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Construction site analysis template

ECOMED - Ecoengineering in the Mediterranean Environment

ECOMED Protocol 1

CASE STUDY REPORT TEMPLATE

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Summerize Info

Project title

ECOMED

WP reference

WP3 Development of sector specific routines and curricula

Task reference

Task 3.1 and 3.2

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1. THE AIM OF THIS TEMPLATE

- This template offers a possibility to show and share the main information and conclusions of the bioengineering work analysis. This template is readily connected to protocols 2 and 3 aims and contents.
- The contents of the bioengineering work analysis collected throughout the ECOMED project, will allow the generation of improvements at the different levels of analysis. These improvements will both be used in the generation of sector specific tools and improved training modules contents and support the specialisation process of the Mediterranean bioengineering sector.

For the generation of the bioengineering work analysis report, please follow the below sections and questions.

2. GENERAL INFORMATION ABOUT THE PROJECT AND THE CONSTRUCTION SITE

- Please, provide in your analysis the following information with your remarks:

Work location / project title:

UTM coordinates:

Completion date of the design stage:

Completion date of the construction stage:

Client: (e.g. private or public person or industrial company)

Decision criteria for this type of construction: (e.g. ecological restoration; prevention; erosion control; landslide to restore; etc.).

3. GENERAL INFORMATION ABOUT THE PROJECT AND THE CONSTRUCTION SITE

In this stage we are looking for information regarding the project and the way the work was done.

3.1 LEVEL 1. WHAT INFORMATION WAS CONSIDERED AND COLLECTED FOR DESIGNING THE PROJECT?

The information we are seeking here is: What was done by the soil- and water- bioengineer during the analysis stage and before the beginning of the designing stage? Here we will analyse all the preliminary analyses and studies related to the site carried out before proposing concrete solutions into the project.

This preliminary analysis stage occurs before the planning/design stage and includes researching and collecting all kind of information available related to the site. Examples of this are the following:

- Project key objectives? (Erosion control, slope stability, habitat restoration -for species-, landscape restoration, etc.).
- Site appraisal: reconnaissance, desk/office studies, and inspections for biodiversity, dendrology, inspections for ecology covering:
    - Climatic aspects (rainfall, temperature, potential evapotranspiration, exposure, aspect)
    - Soil physical aspects (grading, density, water regime)
    - Soil chemical aspects (pH, conductivity, nutrients, organic matter, exchange capacity, acid toxicity)
    - Soil engineering aspects (strength, permeability, aggregate stability)
- Native vegetation analysis
- Landscape features
- Problems, risks and hazards that were addressed by the project including but not limited to:
    - Erosion risk (rain erosivity, soil erodibility, overland flow, channel discharge, wind erosivity)
    - Geotechnical risks (mass movement, liquefaction, seismicity)
    - Fire risk
    - The extent and nature of potential failure of vegetation
    - Implications of the loss of function (temporarily or permanently) the vegetation is performing
    - Costs of repair and making good any consequent damage
    - Risks to life, health or property
- Visual soil/rock classification. Geotechnical analysis (preliminary assessment of ground/slope stability, etc.)
- Hydraulic/hydrographic analysis including flooding risk assessment
- In case of river works, the characteristics of flood events that had affected the job site (data, flow rate, equivalent return period, speeds and shear boundary stress)

- Maps, photographs with the purpose of collecting historical information
- Site topography and site surveying (geomatics)
- Cadastral data, parcel ownership.
- Interviewing people for collecting historical information
- Collection of urban planning processes and information showing current or future impacts with the work/site
- Other construction sites planned close to the site
- Calculations and drawings related to this preliminary stage
- Existing information in Regulatory Agencies (e.g. sustainability initiatives, resilience initiatives)
- ……

3.2 LEVEL 2. WHAT WAS CALCULATED AND INCLUDED INTO THE PROJECT DESIGN?

In this level the planning/designing stage established by the soil- and water- bioengineer is analysed. This stage follows the preliminary analysis stage (analysed in the preceding level 1). The design documents and information (the project itself) are now analysed and assessed.

Some examples of the type of information analysed in his level are the following:

- Is there a clear criterion for the plant species selection? Which is the criteria follow for selecting the plant species included in the project? Do the plants that belong to the first successional stage of the intervention area well represented?
- Was a phytosociological approach used in both the plant species selection process and the intervention strategy?
- Are there clear criteria for the project strategy implementation?
- Are there clear criteria for the bioengineering techniques selections?
- Is there a clear justification of the techniques design? Are the (structural and geotechnical) calculations clear?
- Functional requirements of vegetation (select all that apply to the project):
    - Soil reinforcement and enhancement of soil strength
    - Soil water removal
    - Surface protection against traffic
    - Surface protection against wind/water erosion
    - Bank and channel reinforcement
    - Shelter or screening
- Which improvements would you propose, at the design stage, regarding:
    - Plant selection:
    - Strategy implementation

- Bioengineering techniques selection
- Calculations
- etc.

