# SWIM-Sustain Water MED

## *Demonstration Project in Egypt*

# Progress for the Pilot Project in EGYPT


***By***

***Dr. Rifaat Abdel Wahaab***

*Professor of Environmental Science*

*Sector Head, Research & Development (R&D)*

*Holding Company for Water and Wastewater (HCWW)*

*Cairo, Egypt*


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# SWIM-Sustain Water MED
## *Demonstration Project in Egypt*

## *Project Goal*

- Develop potential decentralized / low cost wastewater treatment technology and reuse for rural (small ) communities in Egypt,
- Study the applicability of treated wastewater quality to promote security and acceptance of wastewater reuse in Egypt,
- Develop integrated approach,targeting the enabling environment for replication in Egypt

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## *Demonstration Project in Egypt*

# *Existing Situation :Sanitation In Egypt*

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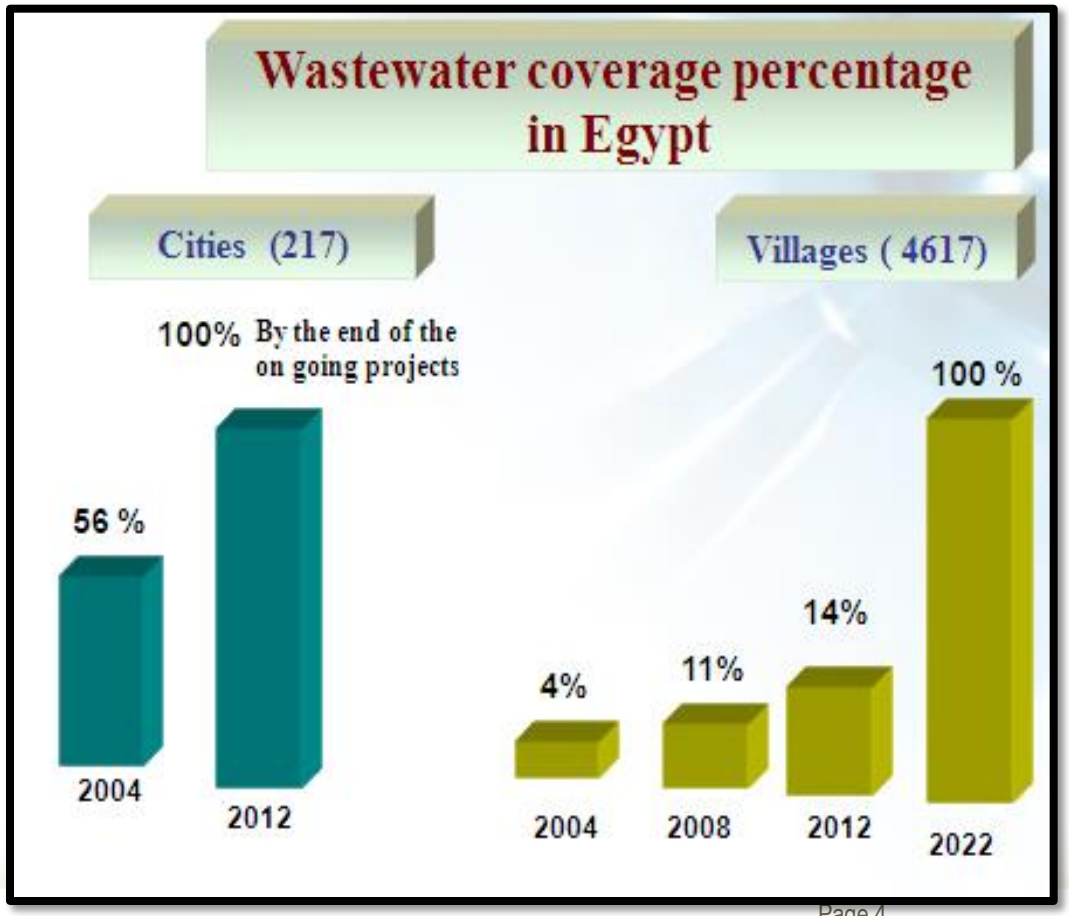
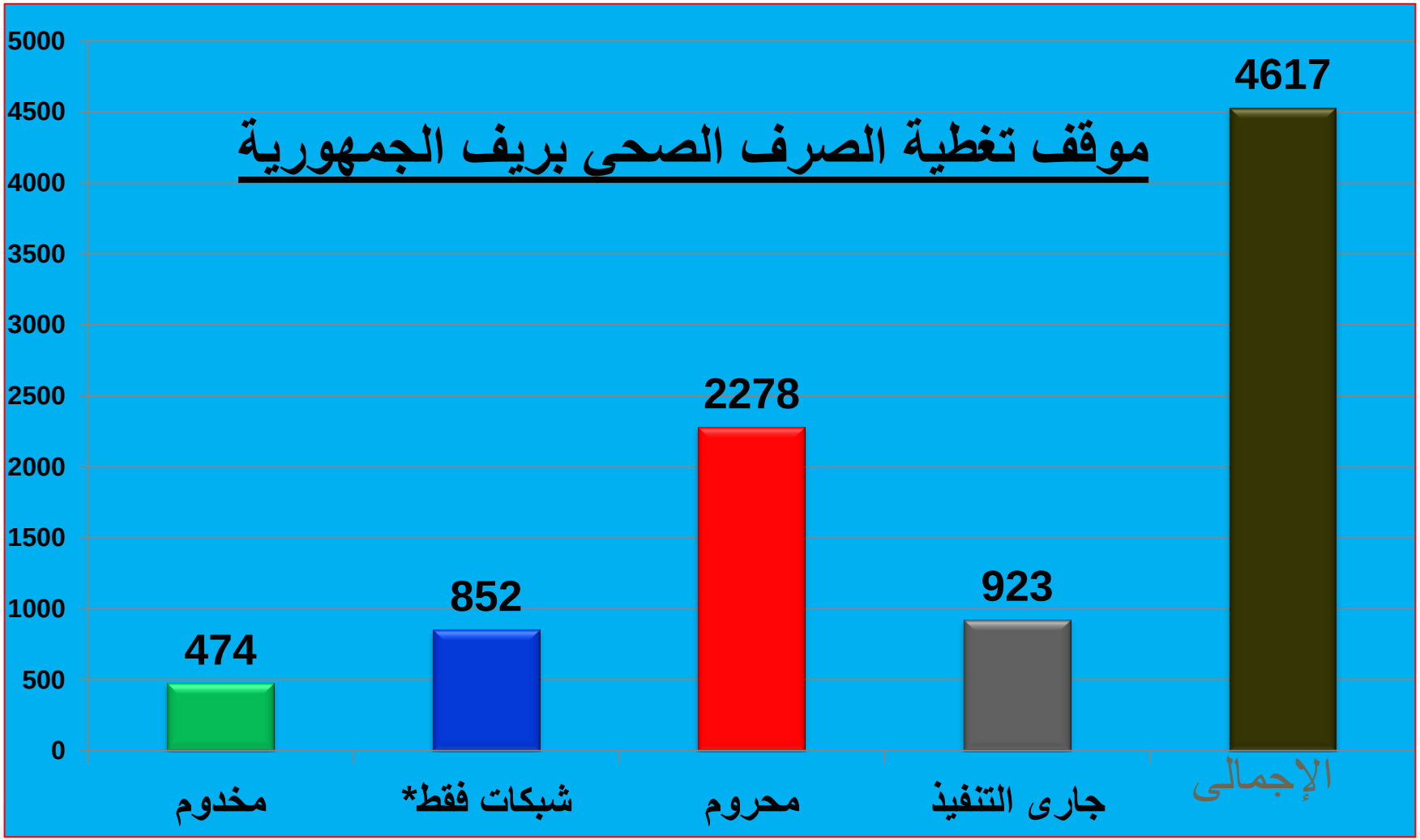
## *Demonstration Project in Egypt*

