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FRAMEWORKS FOR USE WITH ENVIRONMENTAL EVALUATION NF/EN/ISO 14001, 14006, 31000

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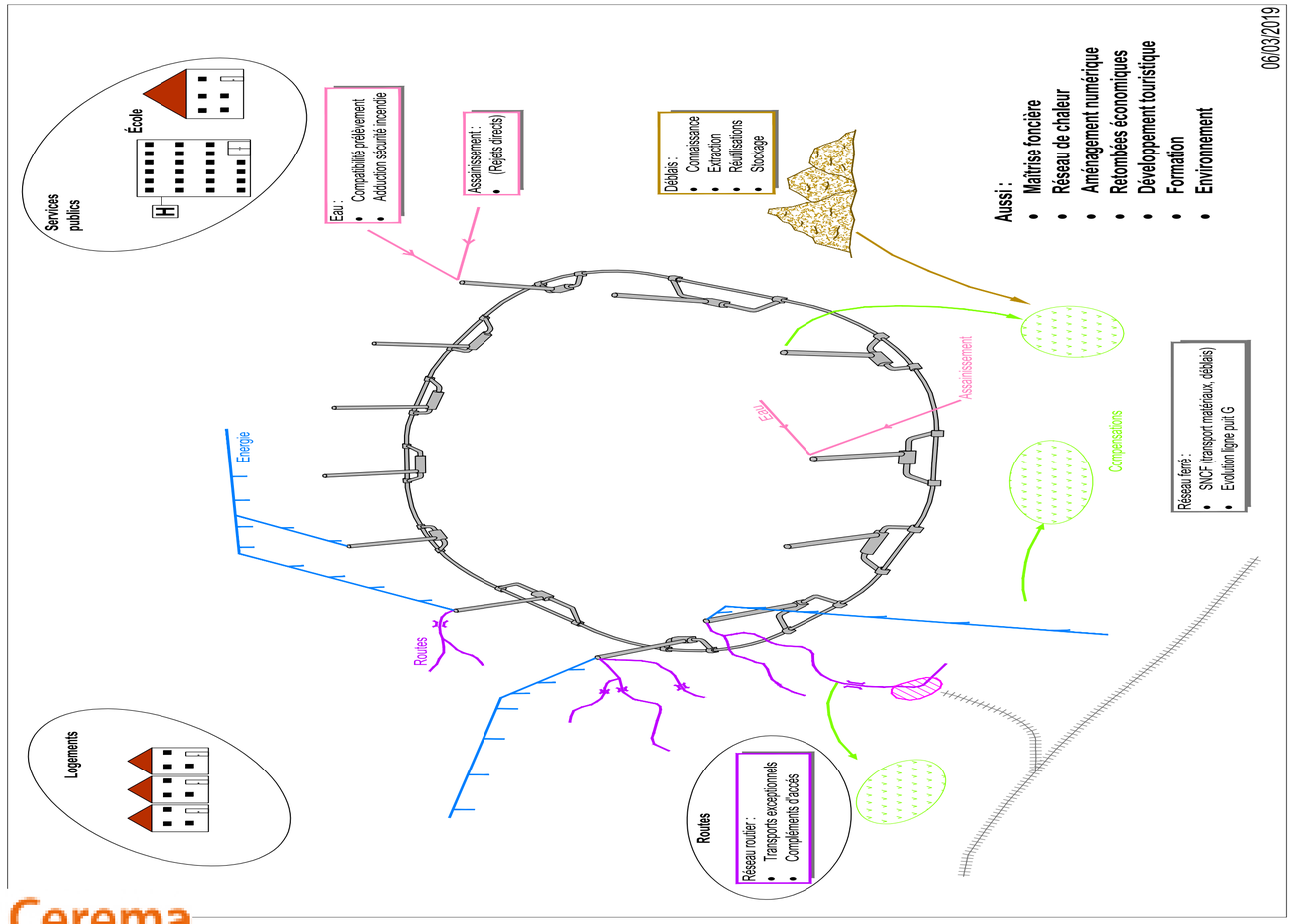
Environmental Evaluation*

