MINnD Project

UC6 « Infrastructure and Environment »

Barcelona meeting 02/06/2016

Denis LE ROUX

OVERVIEW

1. Setec
2. MINnD Project
3. UC6 – « Infrastructures and environment »
4. Software
5. Data organisation

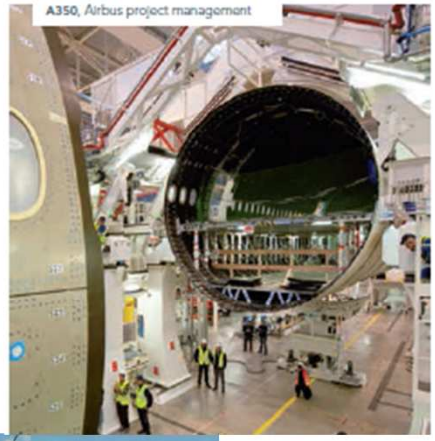
1. setec

1.1. About

An independent global engineering leader

GRANDE RAVINE BRIDGE, La Réunion (Indian Ocean). Architect Alain Spielmann

WATER MANAGEMENT, hydroelectric engineering in the valley of Ossau



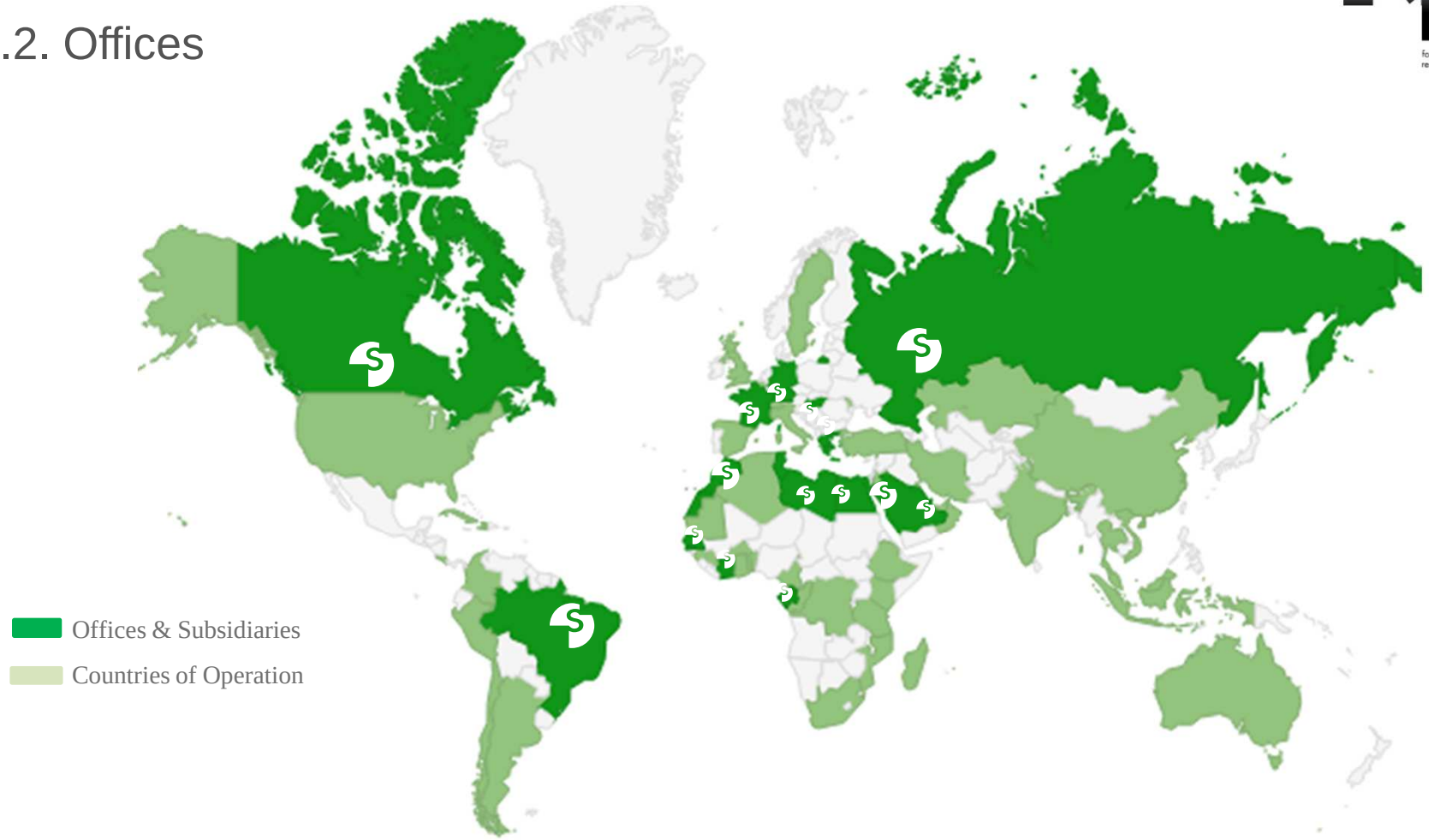
A350, Airbus project management

TRIBUNAL DE GRANDE INSTANCE Paris, design Renzo Piano

THE TUNIS LIGHT RAIL Line 1

1. setec

1.2. Offices



America	Europe		Africa		Middle East	Asia
Brazil	France	Monaco	Egypt	Morocco	Qatar	Macau
Canada	Germany	Russia	Ivory Coast	Senegal	Saudi Arabia	
	Greece		Gabon	Tunisia		
	Hungary		Libya			

1. setec

1.3. BIM Infra

Contournement Ouest de Strasbourg – TRC de Vendenheim

1. setec

1.3. BIM

Strasbourg western bypass – RN4 interchange

1. setec

1.3. BIM

A36 – Sevenans interchange

1. setec

1.3. General range of services

- Upstream Studies

  (technical, economic, environmental…)
- Consulting Services, Expertise
- Design and Site Supervision
- Technical Assistance to the Owner
- Owner’s Representative
- Project Management
- Maintenance - Operations

Transport and Infrastructure

Building and Urban Planning

Energy and Industries

Sustainable Development

Modélisation des INformations INteropérables pour les INfrastructures Durables

Interoperable Information Model for Sustainable Infrastructures

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Ministère
de l'Écologie,
du Développement
durable
et de l'Énergie

2. MINnD Project

2.1. Project partners

Interoperable Information Model for Sustainable Infrastructures

National research project, www.minnd.fr

✓ 55 Partners already involved in MINnD

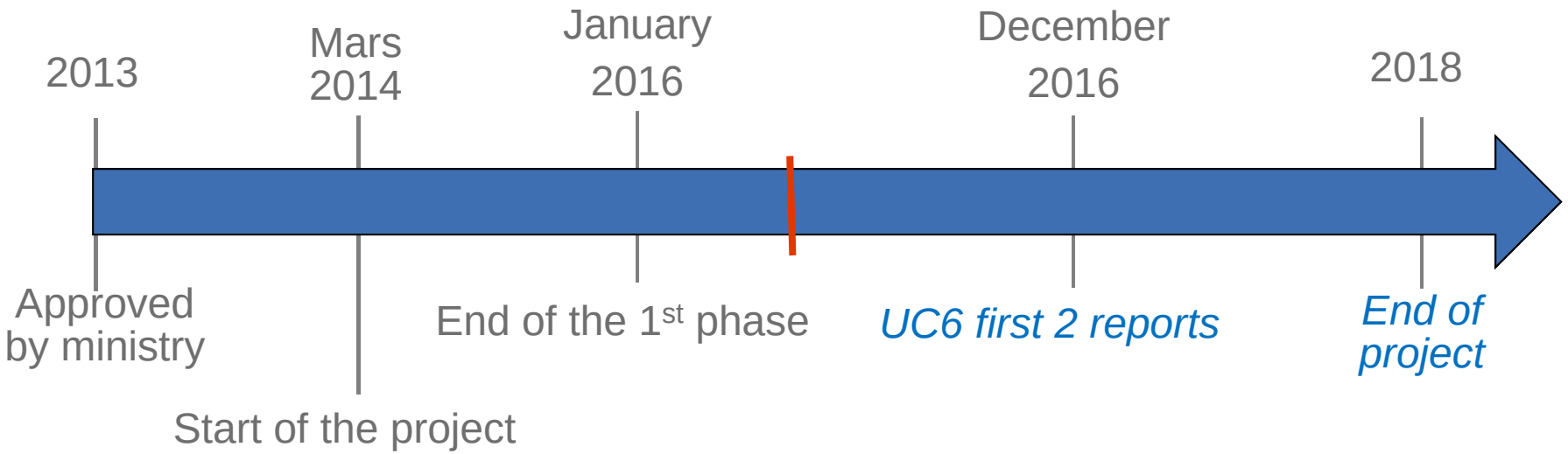
PROFESSIONALS

- State
- Administration
- Architects
- Universities
- Contractors
- Design offices
- Labs
- Operators
- Manufacturers
- Engineers
- Consultants
- Training organizations
- Software editors

2. MINnD Project

2.2. Presentation

- 4 M€ Project
- 4 Years (2014 – 2018)

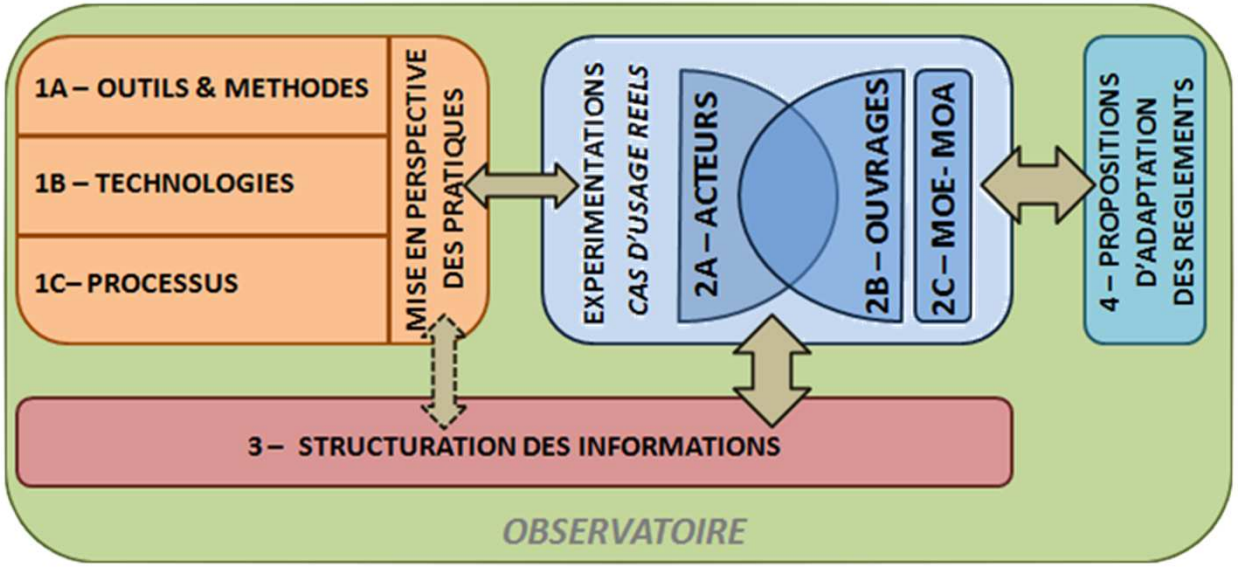


2. MINnD Project

2.3. Research themes

5 Themes:

Th0	Monitoring
Th1	Usages
Th2	Experiments
Th3	Data structuring
Th4	Legal aspects

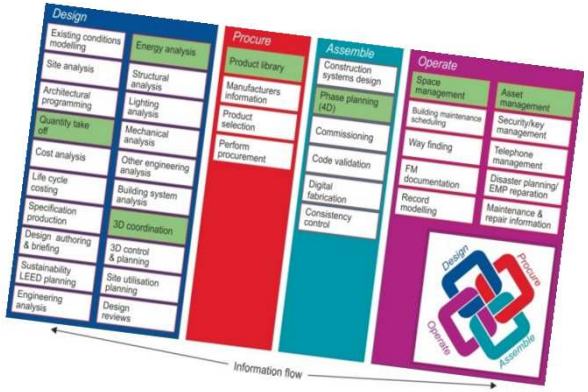


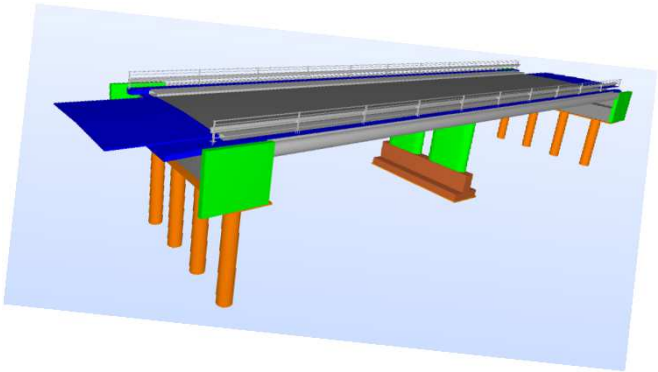
2. MINnD Project

2.3. Uses cases

6 USE CASES :

- UC1 – Standardized use case applied to infrastructure projects
- UC2 – Roads life cycle
- UC3 – IFC Bridge
- UC4 – Project review
- UC5 – Cost containment through modeling
- UC6 – Infrastructures and Environment