## *Sanitation Coverage*

- ✓ *>95 % in Urban areas & < 15% in rural areas*.
- ✓ *75 % rural population* uses septic tanks
- ✓ *Treatment Technologies:*
  - *79% : Activated sludge, oxidation ditches*
  - *11% : WSP*
  - *5% : Trickling filters*
  - *5% : Others*

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مخدوم
شبكات فقط*
محروم
جارى التنفيذ
الإجمالى

# SWIM-Sustain Water MED

## *Demonstration Project in Egypt*

## Problem Definition:

**The problem of rural sanitation are mainly from disposing raw sewage into surface water and ground water via tranches which leads to pollute:**

- ❑Groundwater.
- ❑Drains
- ❑Canals
- ❑Soil

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## *Demonstration Project in Egypt*

## Rural Sanitation : Facts & Figures

- ***Rural sanitation coverage is less than 15%, which means that 40 million Egyptian citizens have no safe sanitation services (4700 villages & 30,000 scattered settlements ).***
- ***The estimated amount of money required to fill this gap is about 12 billion US Dollar .***
- ***Under the conventional solutions we need between 10 to 15 years to cover all villages with the sanitation service.***

# SWIM-Initative

# Pilot Project Selection Criteria

## Pilot Project Selection Criteria

The priority was given for the villages according to the following criteria:

- ✓ Villages that are located near water ways to save water resources from pollution
- ✓ Sensitivity of receiving media (canals, drains,..etc)
- ✓ Villages with high water table to save ground water
- ✓ Villages with commitment & loyalty for public participation in sanitation services.
- ✓ Availability Desert land nearby for WW-Reuse

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## *Demonstration Project in Egypt*

### *Pilot Project -Village Profile*

1. Name & Location : Al-Gezayra, Ismailia Governorate
2. Population (Thousands): 1100
3. Street's Width (m) : 4-6
4. Type of Agricultural Crops: Tomatoes, olives,..etc
5. Irrigation Canal(s)/Agricultural Drain(s): Yes
6. Livestock: yes
7. Industrial Activities (if existing) : No
8. Drinking Water Coverage : yes
9. Existing Sanitation: Tranches to the ground water or pumped to nearby agriculture canal/drains
10. Land Available for proposed WWTP : 350 m2