- Environmental evaluation is the **process that integrates the environment in the project design and planning from the early reflection phase onwards**. It includes an environmental impact evaluation and the project authorisation examination process.
  - Code de l'environnement art. L122 10 July 1976 and 12. July 2010 and 2014/52/UE , directive 2011/92/ UE
- The process **leads to the authorisation of the project** in both host states
- The process is an **iterative project optimisation** process
- The process follows the methodology "**Avoid-reduce-compensate**" (éviter-réduire-compenser)
  - Anchored in Code de l'environnement article R122-13
- The environmental evaluation is an integral part of the project **leading to an "eco-design"**
  - *"L'évaluation environnementale est un processus visant à intégrer l'environnement dans l'élaboration d'un projet, ou d'un document de planification, et ce dès les phases amont de réflexions."*
- The process implements the principles of **prevention, integration and participation of the public**.
- **Issues are treated in a hierarchical manner** with particular attention to the major ones
  - *"Les enjeux environnementaux doivent donc être préalablement hiérarchisés, et une attention particulière doit être apportée aux enjeux identifiés comme majeurs pour le projet et le territoire."*

*More information at https://www.ecologie.gouv.fr/levaluation-environnementale

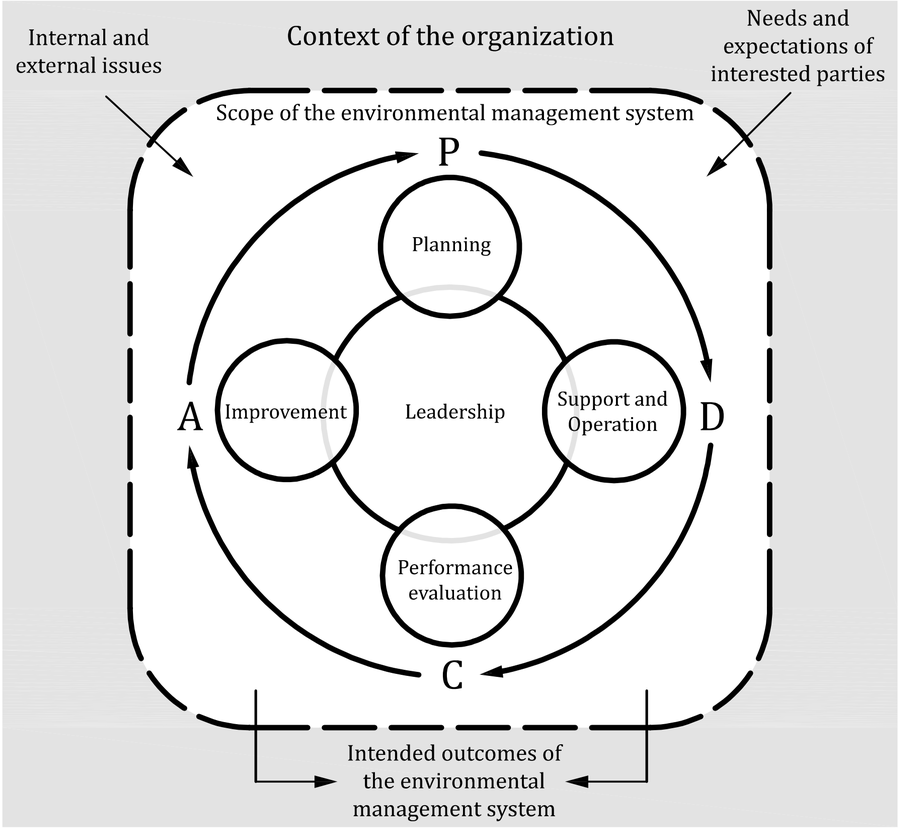
Definition of “Project”

- As required by the applicable laws, **the “project” has to be understood in a large sense (**EU directive 2011/92/UE)
- The project comprising the particle accelerators (injectors, booster, collider), the experiments, the technical infrastructures required for the operation and the directly associated civil works is called the “**Research Infrastructure**” (**RI**) project.
- **CERN is the project owner for the RI project.**
- The **RI project is seen as a single project** (fr: “*unique*”) for which one single eco-design activity as environmental evaluation and one single authorisation in each host state (rather than individual design and evaluation projects for single surface sites, isolated elements or subsurface segments).
- For the construction and the proper operation, sub-projects exist for which the project owners remain to be defined.
  - E.g. new roads, enlargement of roads, potential railway accesses, water supplies and reject, electricity supplies, excavation material buffer areas and deposits, temporary plants, regional infrastructure development projects (housing, health, safety, general services, telecommunications, community services using services of the RI, local economic development projects)



NF EN ISO 14001 (Environmental Management)