3. UC6 – Infrastructure and Environment

3.1. Phase 1

Professionals involved in this MINnD Use case :

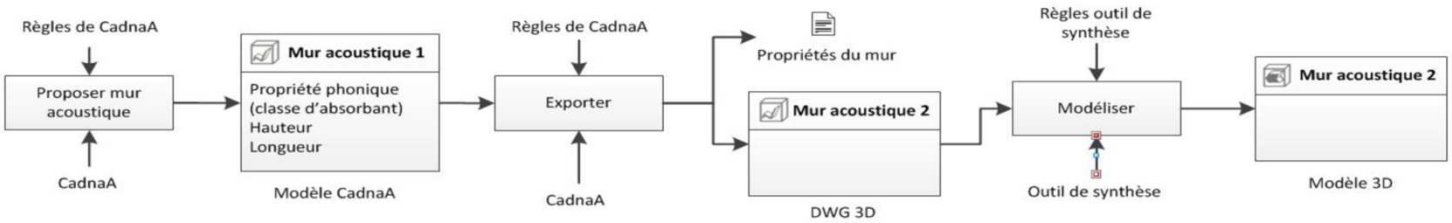
Company	Field	People
VINCI AUTOROUTES	Motorway concession company	Sylvain GUILLOTEAU
IFSTTAR	Research organism	Denis FRANÇOIS Anne RUAS
setec	Design office	Yann LEGALLIC
egis	Design office	Charles-Edouard TOLMER
Terr Oïko	Engineering company for ecological research	Catherine DE ROINCE

3. UC6 – Infrastructure and Environment

3.1. Phase 1 – 2 case studies

UC 6-1 : Infrastructures and noise

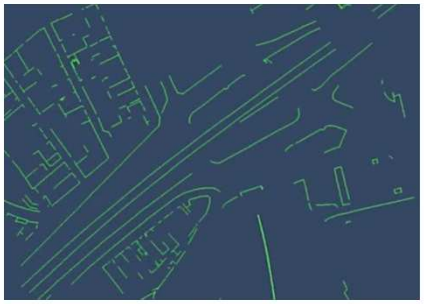
Workflow

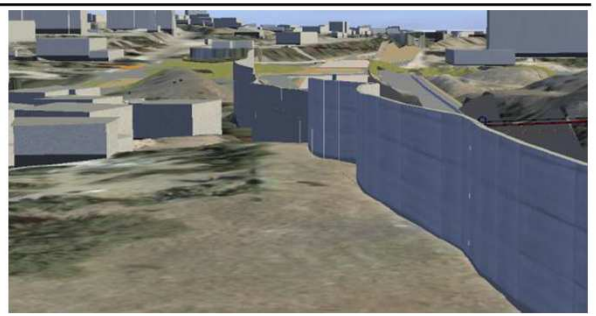


Stapes

Etape	Acteur	Action	Commentaire
1	BE acoustique	Proposer mur acoustique	
2	BE acoustique	Exporte	L'export des propriétés des murs n'est pas automatique
3	Equipe MN	Exporte	L'export des propriétés des murs n'est pas automatique ; export ensuite réutilisé par le BE géométrie

Object modelisation

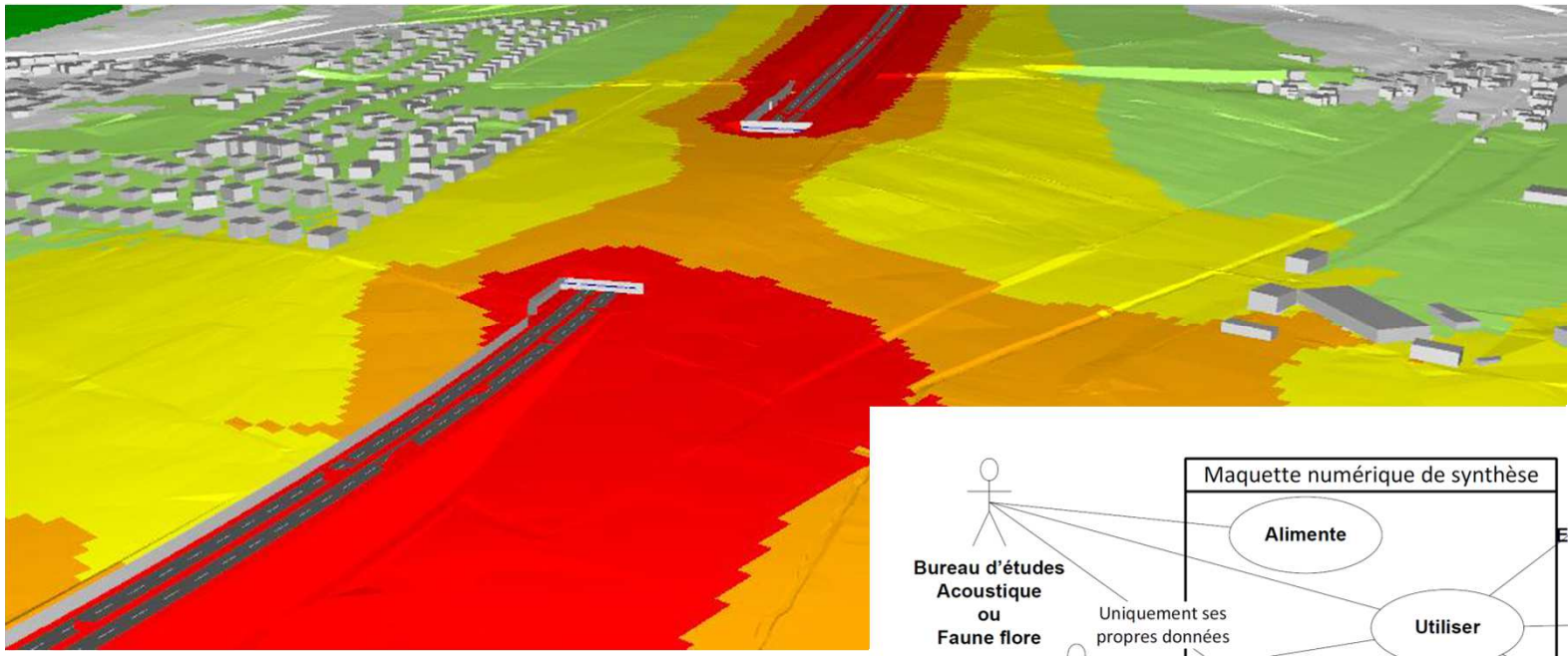


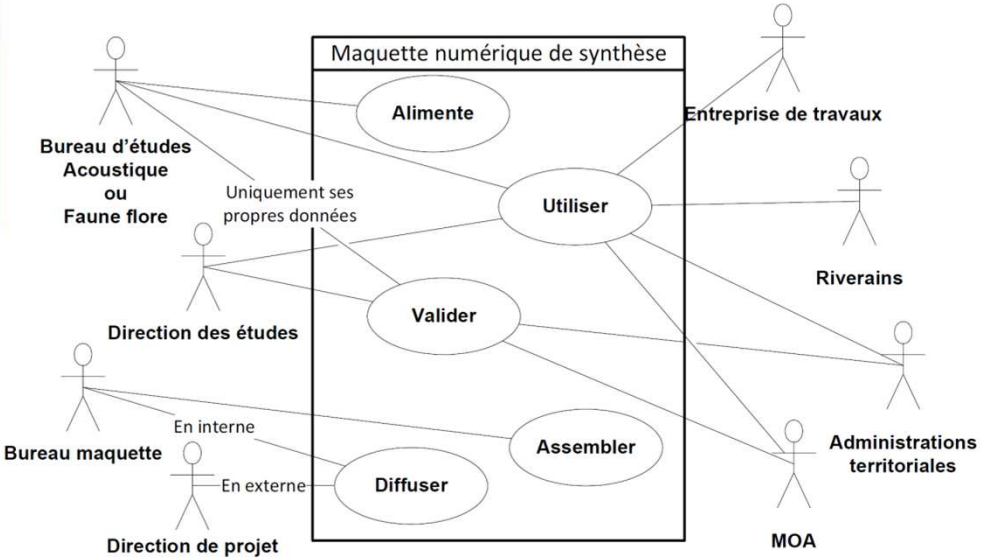


3. UC6 – Infrastructure and Environment

3.1. Phase 1 – 2 case studies

UC 6-1 : Infrastructures and noise



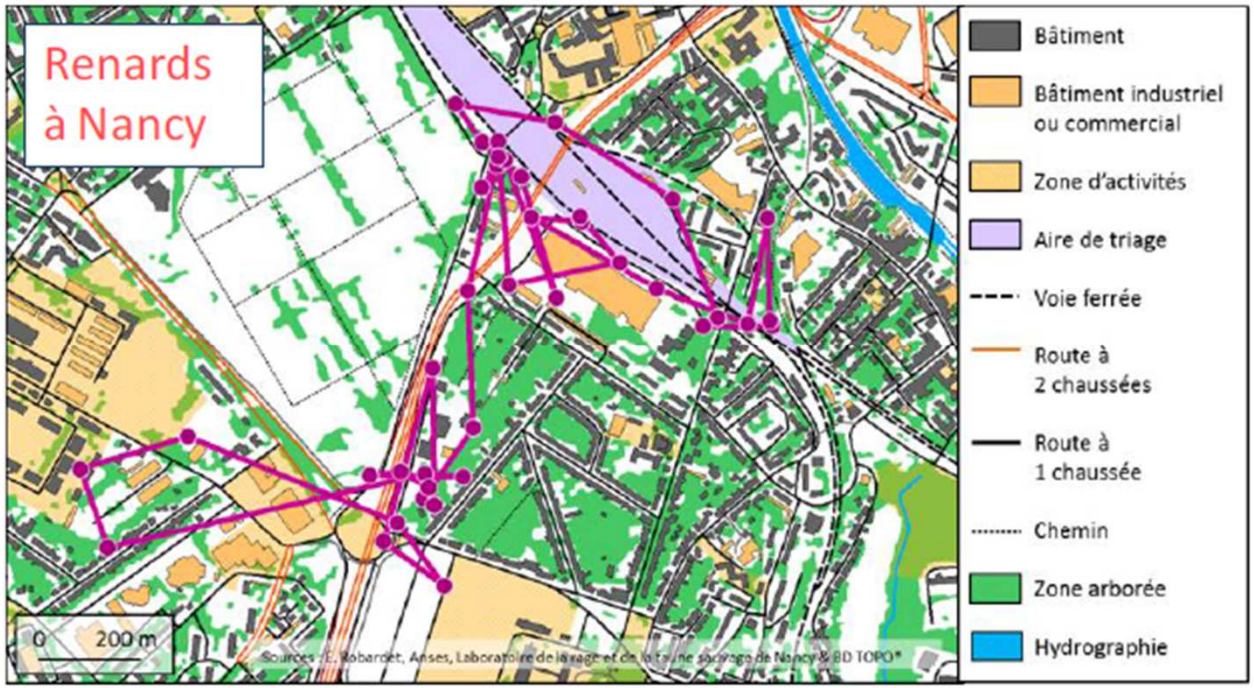


Source : UC6-1 MINnD (EGIS)

