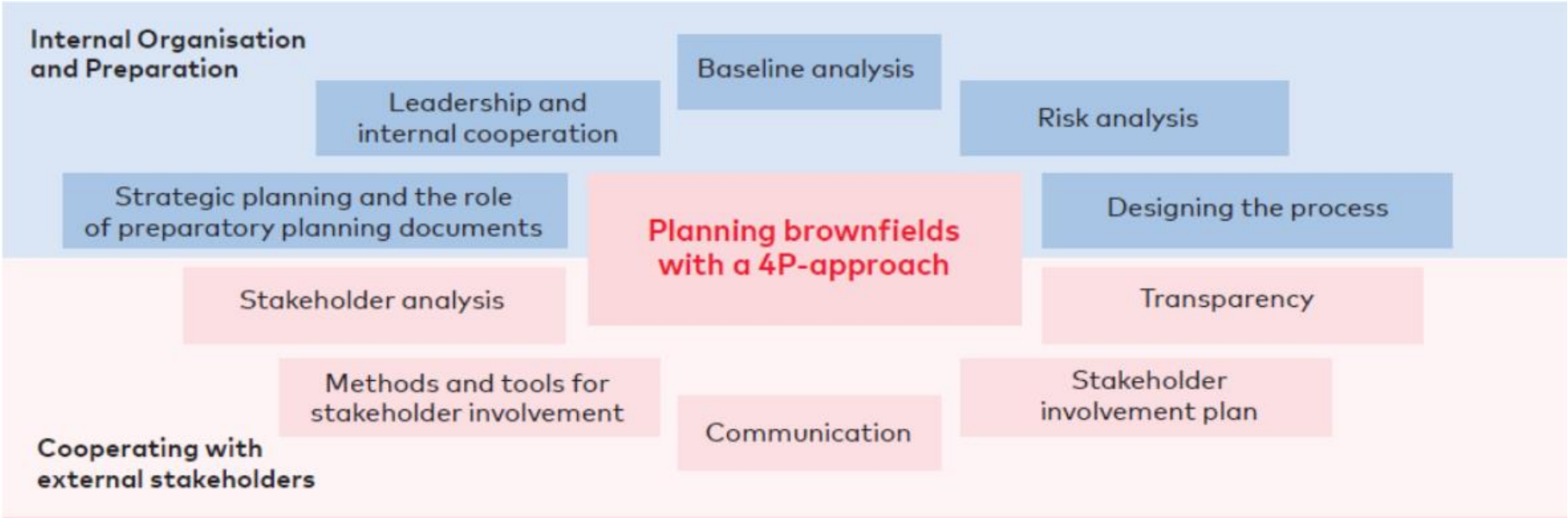
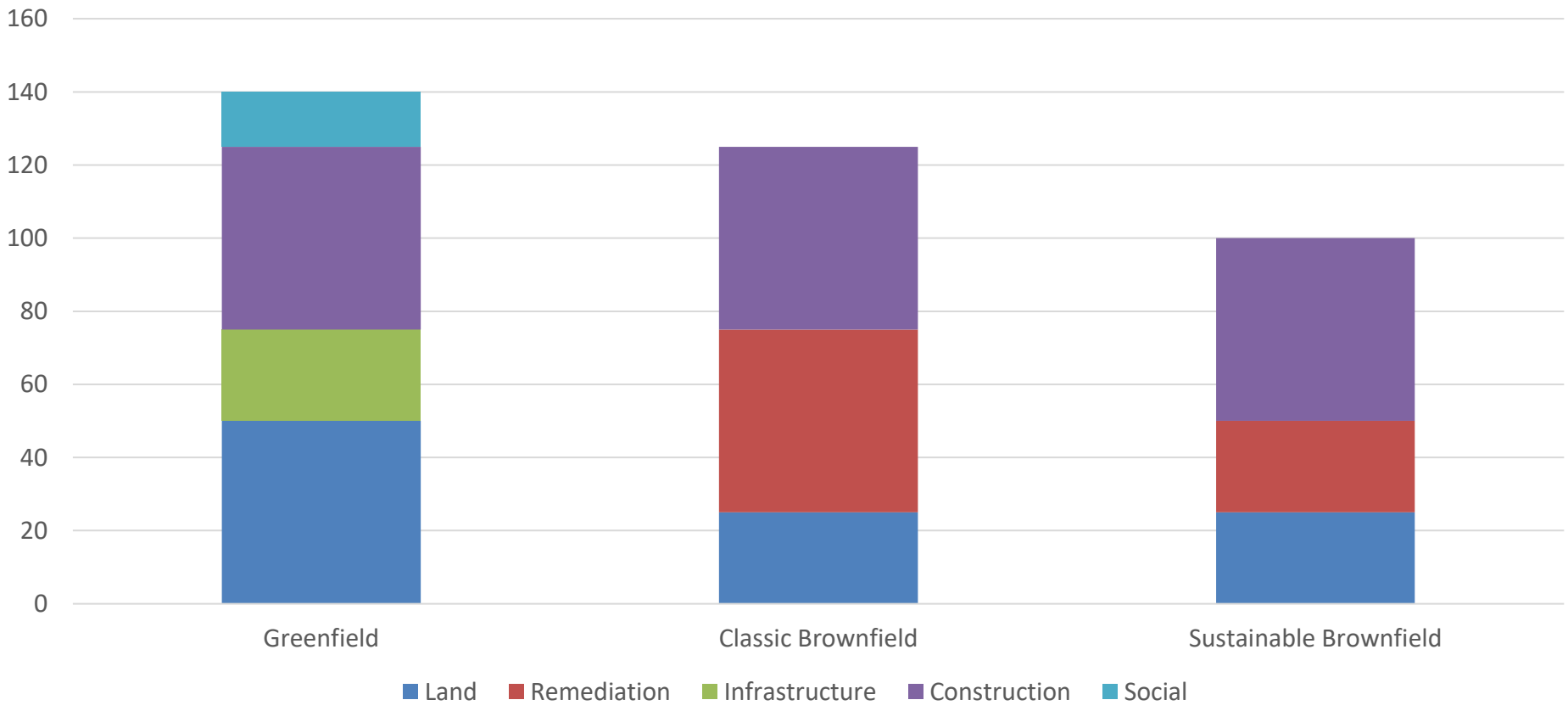


Figure 2: Ten components of the 4P planning process e-Guide, as included in the guide Towards Towards integrated and partnership-based planning of brownfield areas. Available at: https://www.balticurbanlab.eu/materials.

Conclusion

Cost Elements Site Development *)



*) Conceptual model to depict cost comparison greenfield vs. brownfield

Site Selection - Lessons Learned

- Research the site – know the challenges ahead of time
- Take the time to do proper site planning & design
- Design around the most difficult obstacles
- Get creative & think “Out of Box”
- Soil challenges can be easily & inexpensively overcome
- Think “Sustainability” – use what the site is giving to the greatest extent possible

Benefits of Brownfield Redevelopment

- Reduce development of green fields
- Reduce threat to public health
- Air and water quality improvements
- Short- and long-term job creation
- Local economic growth and investment
- Surrounding property values increase
- Revitalization of tax revenue
- Increase tax base
- Efficient use of existing infrastructure
- Renewed use of existing commercial properties
- Neighborhood revitalization
- Reduce Urban Sprawl

ROMANIA GREEN BUILDING COUNCIL
RoGBC.org

Martin Dreiseitel
mdreiseitel@fandr.ro
+40 731 980929

FRW

www.fandr.ro