Relocation of Soulou trench, in PPC’s mines, Ptolemais, Greece

G. Giouli, K. Mahtis and A. Sokratidou
Public Power Corporation, Greece
Purpose of Soulou trench relocation

- Development of Kardia Field Mine
- Extend of mining activity to the west
- Affected infrastructure

Soulou trench

- Kozani – Ptolemais Old National Road
- Ptolemais – Kozani Railway
- Water Transportation Pipe for the cooling need of Power Plants

All infrastructure are addressed comprehensively

Milos Island

30 June – 3 July 2013
Important remarks

was constructed 60 years ago to drain the marshy area Sarigkiol,

SOLOU TRENCH

is used for irrigation needs,

flows through a significantly lignite bearing region,

is close to PPC’s mines (Mavropigi, South Field and Kardia Field) in operation,
Soulou identity

It flows from Sarigkiol area to Vegoritis lake.

Soulou trench
Old National Road
Railway

Ptolemais mines

Miros Island
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Steps of the project

**Study**
1. Mines Depositions
2. Hydrology
3. Environmental Impacts
4. Optimal Sealing System
5. Geotechnical issues

**Issuing of the work**
1. Environmental Permit
2. Permit for the construction

**Construction**
1. Soil works
2. Geotechnical protection works
3. Sealing System construction

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Soulou trench bed before the relocation

- Ptolemais
- Old National Road
- Soulou trench
- Railway
- Area under environmental license

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Soulou trench belongs to the Water District of West Macedonia, Greece, Sarigkiol sub-basin, (closed to Ptolemais basin).

Sarigkiol area (green)
Soulou trench flow flux evaluation

Karstic formation
Relief change due to mining activities
some sub-basin have little involvement in Soulou's trench flux

Active surface: ~ 230 km²

The method of watermark flood was used
Flood flux: ~ 28.30 m³/s

According to landowners of the region, no flood has occurred during the past 50 years
Final flood flux: ~ 30.00 m³/s
1. Trapezoidal cross section of the bed with 5 m bottom width,
2. Slopes’ inclination 1.0 : 1.5 (height : base), and
3. According to hydraulic calculations a pit depth of 3.29 m.
### Soulou trench alternatives

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>RESULT</th>
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<tbody>
<tr>
<td>zero solution to continue the development of mining, without any relocation</td>
<td>the destruction of Soulou trench, will stop the flow of water and the mines excavation will flood, fact that would seriously jeopardize human lives and equipment</td>
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<td>construction of pumping and discharge pipe no surface flow of Soulou trench</td>
<td>disturbance of the ecological balance of the area</td>
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<td>bed location, either NE or SW of the mines (out of the mines area).</td>
<td>diversions / variants of all infrastructure (affected by the development of mines) should be addressed comprehensively</td>
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<tr>
<td>bed location, on the boundary of South Field and Southwest mines</td>
<td>the proper operation of mines is ensured, dumps of the waste materials are used, new trench is located close to the old one</td>
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Soulou trench new bed

Ptolemais

Old National Road

New position of Railway

New position of Railway

Soulou trench new bed

Ptolemais V

Power Plant

Milos Island

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The safety of the infrastructure depends on the geotechnical condition of the dumps.

Soulou trench bed geotechnical investigation

Part of the new trench and the other infrastructure (railway, national road, pipeline) will be implemented over relatively recent dumps of mine waste materials.

Any failure on the stability of the dumps will endanger human life and jeopardize mine equipment.

The safety of the infrastructure depends on the geotechnical condition of the dumps.

MAIN ISSUES
A. Estimate of subsidence, (size and development over time),
B. Determine construction time, to avoid failures

RESULTS
Expected subsidence:
80 % between 2010 - 2012,
17 % between 2012 - 2015,
2 % between 2015 to 2017.
Soulou trench new bed waterproofing

According to the waterproofing investigation the system must have:

A. **low permeability** to minimize the leakage,
B. **sufficient strength** to minimize the risk of failure, and
C. **adequate protection** to minimize the risk of corrosion-cracking.

**MAIN CONCLUSIONS**

A. geological barrier of:
   - thickness ≥ 1 m
   - $K \leq 10^{-9}$ m/sec

B. construction method:
   - “Bath Method” or “Steps Method” or combined solution

C. formation of dumps in operation to fulfill construction needs

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Soulou trench new bed issuing

Environmental Impact Assessment for Soulou trench relocation has been elaborated and submitted in 2006. Environmental Impact Assessment for Ptolemais Mines has been elaborated and submitted in 2009. Request for the Soulou trench relocation has been submitted in 2011, in the West Macedonia Perfecture.

The Ministry for Environment, Energy and Climate Change decided that Soulou trench is a consequent work of the mines.

Environmental Permit has been issued for both projects, according to the Ministarial Degree, in 2011.

Permit for the works of water resources utilization has been issued, in 2012.
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Soulou trench old bed
Soulou trench new bed under construction
Soulou trench new bed under construction

Excavating the old dumps  
Formation of new dumps
Soulou trench new bed

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Soulou trench new bed
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Soulou trench new bed
Soulou trench new bed

Slope’s rehabilitation