3. UC6 – Infrastructure and Environment

3.1. Phase 1 – 2 case studies

UC 6-2 : Infrastructures and environment transparency



Fox GPS tracking over 12 hours. © Jolivet 2014

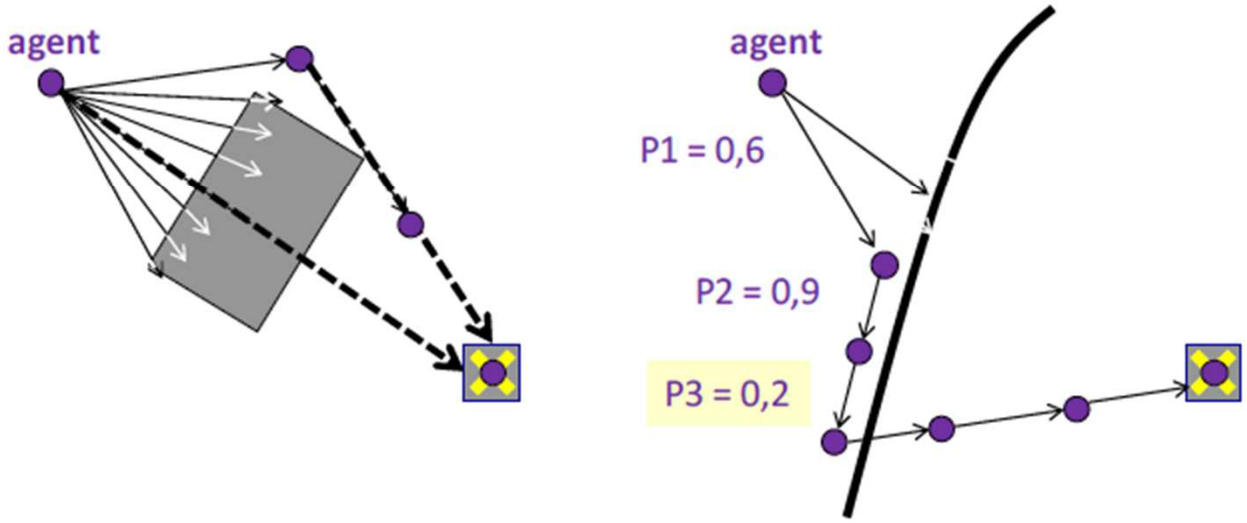
3. UC6 – Infrastructure and Environment

3.1. Phase 1 – 2 case studies

UC 6-2 : Infrastructures and environment transparency

Walking around an obstacle
→ Probability = 0

Walking through an obstacle
→ Probability = 0.3



Methods to reach an target. © Jolivet 2014

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

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Company	Department	People
VINCI AUTOROUTES	Infrastructures	Sylvain GUILLOTEAU
IFSTTAR	Research	Denis FRANÇOIS Anne RUAS
setec	Project manager, design office	Denis LE ROUX Yann LEGALLIC Marc CHASSANDE Justine VASSART
egis	Project manager, design office	Stéphane PRADON Charles-Edouard TOLMER Amos HOUEWATONOU
Terr Oïko	Engineering company for ecological research	Catherine DE ROINCE Sylvain MOULHERAT

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

2 Sites

Source : Google Map

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

2 Sites

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

UC 6-2 : Infrastructures and environment transparency

Goals

- Model how attractive is an environmental measure
- Model the environment (site)
- → Use the model to decide where to locate the environmental measure

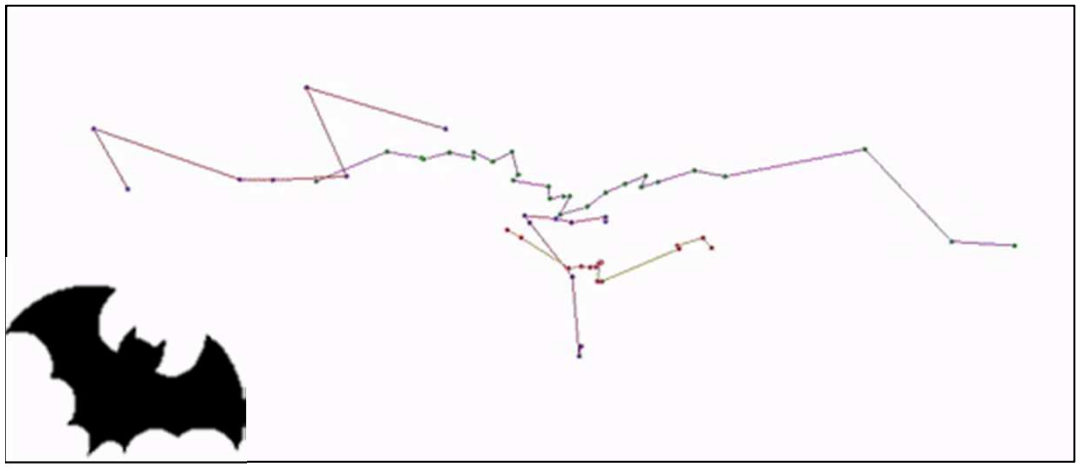
3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

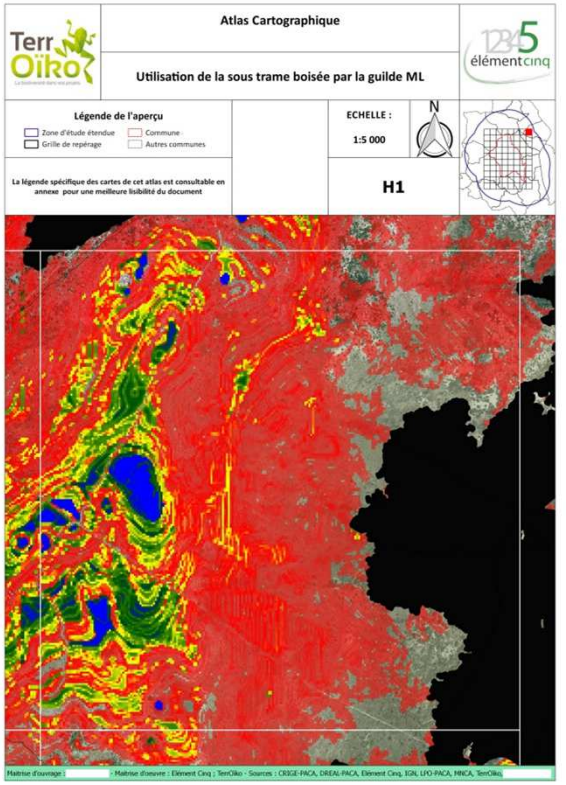
UC 6-2 : Infrastructures and environment transparency

Goals

- **3D method** :
- Using animal's 3D path models
- Using site's 3D models



Bats 3D path models

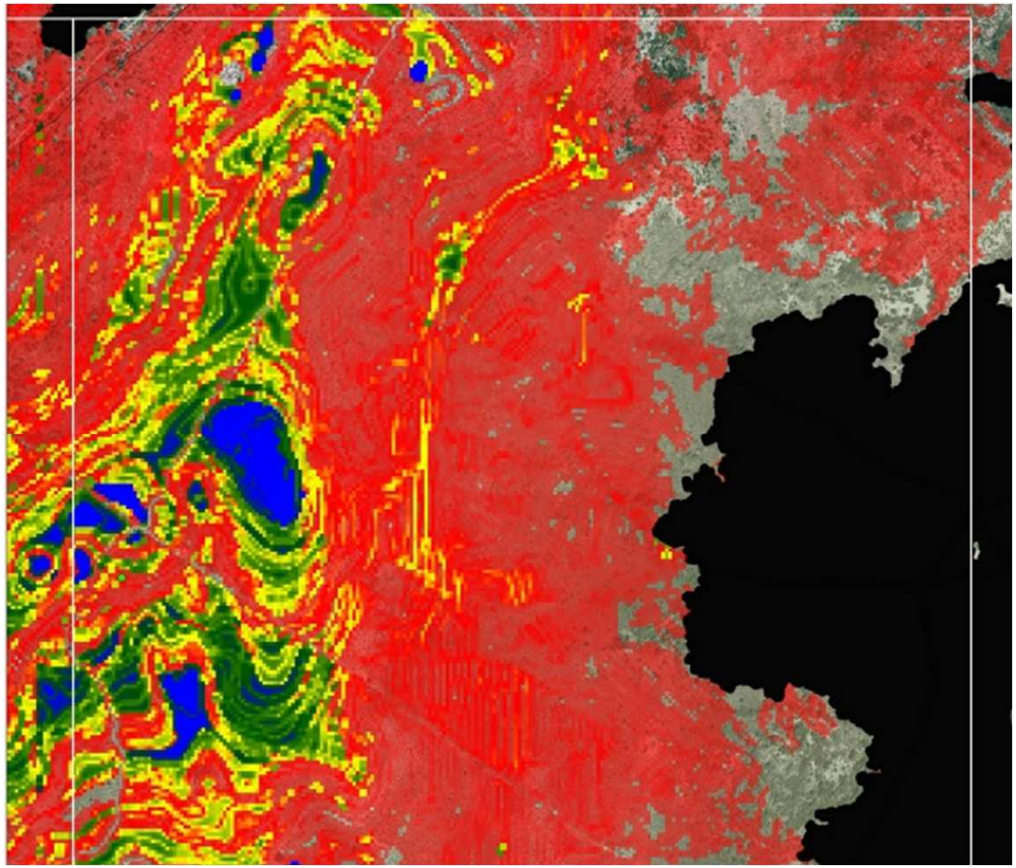


Animals path model map

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

UC 6-2 : Infrastructures and environment transparency



- One travel every 50 years
- One travel every 25 years
- One travel every 10 years
- One travel every year

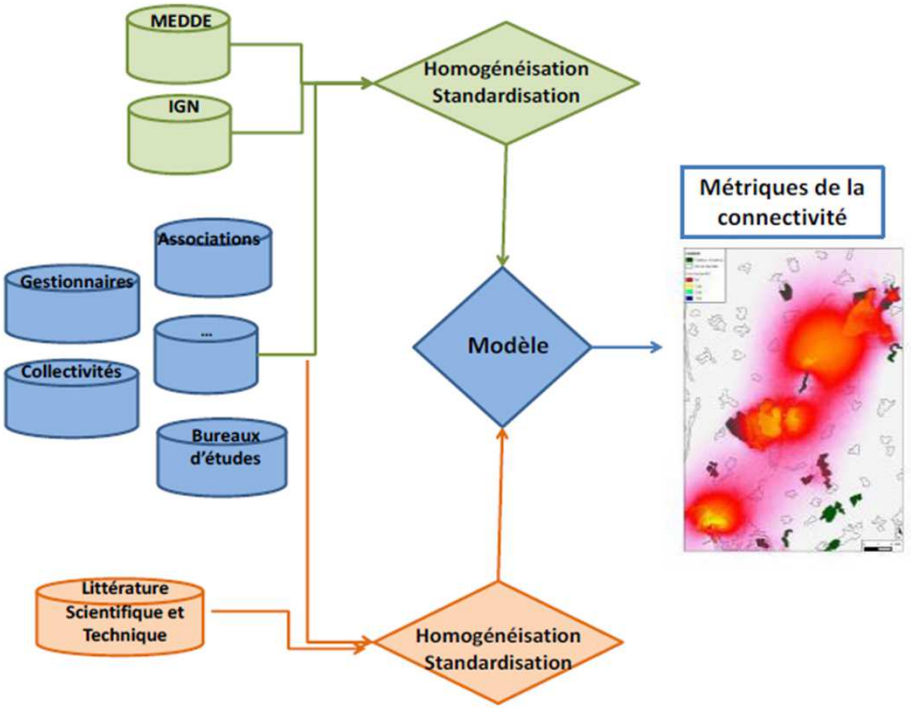
3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