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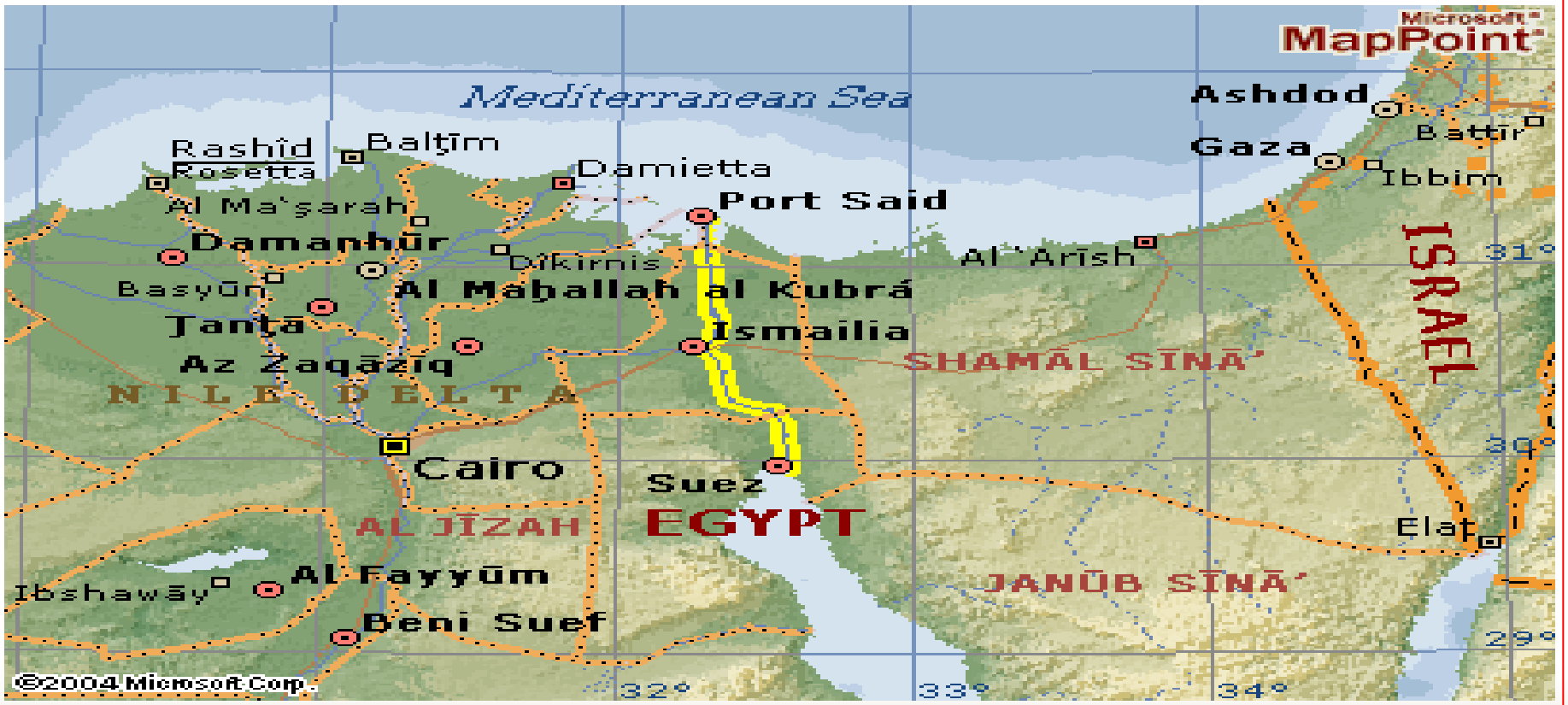
## *Demonstration Project in Egypt*