- Provides a framework to **manage the protection of the environment in balance with socio-economic needs**.
- Defines the need to develop an environmental policy for the project that is expressed by top management (**specify and document the environmental performance objectives**)
- Defines an **iterative work process** (Plan-Do-Check-Act)
- Defines that **environmental aspects are identified and documented** (project elements, normal and abnormal conditions during different lifecycle phases) based on an **input-process-output model for the aspects** and indicates the aspect classes
- Defines to **determine risks and opportunities** of environmental apects
- Defines to **establish a documentation system** for aspects, associated impacts, criteria used to determine significant aspects.
- Defines that **responsibilities, resources and schedule** are analysed, **assigned** and kept up to date.
- Defines the project internal and external **communication requirements**



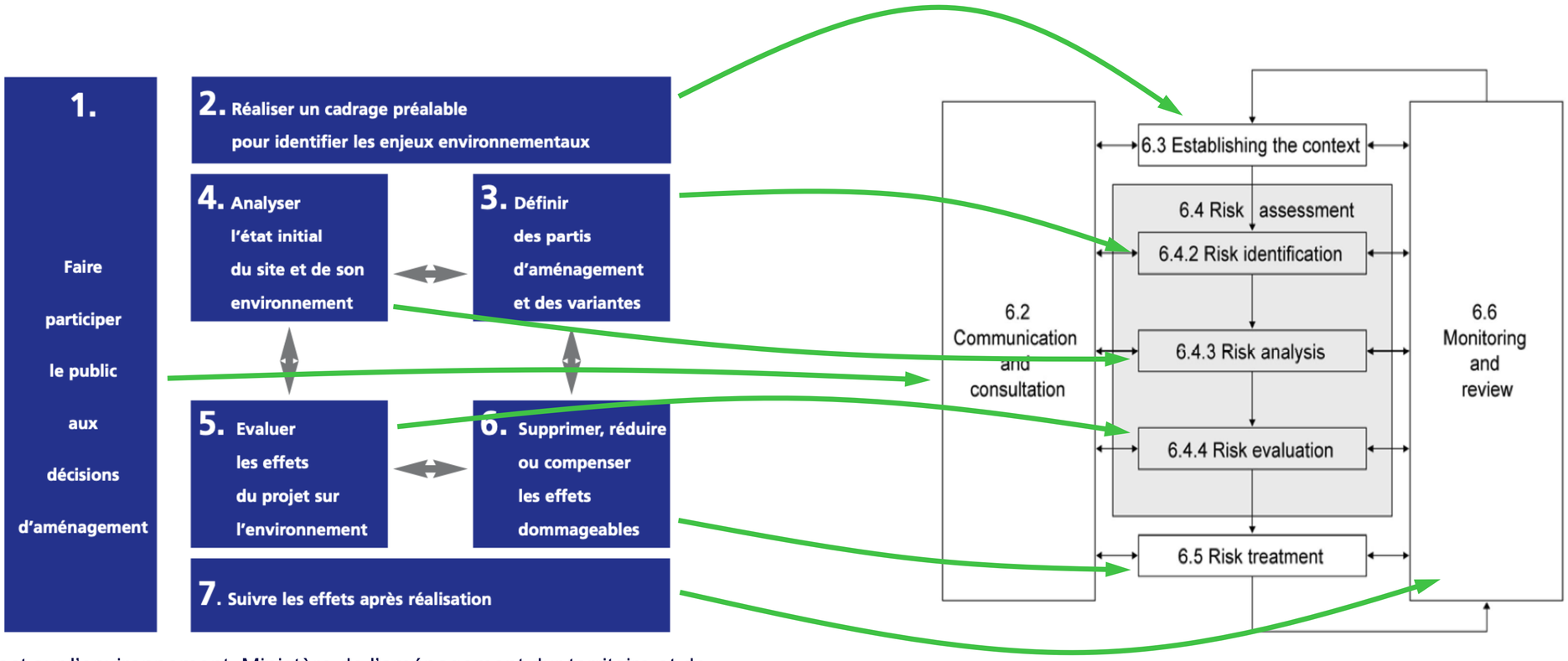
NF EN ISO 14006 (Incorporating ecodesign)

- In addition to EN 14001, defines the **process to include environmental considerations in design and development** (as required by law)
- Aims at keeping adverse environmental impacts low throughout the project's life cycle and balance it with the project goals
- Requires to start with the external and internal constraints and the ability to achieve the desired outcomes (in progress since 2019)
- Requires to identify the interested parties and their possible levels of involvement (stakeholders, in progress)
- Requires to define an **eco-design policy that is expressed by top management** together with a framework for reviewing the objectives (to be done)
- Requires the **definition of a design and development process with control stages** with **identification and documentation of requirements** (functional, performance, regulatory)
- Requires the definition of acceptance criteria
- Foresee innovation and value creation