UC 6-2 : Infrastructures and environment transparency

Goals

- **From models** (GIS + 3D)
- **From onsite investigations**
- ➔ identify possible location for an environmental measure
- Track reasons for decisions
- Identify documents and procedures dataflow



3. UC6 – Infrastructure and Environment

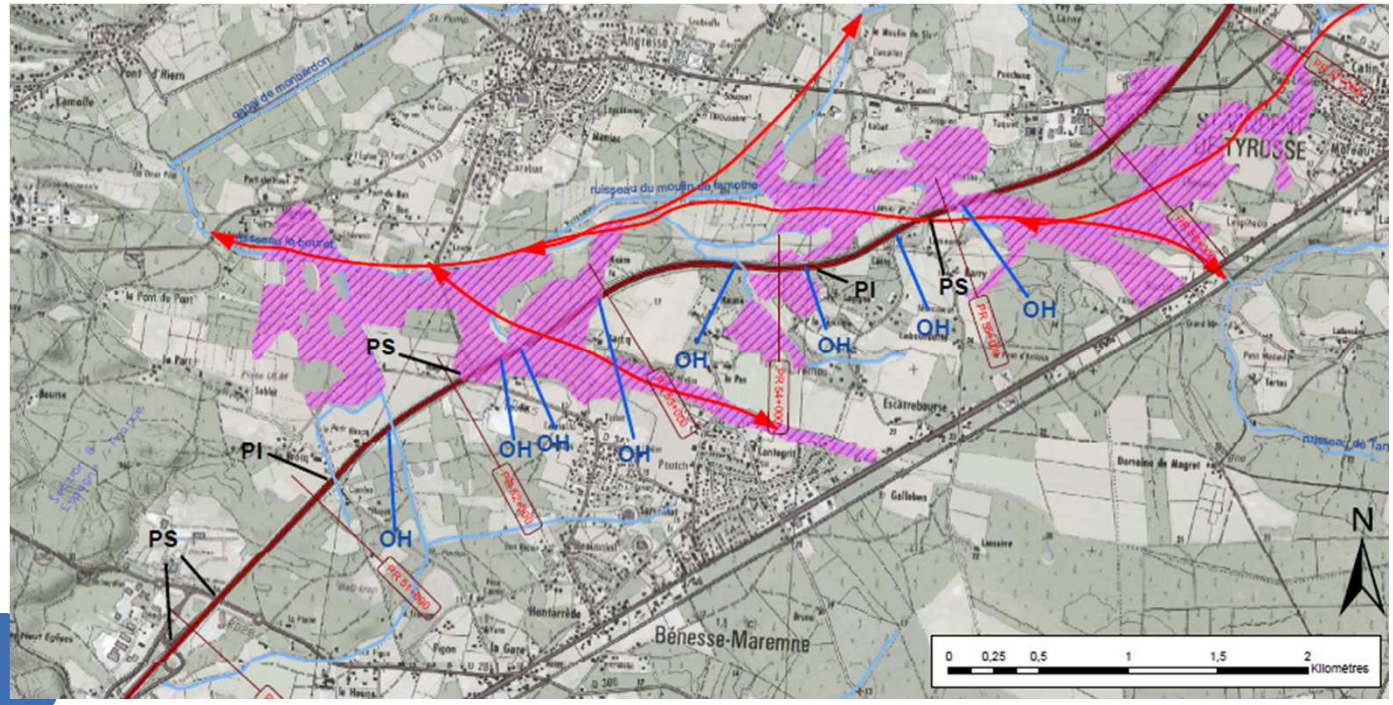
3.2. Phase 2 - detailed studies

UC 6-2 : Infrastructures and environment transparency

Usual method

to choose the location of environmental measures

→ **2D method** : using GIS technology



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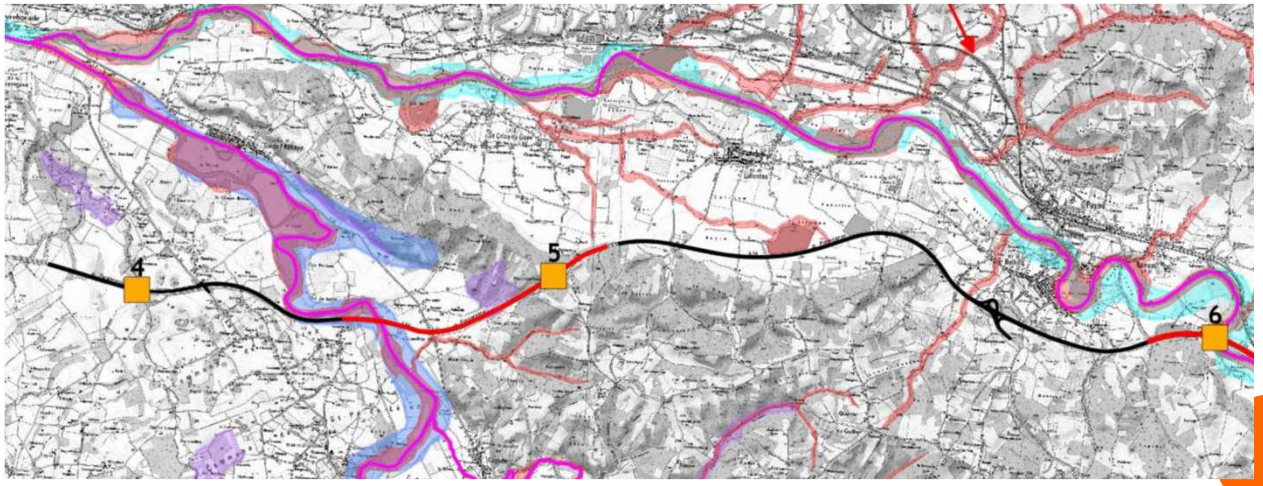
3.2. Phase 2 - detailed studies

UC 6-2 : Infrastructures and environment transparency

Usual method

The location of environmental measures is defined according to :

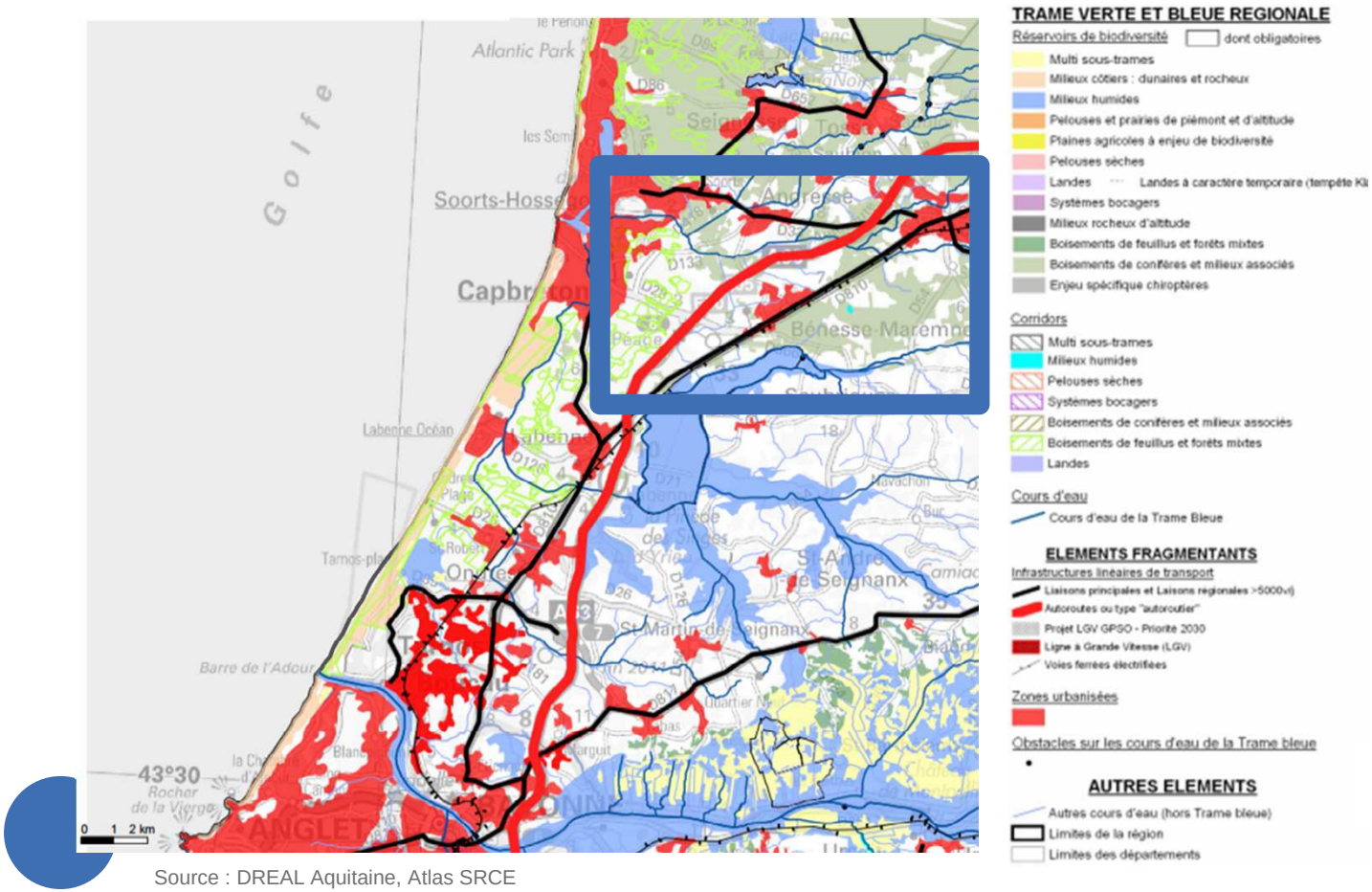
1. available fields = main argument (in those use cases)
2. environmental studies
3. suitable topography for the infrastructure
4. identified animals usual patterns / behaviours