## Ismailia-Pilot Project Location



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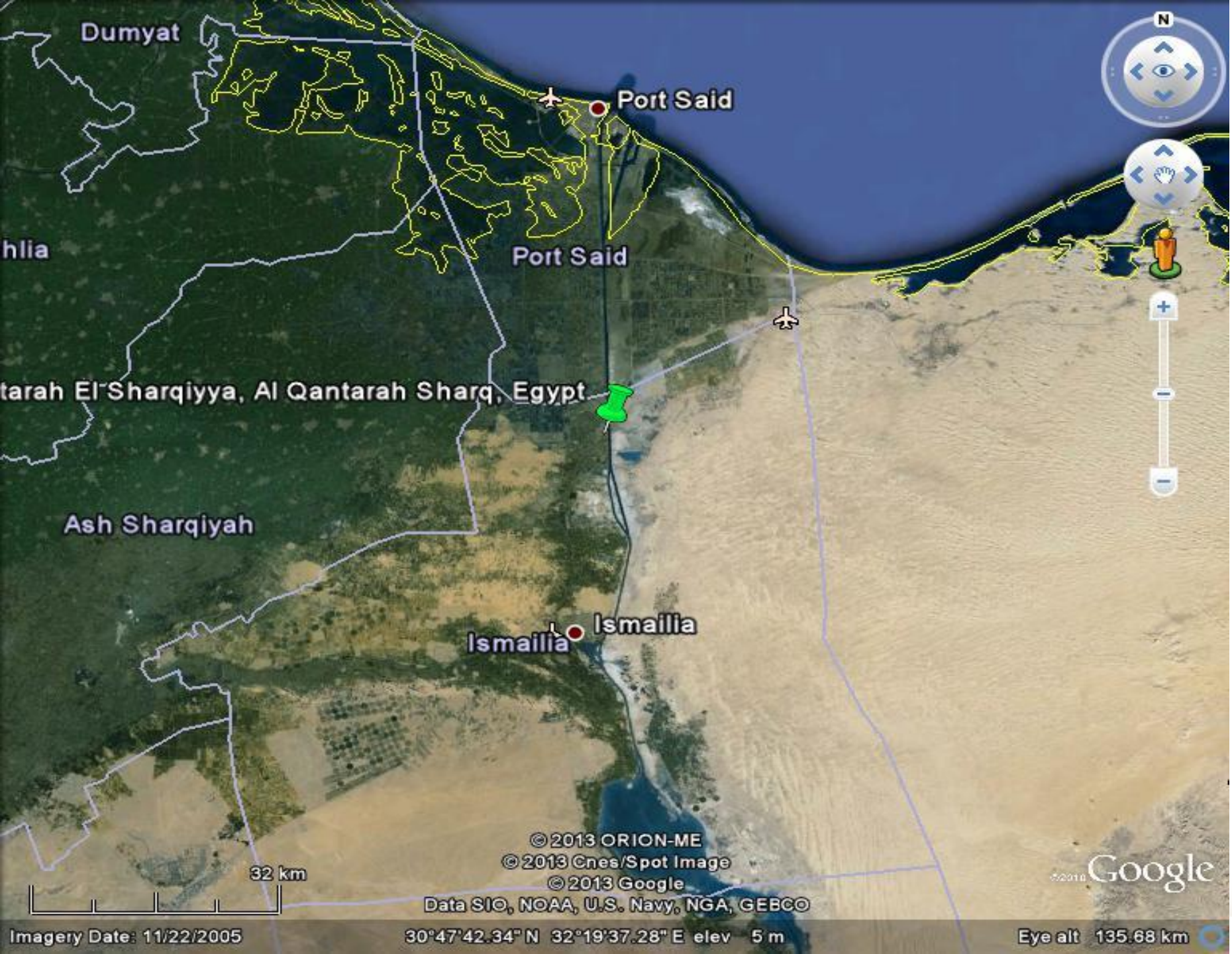
## *Demonstration Project in Egypt*