Example of eco-design: Congress centre Alpbach, Tirol (Austria)

NF EN ISO 31000 (Risk management)

- Defines a process to **work with incomplete knowledge** to create value, help achieving objectives (compliance, environmental protection, project performance, project cost control).
- Is an **integral part of the decision-making** process
- **Leads to transparency and inclusion** of stakeholders



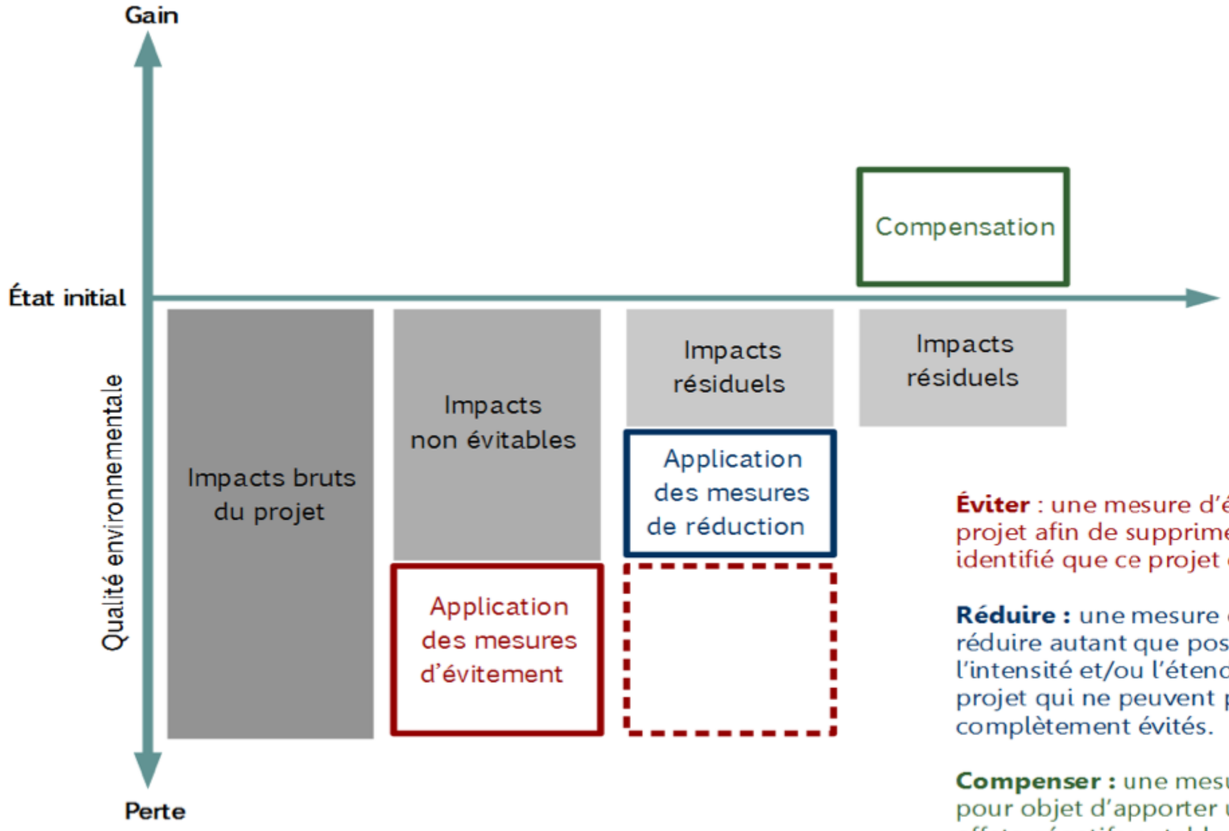
L'étude d'impact sur l'environnement, Ministère de l'aménagement dur territoire et de l'environnement 2001, p. 27, http://temis.documentation.developpement-durable.gouv.fr/document.html?id=Temis-0061372&requestId=0&number=1

EN 31000 p. 8

Methodology Avoid – Reduce - Compensate

The sequence “Éviter, réduire, compenser” (ERC) is anchored in the french law “Code de l’environnement” L.110-1/2:

*“Le principe d'action préventive et de correction, par priorité à la source, des atteintes à l'environnement, en utilisant les meilleures techniques disponibles à un coût économiquement acceptable. Ce principe implique d'**éviter les atteintes** à la biodiversité et aux services qu'elle fournit ; **à défaut, d'en réduire la portée** ; **enfin, en dernier lieu, de compenser les atteintes** qui n'ont pu être évitées ni réduites, en tenant compte des espèces, des habitats naturels et des fonctions écologiques affectées ;*
Ce principe doit viser un objectif d'absence de perte nette de biodiversité, voire tendre vers un gain de biodiversité ;”



Éviter : une mesure d’évitement modifie un projet afin de supprimer un impact négatif identifié que ce projet engendrait.