3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

A63 Motorway – Natural environment issues

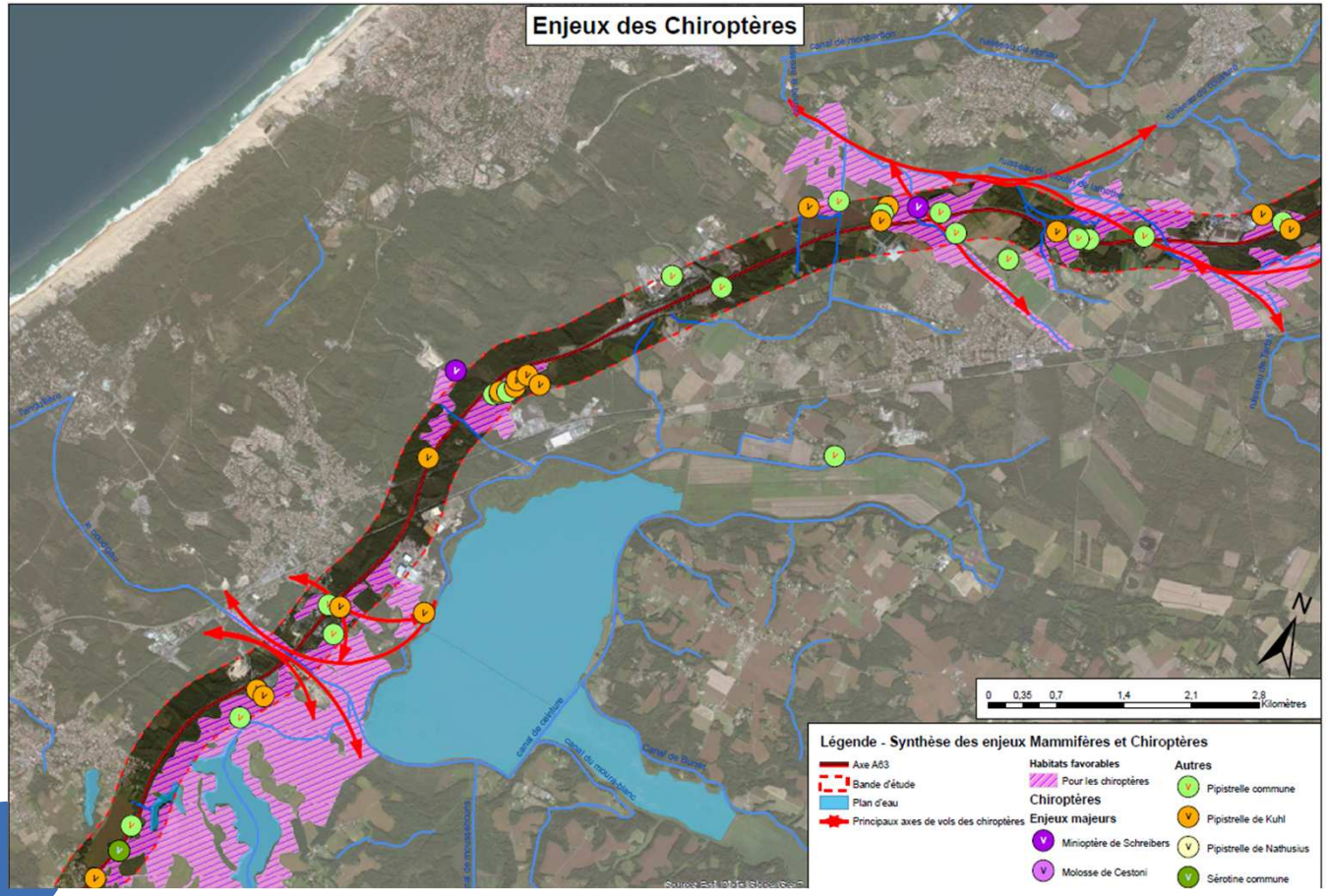


Source : DREAL Aquitaine, Atlas SRCE

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

A63 Motorway – Natural environment issues



Source : dossier CNPN de l'A63, Setec – 02/2015

Miniopterus schreibersi

Pipistrellus pipistrellus

Pipistrellus kuhlii

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

A64 Motorway – Natural environment issues

Source : Google streetview

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

A63 Motorway – Available data

Available data				
Content	**Format**	**Description**	**Provider**	**Producer**
Topography	Dwg	Elevation model, topography	Vinci	
DTM	Grid ASCII	Elevation model	IFFSTAR	IGN
Areal photography	Jpeg	Orthophotos	Setec	IGN
Map	Shapefile	Environmental datas	Setec	IGN
Map	Tiff	SCAN25, 1:25000	Setec	IGN
Natural environnement	Shapefile	Vectorial database: environmental data	Setec	Inventary from impact study

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

A63 Motorway – Available data

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

A64 Motorway – Available data

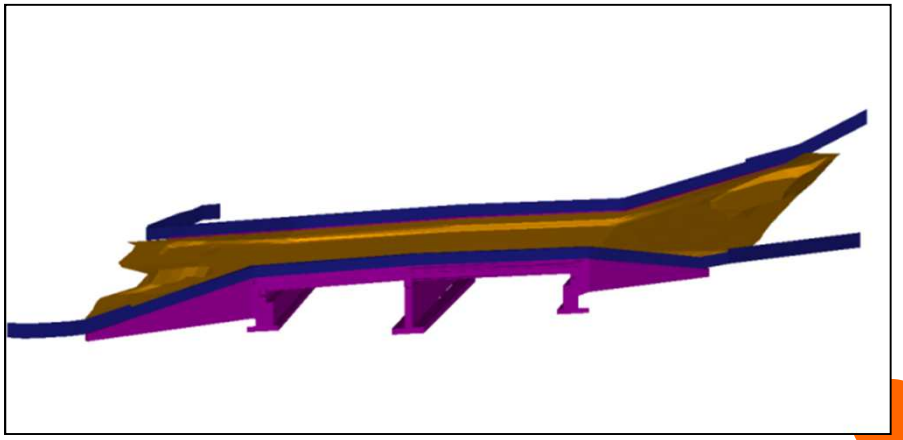
Available data			
Content	**Format**	**Description**	**Provider**
Animal crossing	Citygml	3D model of the bridge	Vinci
Animal crossing	Dwg	Phasing plans	Vinci
Topography	Dwg	Elevations, topography	Vinci
DTM	Grid ASCII	Elevations	IFFSTAR (IGN)

3. UC6 – Infrastructure and Environment

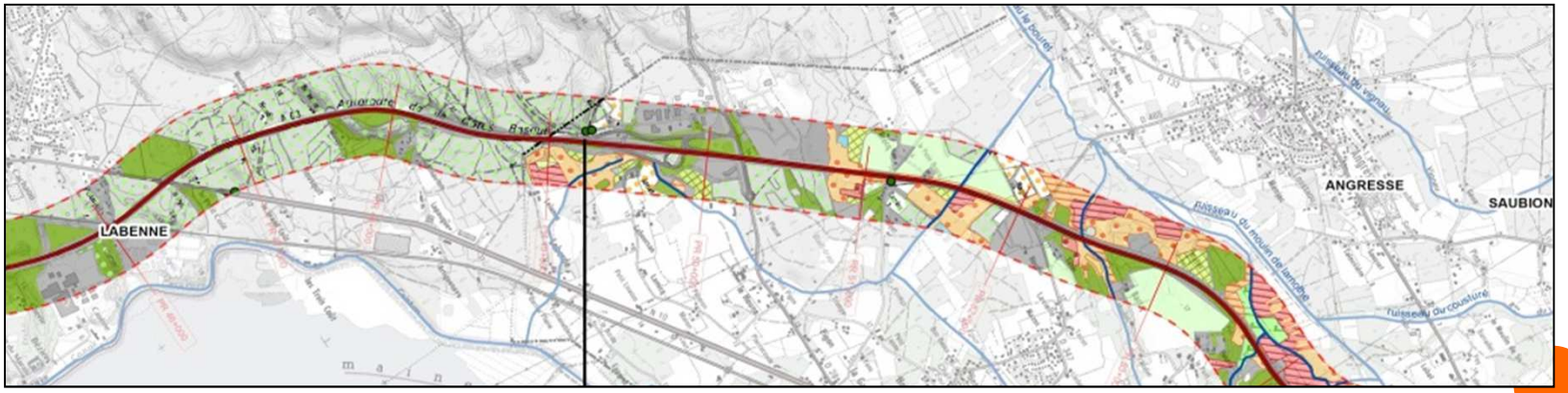
3.2. Phase 2 - detailed studies

A64 Motorway – Available data

Shapefiles	
From IGN	**From Setec**
Buildings	Wildlife inventory
Roads	Wildlife natural environment issues
Hydrography	Protected areas
Vegetation	List of the protected flora and fauna



Animal crossing



GIS data

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

Modeling - The Good, the Bad and the Ugly

- **Three scenarios for fences**

1. Usual environmental measures project (what have been applied)
2. A very cheap project
3. A project defined as the most efficient