## Ismailia-Pilot Project Location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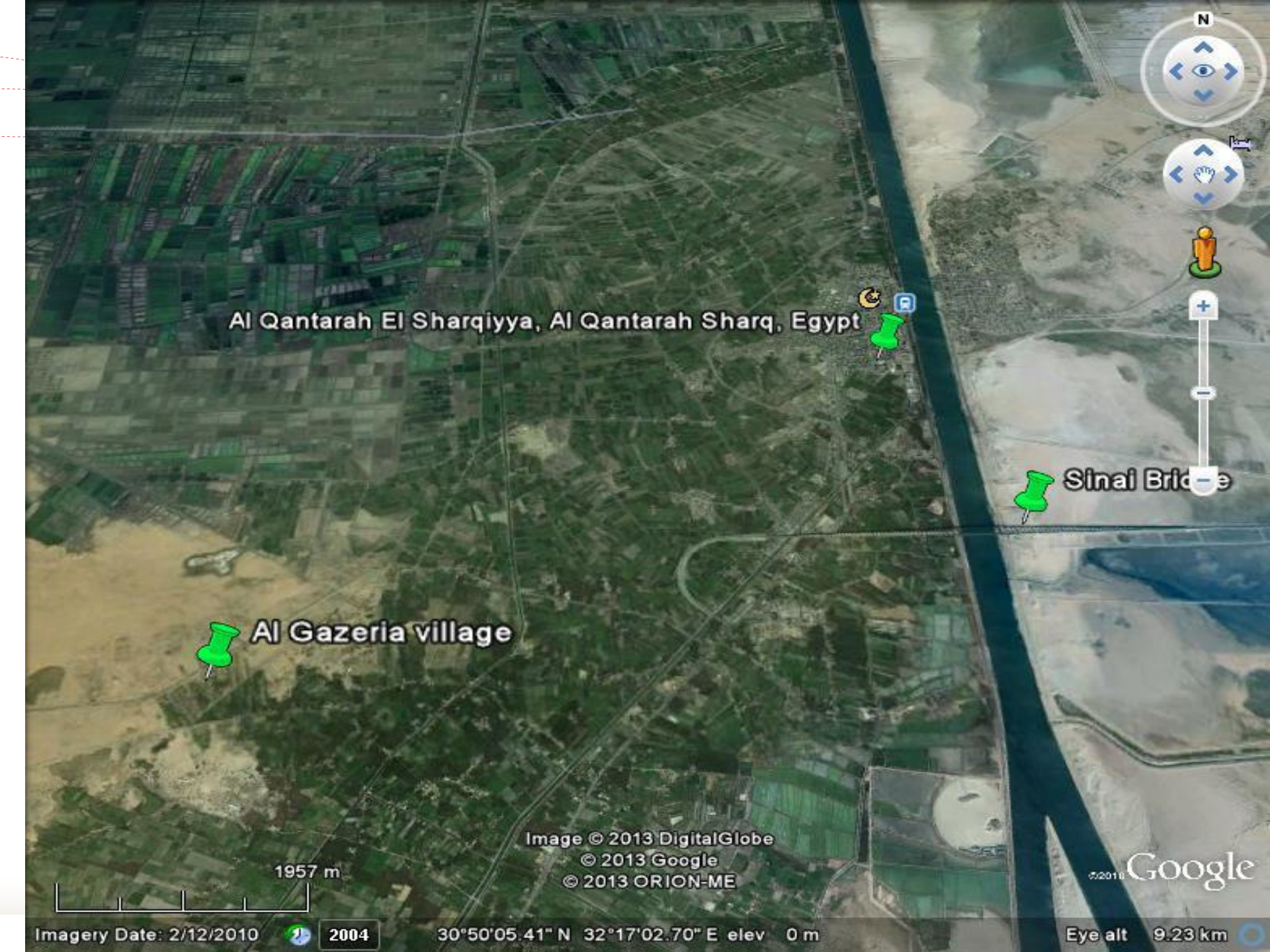
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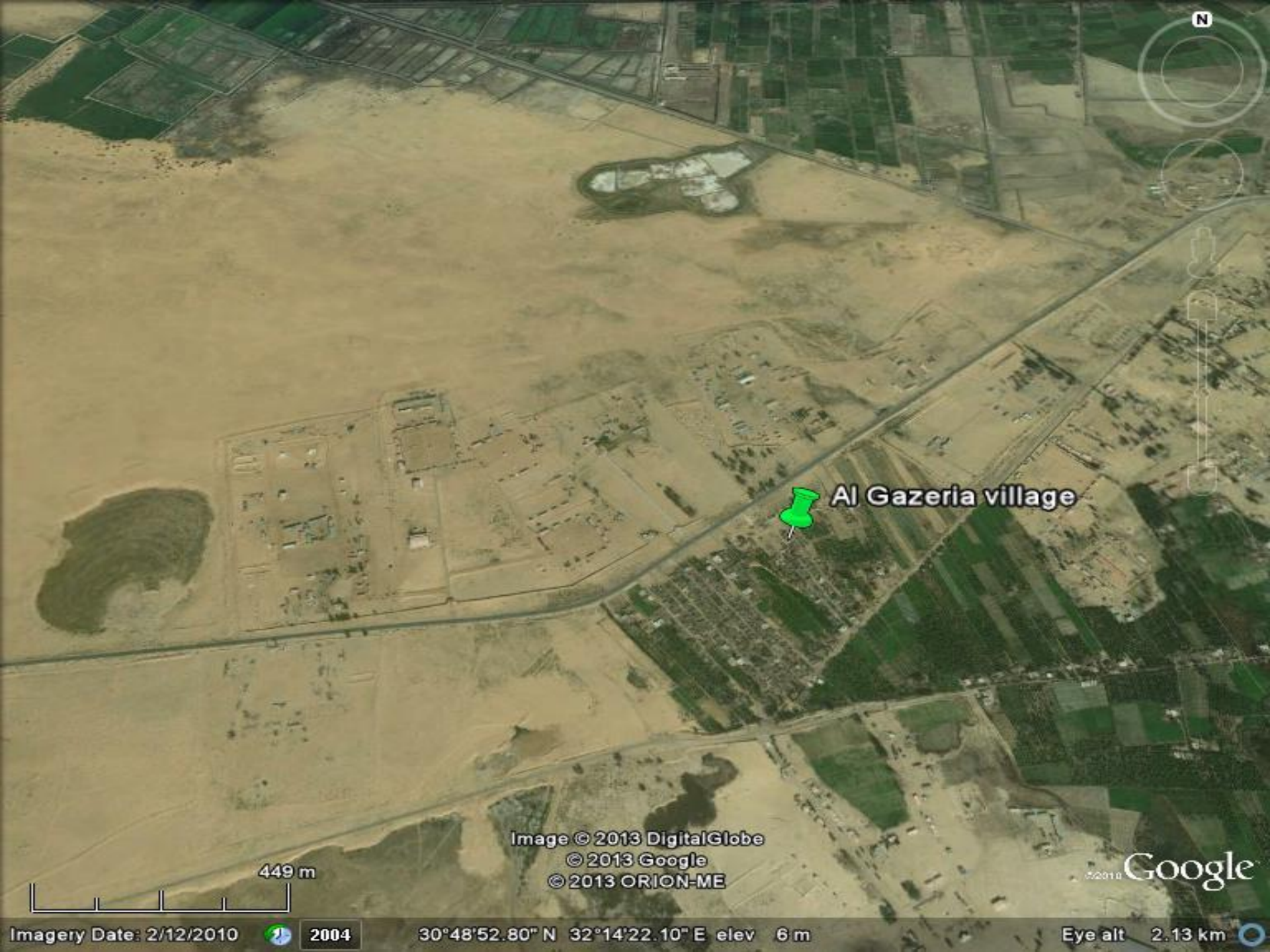
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# SWIM-Sustain Water MED