Réduire : une mesure de réduction vise à réduire autant que possible la durée, l’intensité et/ou l’étendue des impacts d’un projet qui ne peuvent pas être complètement évités.

Compenser : une mesure compensatoire a pour objet d’apporter une contrepartie aux effets négatifs notables, directs ou indirects du projet qui n’ont pu être évités ou suffisamment réduits.

Further information:
https://www.ecologie.gouv.fr/eviter-reduire-et-compenser-impacts-sur-lenvironnement

Step 1: Definition of territorial constraints

Intolérable	Intorelable	Contrainte forte Strong constraint	Périmètre de protection de monuments historiques — Perimeter protection of historical monuments
			Sites de compensations au titre des demandes de dérogation à la destruction des esp… espaces identifiés et … le cadre des mesures
			Sites abritant des esp…
			Zonages liés aux Plan…
			Habitats d'espèces pr…
			Zone naturelle d'inté… →ZNIEFF de type 1 — Natural area of ecological interest in fauna and flora → ZNIEFF type 1
			Inventaire Zones humides — Wetland inventory
			Zone d'importance pour la conservation des oiseaux : ZICO — Priority zone for bird preservation: ZICO
			Espace boisé classé (EBC) — Classified wooded area (EBC)
			Corridor écologique à préserver au titre du PLU — Ecological Corridor to be preserved under PLU
			Monuments historiques protégés au Plan local d'urbanisme (PLU) — Protected Historical monuments in the Local Urban Plan (PLU)

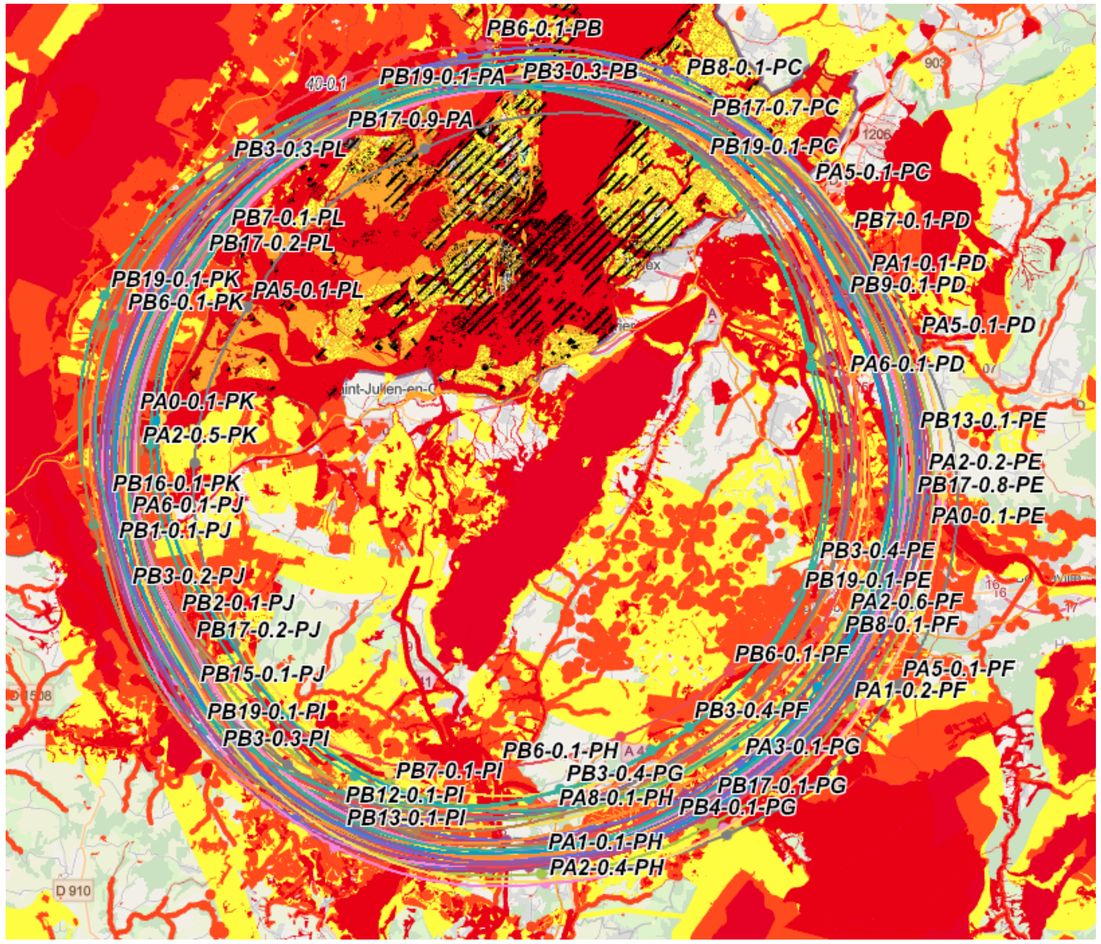
		Contrainte tolérable Tolerable constraint	Zones agricoles ou milieux naturels non protégées — Unprotected agricultural areas or most natural environments
			Forêts non protégées — Unprotected forests
			Corridors écologiques SRCE (Schéma régional de cohérence écologique) — Ecological corridors SRCE (Regional ecological coherence scheme)
			Zone naturelle d'intérêt écologique faunistique et floristique → ZNIEFF de type 2 — Natural area of ecological interest in fauna and flora → ZNIEFF type 2
			Zone Bleu ou blanche d'un plan de prévention de risque naturel — Blue or white zone of a natural risk prevention plan
			Réserve nationale de chasse de faune sauvage (RNCFS) — National Wildlife Hunting Reserve (RNCFS)
			Servitude PT1 : protection des centres de réception radioélectriques contre les perturbations électromagnétiques — Right of way PT1: protection of radio reception centers against electromagnetic interference