- **Test the efficiency of models**

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

Modeling - The Good, the Bad and the Ugly

Type of fences

News fences

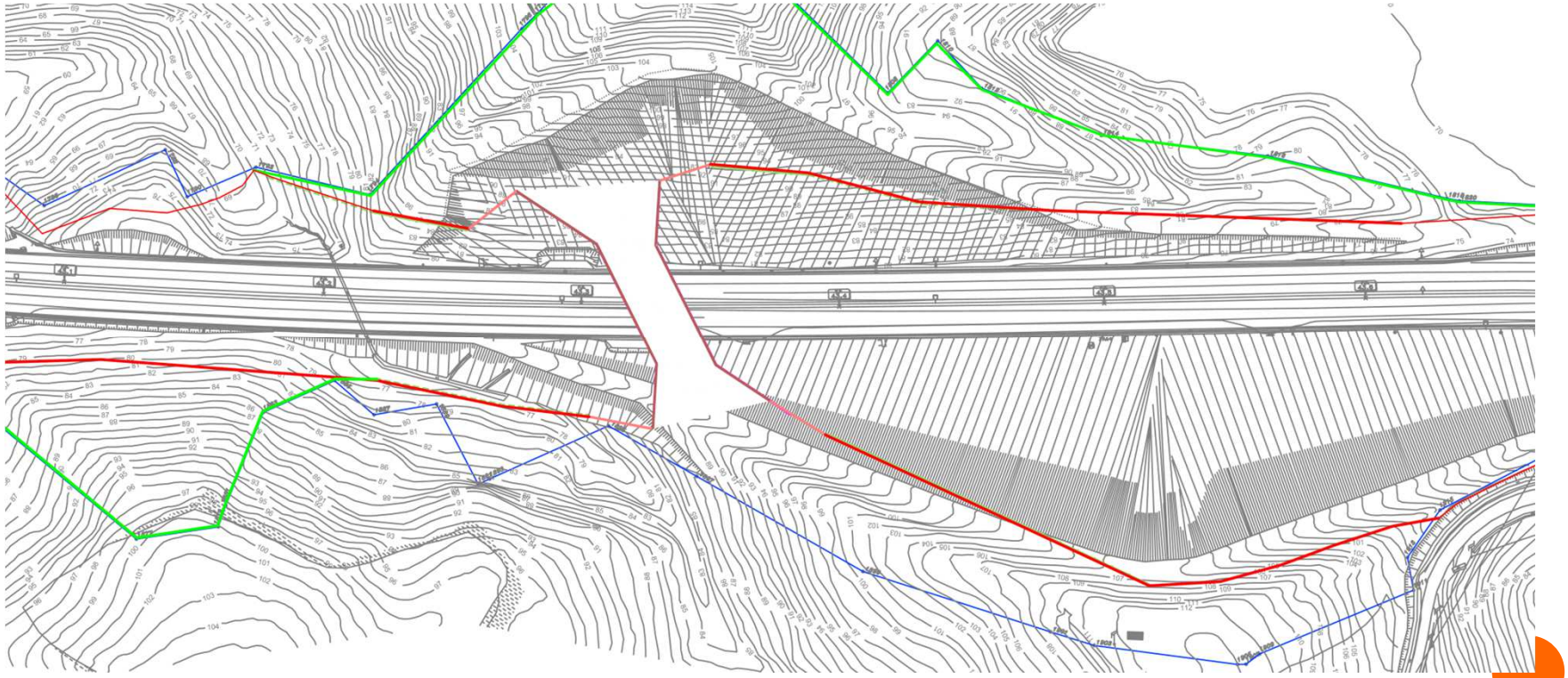
New permeable fences

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

Modeling - The Good, the Bad and the Ugly

Usual project



Limit of available lands

News fences

Existing fences

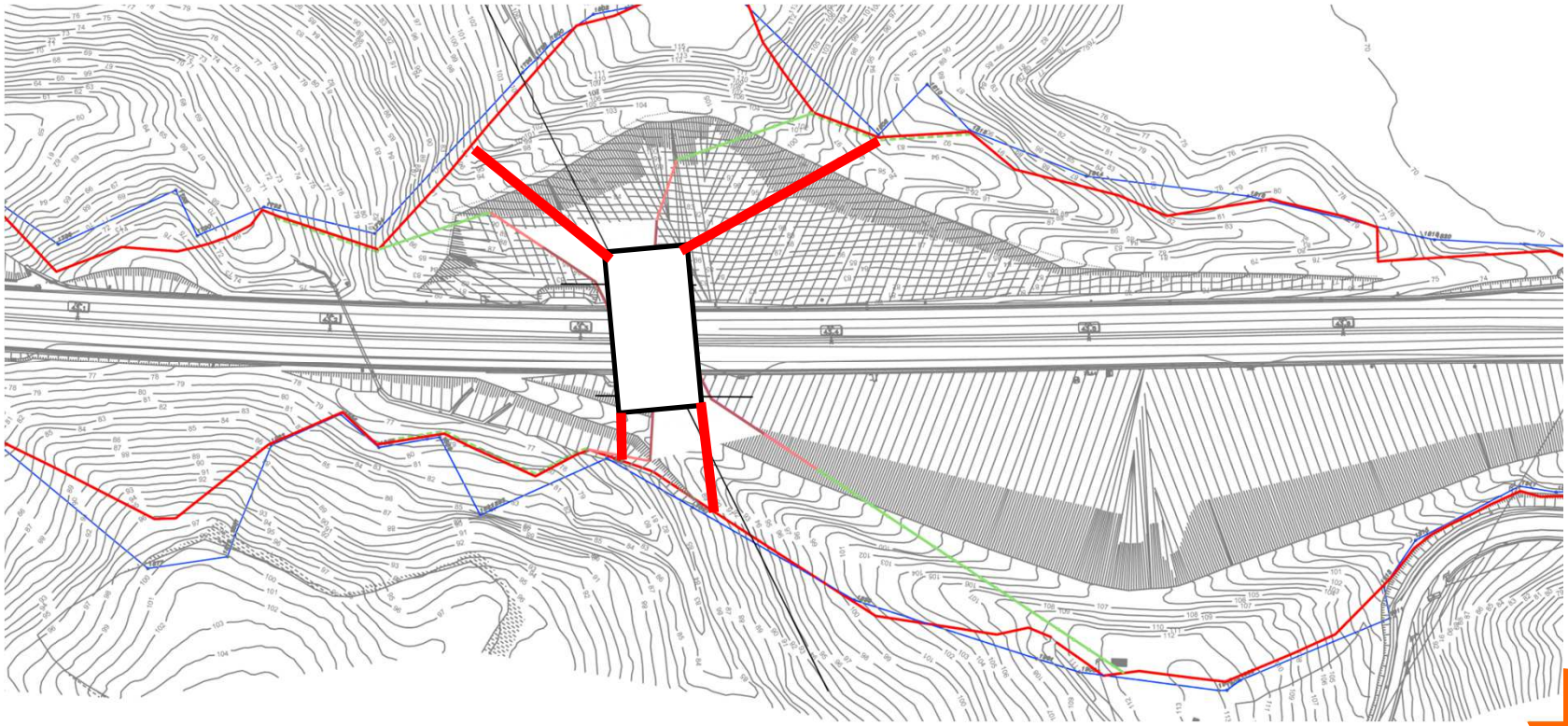
New permeable fences

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

Modeling - The Good, the Bad and the Ugly

Very cheap project



Limit of available lands

News fences

Existing fences

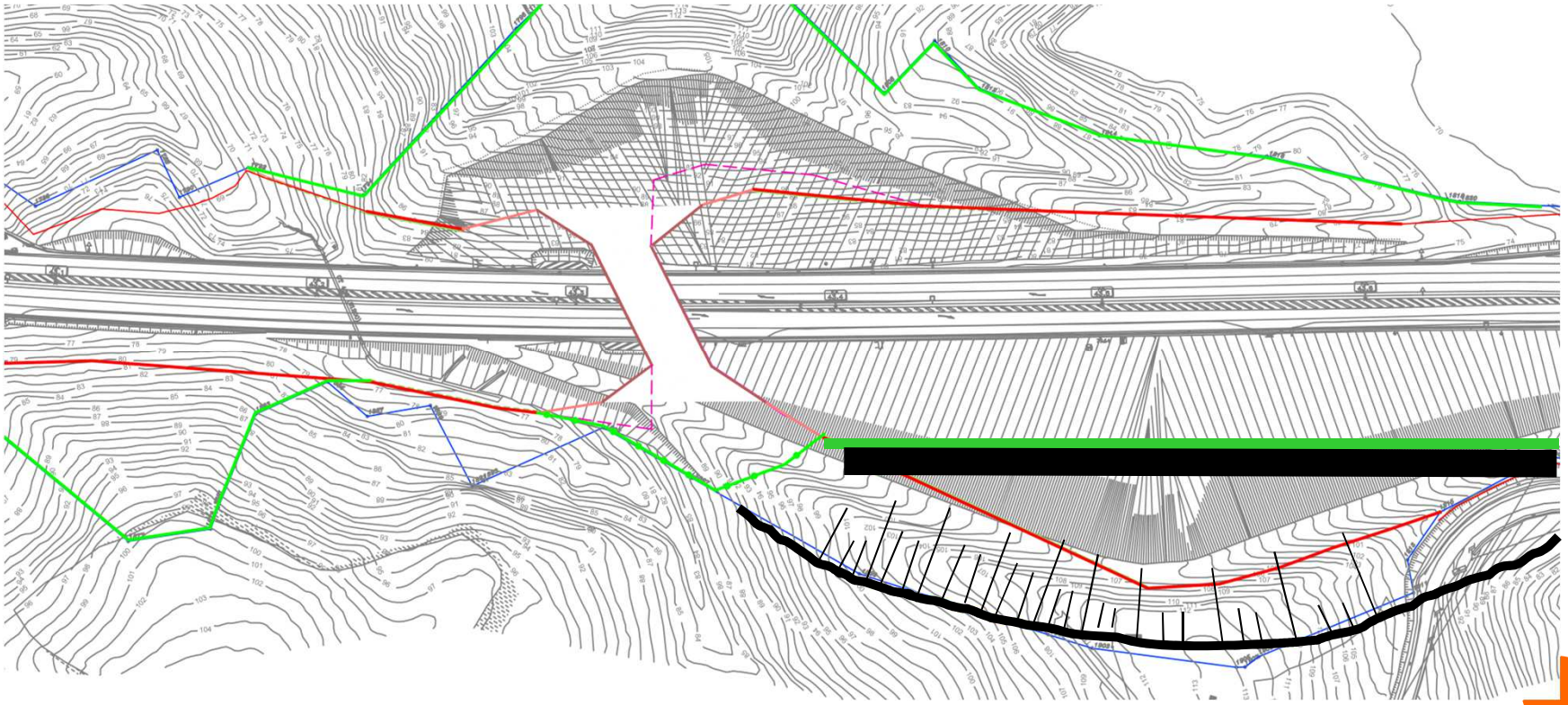
New permeable fences

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

Modeling - The Good, the Bad and the Ugly

Most efficient project



Limit of available lands

News fences

Landscaping

Existing fences

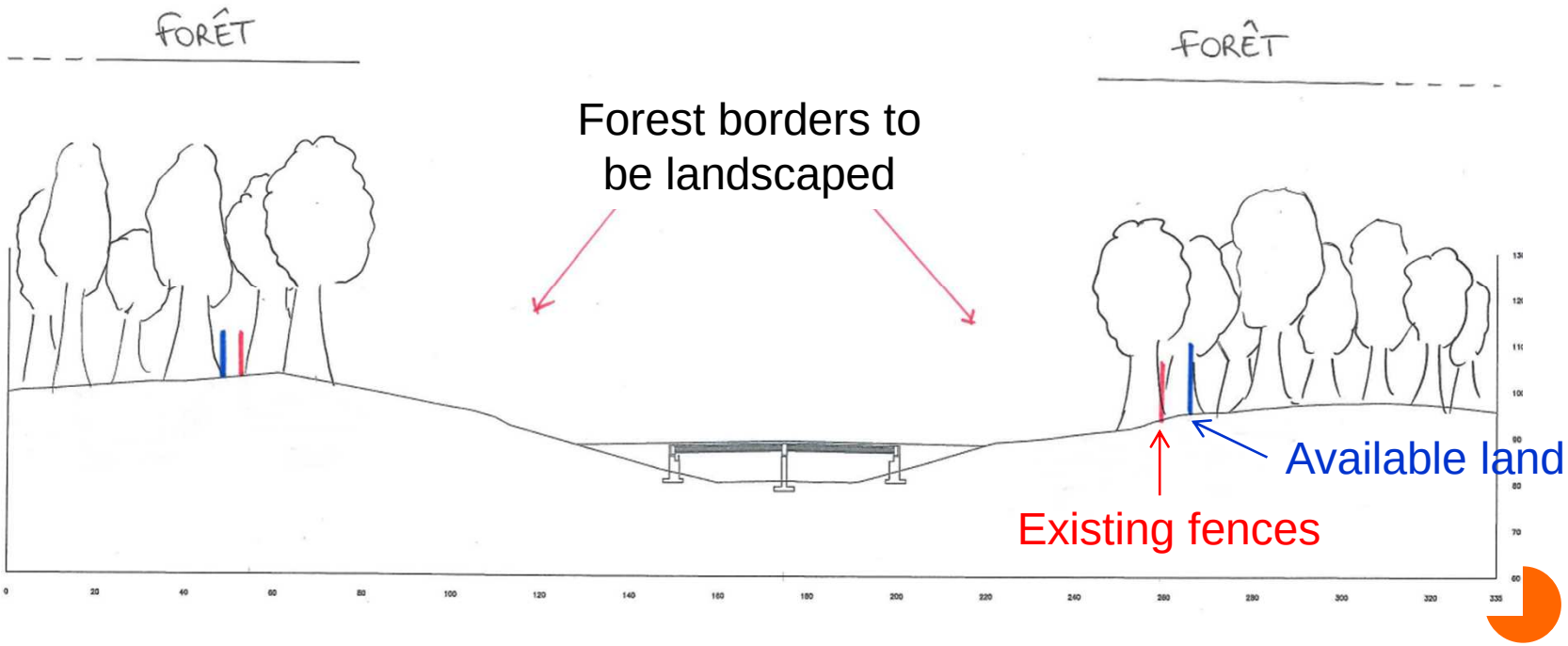
New permeable fences

3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

Modeling - The Good, the Bad and the Ugly

Landscaping

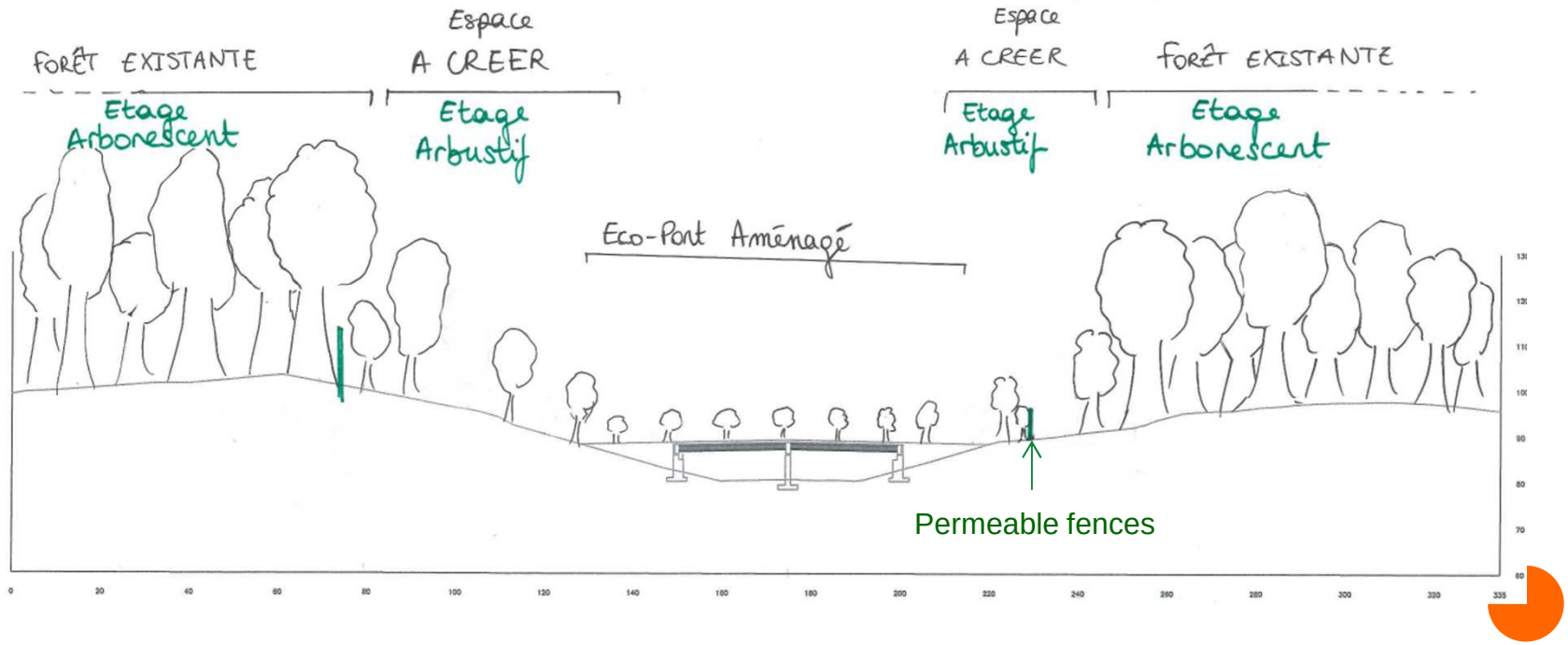


3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