Please indicate your main conclusions after the analysis of the bioengineering work at the design stage:

4. INFORMATION TO ANALYSE THE WORK THROUGHOUT ITS CONSTRUCTION AND SERVICE LIFE

In this section the work will be analysed throughout its service life. We will have the following levels of analysis:

Level 1: Construction stage analysis

Level 2: Operation, maintenance and monitoring stage analysis

Level 3: Current state of the bioengineering work

Please note that, at level 3, comparisons with reference scenarios (pre-restored and end-point scenarios) will also be included.

Level 4: Analysis of the bioengineering work performance

Level 5: Conclusions from the bioengineering work performance analysis.

4.1 LEVEL 1. CONSTRUCTION STAGE ANALYSIS (CONSTRUCTION COMPANY'S WORK)

The question to answer here is: how was the work carried out by the contractor (Construction Company) during the construction stage?

The construction stage corresponds to the construction of the client's project by a contractor (construction company) based on design documents approved by the client. Examples of the issues to be analyzed here are the following:

General issues, problems and defects.

- Problems/defects/issues recorded during the construction stage (information retrieved from the construction company).
- Detected flaws regarding the construction stage. E.g.
    - increasing bed or river bank erosion in upstream or downstream areas adjacent to the work,
    - Incorrect harvest method and transport conditions of the living material
    - Incorrect use and placement of the living material,
    - Incorrect storage conditions of the living material
    - Incorrect machinery selection
    - etc.
- Please give your opinion about disturbing/destabilizing elements present between the design stage and the construction stage:
    - Insufficient budget
    - Construction stage too short
    - Lack of a competent (effective) supervision during the construction stage
    - Lack of and affective monitoring stage after the construction stage
    - Machinery utilised in the work
    - Other (detail)……

- Please, indicate the construction standards used in the work:
- Please, indicate the kind/type of insurance applied for designer/construction company, write NONE when no insurance applied: ……..

Issues related to construction features:

- Where there any plantation techniques used to better attain and/or preserve soil humidity? (e.g. tree pit formation, mulching, etc.).
- Was there any mycorrhizae used in the utilised plants?
- Were there any changes in terms of the plant species used in comparison with those included at the design stage? If so, how those changes were justified?
- Were the utilised plants regionally distinctive/characteristic of the intervention area?
- Were there any quality control for the materials, plants (quality and origin) used in the work? If so, which normative (standard) was followed?
- Information regarding quality control for the inert materials (grey materials). Related normative (standard).
- Information regarding quality controls for the living material (vegetation, stakes, seeds, live branches, etc.). Related normative (standard).
- Were there any hormone treatment used for improving plant rooting capacity and root system development? Related normative (standard).
- Plant density. In case of herbaceous species: seeding rate.
- bad connections/junctions between the logs,
- bad lateral connection of the work edges with the slope,
- Insufficient or missing soil compaction
- Adverse climate conditions
- Other (detail)…..

Miscellaneous:

- Information regarding the qualification documents of the construction company in the field of soil- and water-bioengineering techniques?
- Qualifications and sufficient number of the workforce employed (in terms of workforce capacity to finish the work within the decided schedule and reaching the pursued quality standards)?
- Were there any adherent polluting matters or residues on inherent construction material?
- Groundwater appearance?
- Sanitation failure?
- Natural landslide impact?
- Destruction by local residents (or vandalism) observed?
- Other (detail)…..

CONCLUSIONS AT THE CONSTRUCTION STAGE ANALYSIS:

Please, include here the main conclusions of your analysis at this stage.

Which improvements would you propose for the analysed bioengineering work at the construction stage?

4.2 LEVEL 2. MAINTENANCE AND MONITORING STAGE ANALYSIS

Please, provide information regarding the bioengineering work monitoring and maintenance tasks carried out.

- Was there a maintenance contract?
- Comparison between specification/design and 'as built' measure
- Information on any maintenance work during monitoring phase. If applicable, conduct a characterisation of the maintenance tasks in terms of their performance and suitability
- Analyse all the available information regarding the bioengineering work monitoring tasks carried out
- Was there any monitoring specified? If so, was it installed/performed as planned? If not, please note any reasons
- Was any instrumentation left in situ for monitoring? Detail?
- Were inspections carried out? How regularly? Who carried out the inspections (qualifications?)
- Were there any defects noted after the defect correction period? What was the nature of the defects? Who noted them? Who corrected them? Who paid for them? Value (as percentage of the total contract)?
- Were there any emergency works carried out? What was the nature of the works? Who carried them out? Who paid for them? Value (as percentage of the total contract)?
- Etc.

4.3 LEVEL 3. ANALYSIS OF THE CURRENT STATE OF THE BIOEGINEERING WORK

This level is directly related to the field work protocol (protocol 3). In this level we will analyse the data related to the operation stage (or work service life stage) of the work. This is the stage in which the construction site field work takes place.