Level	Colour	Name	Consequence
4	Red	Intolerable	The constraint level does not permit considering the zone for the placement of a surface site.
3	Orange	Undesirable	It is not recommended to consider the zone for a surface site placement. If decisive for project feasibility, the area can be acceptable with significant mitigation and compensation measures.
2	Yellow	Tolerable	The existing constraints are acceptable for the placement of a site. Adequate mitigation measures must be developed and implemented.
1	Green	Negligible	The existing contraints are minor. The zone can be considered for the placement of a site without further mitigation measures.

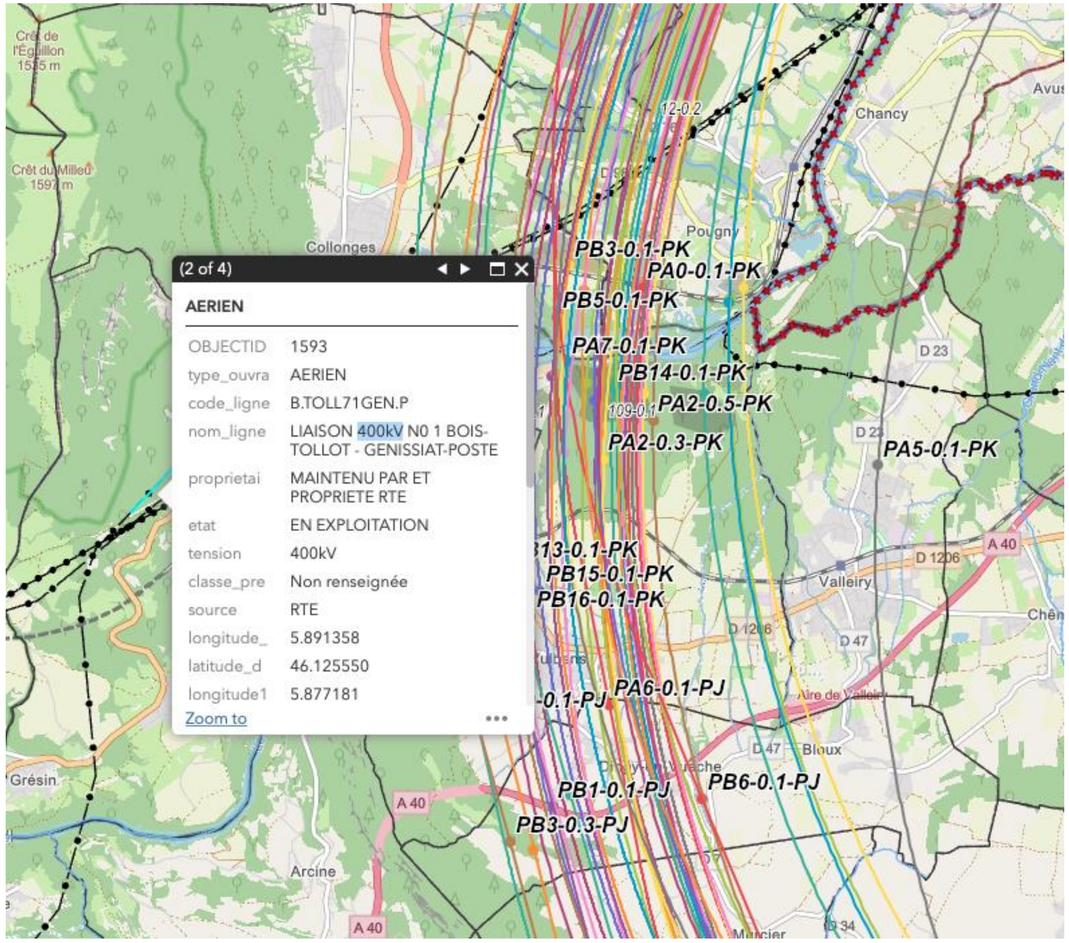
Step 2: Development of placement classes