Modeling - The Good, the Bad and the Ugly

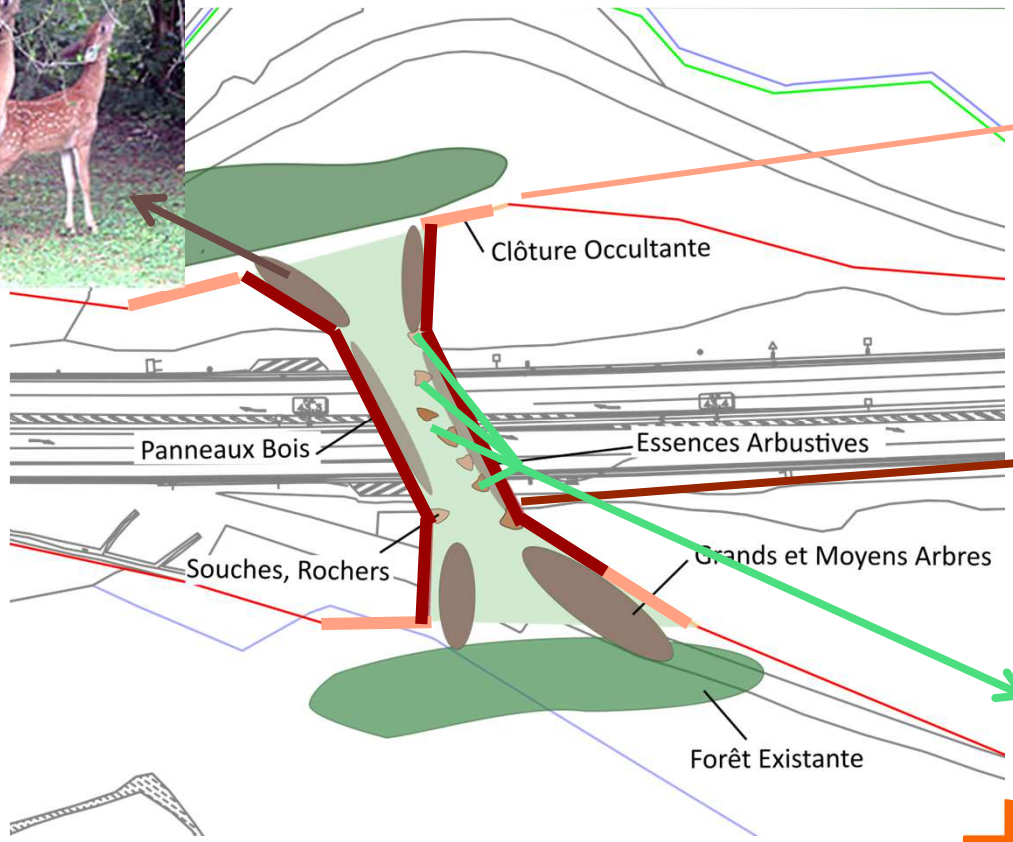
Landscaping



3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

Modeling - The Good, the Bad and the Ugly



3. UC6 – Infrastructure and Environment

3.2. Phase 2 - detailed studies

Modeling

- Many data types
- Content not unified

4. Software

4.1. Needs and abilities

Ability to :

- manage many types of data
- manage large models
- connect to servers

Source : www.telegraph.co.uk

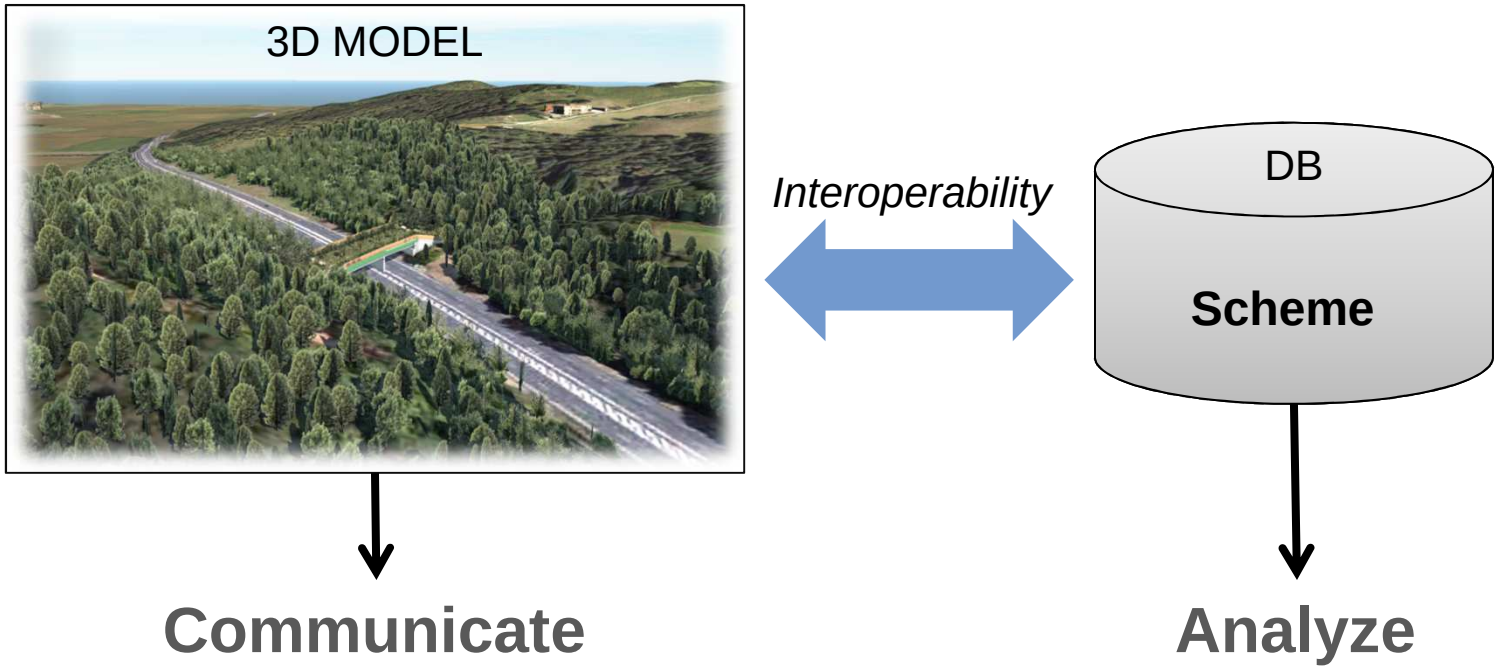
4. Software

4.1. Needs and abilities

Software / Solution	Editor	Type
MicroStation, ProjectWise, AssetWise,…	Bentley	Solution
Novapoint VDC	Vianova	Model federation
Mensura	Geomensura	CAD
Covadis	Geomedia	CAD
ArcGis	Esri	SIG
QGis	Qgis	SIG
Civil 3D, Infraworks, Revit, Navisworks	Autodesk	Solution
FME	Safe software	Data transformation

4. Software

4.2. Goals



4. Software

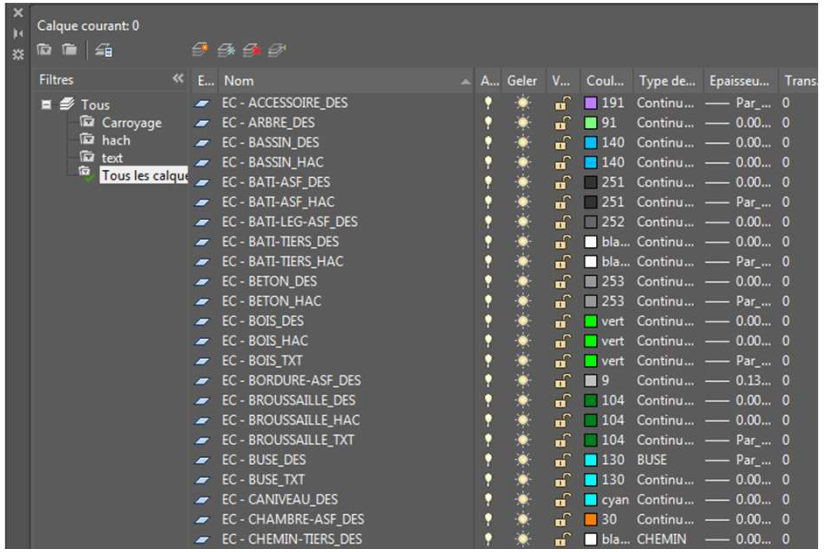
4.3. Actual issues

Hardware:

- Heavy models
- Sharing with others (not CAD users)

Data :

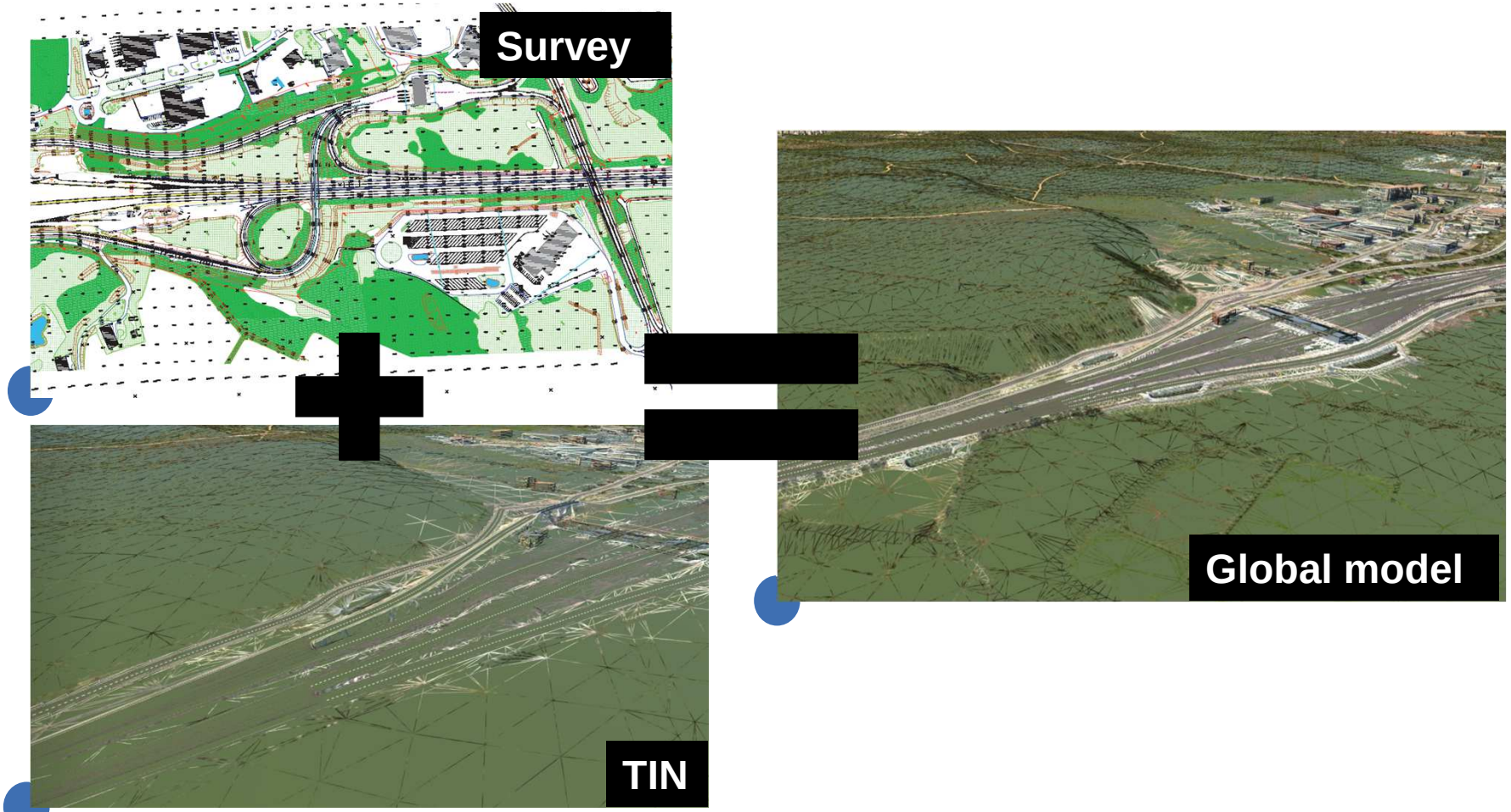
- Not structured
- Lost when changing format
- Not reliant to our needs