## *Demonstration Project in Egypt*

## SWIM –Egypt :Scope & Methodology

Systematic assessment using the **Enabling Environment Framework**


Confederation

al Department of Economic Affairs FDEA
Secretariat for Economic Affairs SECO

## What has been done?

**Assessment of the challenges and success factors of past small-scale sanitation initiative in Egypt:**

- ✓ Field visits
- ✓ Questionnaire for date collection & evaluation
- ✓ Interviews with key-stakeholder in the pilot area
- ✓ Literature review for past initiatives
- ✓ TORs for Base Line Assessment Study

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## *Demonstration Project in Egypt*

## Preliminary Assessment of Past Initiatives

| Governorate | Village (District) | Technology |
|---|---|---|
| | | |
| **FIELD VISIT WITH SAMPLING** | | |
| **Gharbeya** | Mashal / Kom El-Naggar (Bassyun) | Activated sludge |
| **Fayoum** | Zawyat El-Karatsah WWTP | Compact anaerobic tower: upflow anaerobic sludge blanket + anaerobic filter + trickling filter + sand filtration |
| | Abdel Kareem Issa (Sanhorus) | Upflow Septic Tank / Baffled Reactor (USBR) |
| **Beni Suef** | Sheikh Yacoub (Fashn) | Primary settling tanks + aeration + subflow planted gravel filter + oxidation channel |
| | Maimun (Markaz El Wasta) | On-site collective septic tank with gravel filter + aerated filter at WWTP |
| **Sharkiya** | Kafr El Hamam (next to Zagazig) | Kimatech® (Prefabricated unit based on physico-chemical treatment) |