Identification of acceptable layout and placement classes…

… according to constraints



… and opportunities



Step 3: Multi criteria analysis

Analysis and optimisation of placements with multi-criteria analysis for 12 sites and one criteria list for the overall placement

Land status
Plot availability
Clean and clear title to obtain rights on plot
Plot price
Time for acquisition
Cost of plot development
Connectivity
Distances from transport and infrastructures
Distance from populated areas
Raw materials and services
Availability of raw materials
Proximity to service providers
Infrastructure
Accessibility of electrical power
Communication networks
Water for industrial user
Drinking water
Sewerage disposal and treatment
Temporary storage areas during construction

Physical features
Plot size and shape
Topography
Shaft depth
Drainage conditions
Surface ground conditions
Water resources
Accessibility
Physical subsurface conditions
Regulatory subsurface conditions
Environmental and social factors
Territorial constraints
Fauna and flora
Existing construction constraints
Adjacent surrounding constraints
Nuisances
Workforce availability and accessibility
Local government support
Civil society support

Overall layout
Geometry
Size
Transfer line compatibility
Project cost
Overall scenario cost
Project risk
Overall scenario implementation risk

Step 4: Aspect element identification

Identification of project elements

Location	Domain	Name
PG	Experiment	Data centre
PA	Site	Access road
PA	Site	Land plot
PA	Site	Fence
PA	Site	Access building
PA	Site	Access portal
PA	Site	Staff parking
PA	Site	Bus parking
PA	Site	Visitor parking
PA		ary buildings during construction
PA		
PA		

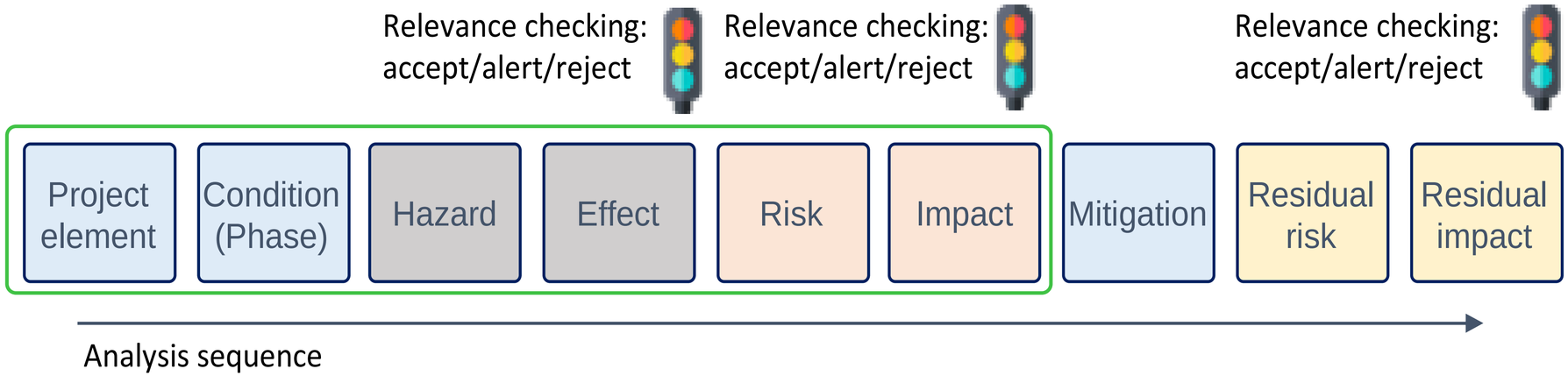
Identification of impact domains

Identifier	Category ID	Category	Name
300	3	Pollution and nuisances	
301	3	Pollution and nuisances	Air quality
302	3	Pollution and nuisances	Water quality
303	3	Pollution and nuisances	Soil quality and usability
304	3	Pollution and nuisances	Climate
305	3	Pollution and nuisances	Nuisances
306	3	Pollution and nuisances	Pollutants
307	3	Pollution and nuisances	Irradiation (ionising)
308	3	Pollution and nuisances	Radioactive waste