4. Software

4.4. Tests and results from the two sites

Achievements so far…

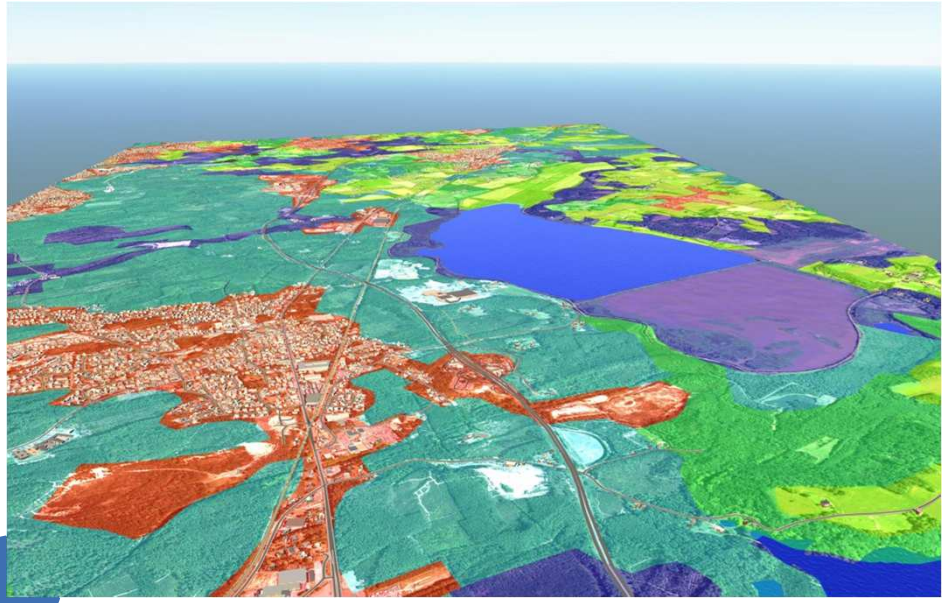


4. Software

4.4. Tests and results from the two use cases

Achievements so far…

GIS in the 3D model



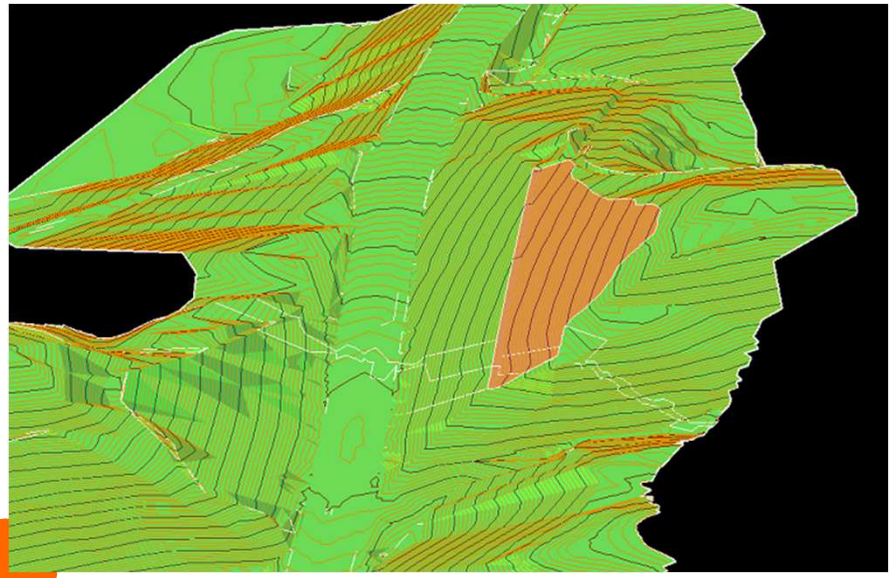
CityGML in the 3D model

4. Software

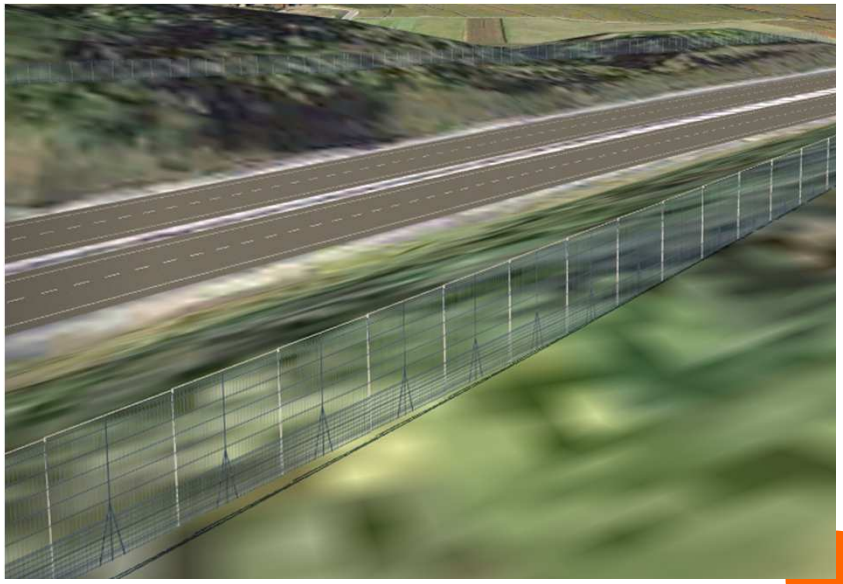
4.4. Tests and results from the two use cases

Achievements so far…

Creation of landscaping



Automatic representation of fences from shp



5. Data organization

5.1. What to organise

Workflow :

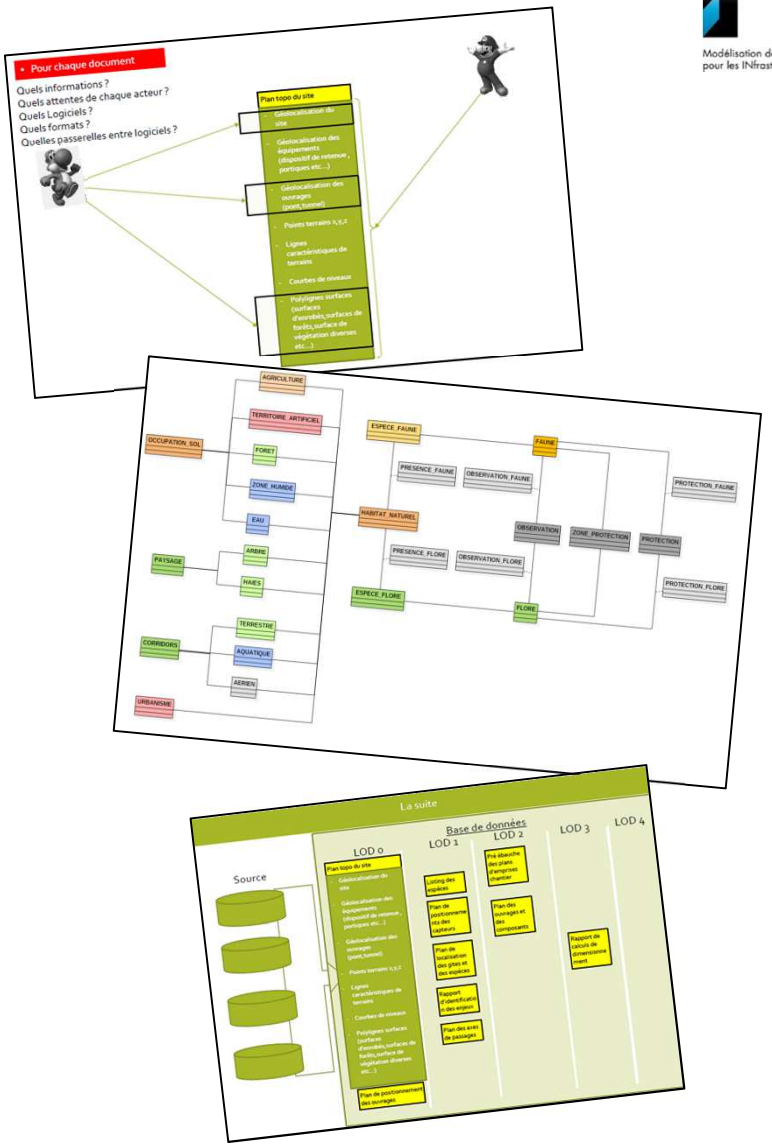
- Who needs what and when
- What for ?

Data :

- To structured
- Level of Details / Development

History :

- Trace decision taking
- Make it available for everyone
- Data storage, hardware and format lifetime



5. Data organization

5.2. Use case for data : Fences

Geometry :

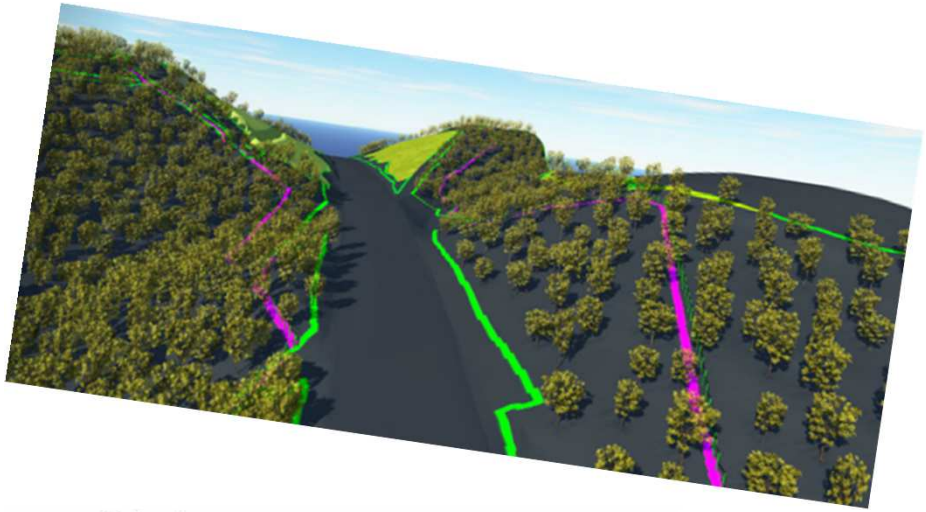
- 2D / 3D
- Linked to other objects ?
- Detailed geometry

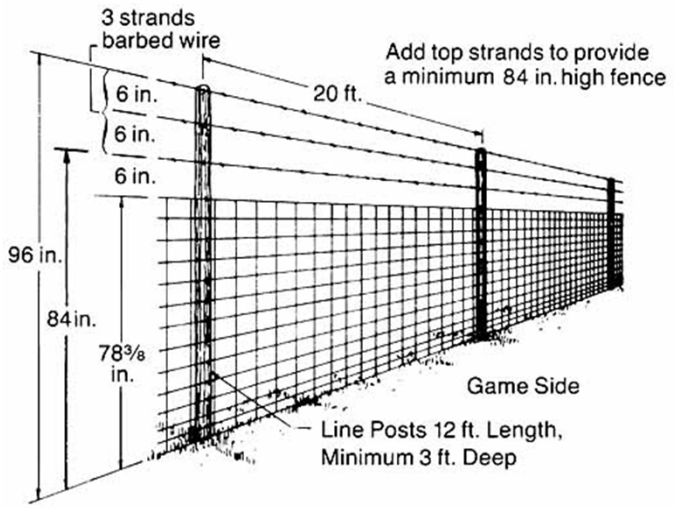
Attributes:

- Height / mesh size
- Permeability

History :

- Location
- Temporary or not
- Maintenance
- …





Thank you for your attention

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