4.3.1 IN SITU FIELD WORK VARIABLES SELECTION

Please, show the selected set of field work variables used for the bioengineering work field work analysis. Please, recall that the selected set of field work variables should include those able to effectively reflect the bioengineering work evolution, performance, and beneficial effects.

Justify the set of field work variables you finally chose. Please, explain the criteria followed in this process. The field work variables can be classified according to the following categories:

- WOODEN ELEMENTS
- PLANTS (IN/OUT THE BIOENGINEERING WORK)
- SOILS
- WATER/TEMPERATURE/CLIMATE

- OTHER UTILISED GREY AND GREEN MATERIALS

A more detailed information can be found in Protocol 2 and 3.

4.3.2 BIOENGINEERING WORK CURRENT STATE DESCRIPTION

Include in this section the field work variables description from a statistical point of view (number of samples, average, variance, variation coefficient, etc.).

Please indicate the field work procedures followed in your work.

COMPARISONS WITH REFERENCE SCENARIOS

PRE-RESTORED SCENARIO:

A complementary analysis of an adjacent or nearby area without bioengineering intervention must also be accomplished (if possible) in order to assess the overall beneficial effects of the bioengineering intervention.

- Location:
- Field work variables measured:
- Number of samples taken and field work variables average values:

Please indicate the main differences found between the bioengineering work area and the pre-restored scenario:

Please, give your opinion in a justified manner, about the main effects of the soil bioengineering work:

TARGETED SCENARIO (END-POINT SCENARIO):

The targeted scenario is a study area similar to the intervention area, but not in need of stabilisation. This site represents the study area if it were undisturbed or stable. Conditions at the reference site represent the conditions that are the goals of the intervention.

- Location:
- Field work variables measured:
- Number of samples taken and field work variables average values:

Please indicate the main differences found between the bioengineering work area and the targeted scenario:

What is the effectiveness level of the intervention compared to the targeted situation. Which is the level of fulfilment of the restoration objectives? Is the work evolving at an adequate pace from a restoration performance point of view?

Please indicate the presence of plants belonging to different successional stages in the intervention area, the pre-restored conditions and the targeted conditions (the end point scenario):

Is Climate Change affecting the achievement of the targeted conditions? In which variables this influence is more intense?

4.4 LEVEL 4. ANALYSIS OF THE WORK PERFORMANCE

In this section we should be able to do the following:

- Analysis of the gap between the planned (designed) work and the ‘as built’ work

- Work performance and beneficial effect analysis
- Which are the achieved functions or targets? For example, Ecological functions: such as biotope connectivity, habitat improvements (in number and in quality), plant community development, hydrologic and hydraulic functions, geotechnical functions, landscape functions, socio-economic functions, etc.

Particularly, the assessment of the bioengineering work elements performance (inert elements, plants, other materials) will be done. Examples of this are the following:

- Suitability of the plant species utilised in the work: Are the plant species well adapted to the site conditions (soil, climate, aspect, etc.)?
- Were the seeds used for the hydro-seeding appropriately selected?
- Problems related to the lack or abundance of water
- Problems related to an excessive plant density
- Problems related to soil fertility
- Problems related to slope aspect/angle/topography
- Problems with availability and adequacy of workforce with relevant qualifications
- Problems with access to the work site
- Problems with health/safety (e.g. invasive species)
- Problems related to a maintenance contract failure
- Problems related to a missing maintenance contract
- Engineering/Stability performance of the works
- Sustainability performance of the works

4.5 LEVEL 5. CONCLUSIONS OF THE BIOENGINEERING WORK PERFORMANCE

Please, show here your conclusions obtained after combining the different levels analysed (design, construction, /maintenance and monitoring).

Please, include in this section your opinion to describe the result of the work, in terms of the pursued objectives. You may use the following approach:

- Very successful evolution of the work (all the main objectives were achieved) during 1 to 2 or 3 years after its completion
- The successful evolution of the work (all the main objectives were achieved) after more than 5 years after its completion
- Acceptable evolution and results (the main objectives were partially achieved) after more than 5 years after its completion
- Long-term failure (after more than 5 years after its completion): slope failure, erosion problems, etc.
- Short-term failure (within 2 or 3 years after its completion): slope failure, erosion problems, etc.

Please, indicate how the initial risks that were present in the intervention area have decreased because of the bioengineering work beneficial effects.

Is the climate change affecting the performance of the bioengineering intervention? If so, please indicate how.

Finally, include in this section your opinion, in a justified manner, about why the work succeeded and/or failed in achieving its objectives. Include your proposals for improving the work performance and efficiency.

ECOMED is an ERASMUS+ co-founded programme promoted by Universidad Politecnica Madrid which aims to improve the specialisation level of the ecoengineering sector in Mediterranean areas and within this context, this project offers to provide a sound and practical knowledge based on the accumulated experience in order to offer to the next generation of practitioners and managers a solid and well suited training in ecoengineering restoration techniques in Mediterranean scenarios.

For further information

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