Identification of issue sources

418	Mechanical	4	Water ingress
419	Mechanical	4	Conventional matex
420	Mechanical	4	Polluted matex
421	Mechanical	4	Conventional waste
422	Mechanical	4	Polluted waste
500	Physical	5	
501	Physical	5	Electricity
502	Physical	5	Sound
504	Physical	5	Non-ionising radiation
505	Physical	5	Artificial light
507	Physical	5	Ionising radiation
508	Physical	5	Oxygen deficiency
509	Physical	5	Temperature

Step 5: Identification of environmental aspect chains



Example (only for illustration purposes, not part of the project)

Identifier	Scenario	Location	Element	Phase	Hazard	Effect	Impact category	Specific impact	Severity	Likelihood	Risk
24	PA2-1.0	PG	Data centre	Construction	Equipment traffic	Evening of surface requires wetlands to be dried.	Natural environments	Loss of fauna in existing wetland:1 population of frogs and fish.	3	5	4
25	PA2-1.0	PA	Visitor parking	Construction	Surface construction	The parking removes valuable land		There is a loss of agricultural income	4	5	4

Step 6: Analysis of acceptability

Hierarchy of environmental aspect chains

- Chains appear in an “environmental risk matrix” according to their estimated ocurrence and severity to the best current obtainable knowledge.
- Risk levels determine if identified environmental aspects can be considered acceptable without further actions, needs to be acknowledged or mitigated.

Colour	Definition
Red	The overall risk is not acceptable for the project owner. Risk mitigation is primarily avoidance. Compensation is not acceptable.
Orange	The risk should not be accepted by the project owner. Risk mitigation measures must be developed and implemented. Compensation measures are acceptable.
Yellow	The risk is elevated, but acceptable for the project owner. Accompanying measures to protect the project owner against risk occurrence must be developed and proposed. Compensation measures are acceptable.
Green	The risk is acceptable for the project owner. No further mitigation and protection measures need to be taken.

		Severity of Effects				
		Insignificant	**Small**	**Medium**	**Severe**	**Catastrophic**
Likelihood of Occurrance	**Frequent**	Undesirable	Undesirable	Intolerable	Intolerable	Intolerable
	Probable	Tolerable	Undesirable	Intolerable	Intolerable	Intolerable
	Occasional	Negligible	Tolerable	Undesirable	Intolerable	Intolerable
	Remote	Negligible	Negligible	Tolerable	Undesirable	Undesirable
	Improbable	Negligible	Negligible	Negligible	Tolerable	Undesirable

Step 7: Act and Iterate with domain experts

- **Develop avoidance measures**
  - Example geographical: plan water intake locations
  - Example time: develop schedule for works
- **Develop reduction measures**
  - Example geographical: move equipment underground
  - Example technical: reduce cooling water consumption
- **Develop compensation measures (yellow and orange)**
  - Example re-create: create forest at a different location
  - Example re-store: create ecological corridor
  - Example management: supply waste heat
  - Example management: create products from excavation materials

- **Study the feasibility**
- **Quantify the required resources**
- **Select the applicable measures**

- Re-analyse the environmental chains and **identify the residual risks**.
- **Repeat the process until the residual risks are acceptable** in agreement with the public authorities and the affected population/key stakeholders

		Risques initiales						Risques après atténuation				
		Probabilité d'occurrence						Probabilité d'occurrence				
		1	2	3	4	5		1	2	3	4	5
Gravié	5	0	1	1	1	1	5	0	4	0	0	0
	4	0	1	1	1	1	4	2	2	0	0	0
	3	0	0	1	1	1	3	0	0	0	0	0
	2	1	1	0	1	1	2	1	1	1	0	1
	1	0	1	0	0	0	1	0	1	0	1	0

Atténuation des risques non acceptables (en rouge) avec planification des mésures de mitigation. Documentation des risques initiaux et résiduels.