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## *Demonstration Project in Egypt*

## Preliminary Assessment of Past Initiatives

| CASE STUDIES WITH DATA AVAILABLE | | |
|---|---|---|
| **Dakahlia** | Meet Dafr | UASB + Downflow Hanging Sponge (DHS) |
| | Samaha | Constructed wetland |
| | Meet Mazah | Waste stabilisation ponds |
| **Gharbeya** | Senbo | Dual Biological Aerobic Filter (DBAF) |
| **Damietta** | 24 villages | Various technologies |
| **Kafr El Sheikh** | Various ezbas (incl. El Moufty, Om Sen, El Koleea) | Waste Stabilisation Ponds (WSP) |
| **Giza** | Zinin WWTP | Pilot compact anaerobic tower with biological filter |
| | NRC | Pilot UASB + DHS<br>Pilot Primary sed. + DHS |
| | | |
| **FIELD VISIT ONLY** | | |
| **Beheira** | Sharaf El Din (Zawayt Gazal) | Anaerobic Baffled Reactor (ABR) |
| **Qena** *(visit to be done)* | Kom El Dabae | WSP, small-bore sewer sytem (SBS), forest |
| | Dandara | ABR with upflow gravel filter |

# (i) TECHNICAL COMPARISON (for Egyptian conditions)

| | CAS w.d. | CAS (EA) | SBR | MBBR (EA) | RBC+ Imh | TF+ Imh | UASB +TF | ABR +TF | WSP | CW |
|---|---|---|---|---|---|---|---|---|---|---|
| ✓ Appropriateness of technology | - | + | - | - | + | + | + | + | + | + |
| ✓ Ease of operation | - | +/- | - | - | + | + | +/- | + | + | + |
| ✓ Safety against peak loads | + | + | + | +/- | +/- | +/- | +/- | + | + | + |
| ✓ Dependence on uninterrupted power supply | - | - | - | - | - | - | +/- | + | + | + |
| ✓ Dependence on foreign spare parts | - | +/- | - | - | +/- | +/- | +/- | + | + | + |
| ✓ Land requirements | + | + | + | + | + | + | + | - | - | - |

w.d. ... with digestion, Imh ... Imhoff Tank

# (ii) ENVIRONMENTAL COMPARISON (for Egyptian conditions)

| | CAS w.d. | CAS (EA) | SBR | MBBR (EA) | RBC+ Imh | TF+ Imh | UASB +TF | ABR +TF | WSP | CW |
|---|---|---|---|---|---|---|---|---|---|---|
| ✓ Compliance with Egyptian effluent criteria | + | + | + | + | + | + | + | + | +/- | + |
| ✓ Risk of odour / noise / vectors | + | + | + | + | + | + | + | + | +/- | + |
| ✓ CO2 – equiv. emissions | - | - | - | - | + | + | +/- | +/- | + | + |
| ✓ Ease of upgrading to meet stricter effluent standards | + | + | + | + | + | + | + | + | - | + |

w.d. ... with digestion, Imh ... Imhoff Tank

# (iii) FINANCIAL COMPARISON (for Egyptian conditions)

| | CAS w.d. | CAS (EA) | SBR | MBBR (EA) | RBC+ Imh | TF+ Imh | UASB +TF | ABR +TF | WSP | CW |
|---|---|---|---|---|---|---|---|---|---|---|
| ✓ CAPEX | - | - | - | - | +/- | +/- | +/- | +/- | +/- | +/- |
| ✓ OPEX | - | - | - | - | + | + | + | + | + | + |

NOTE:

CAPEX results might be substantially different in different regions of Egypt (Upper Egypt versus Nile Delta)

***What is the appropriate technology for rural areas in Egypt?***

# Some criteria for WWTPs in rural areas

- One should choose a simple and reliable process
- Construction and O & M costs should be reasonable
- Decentralized treatment plants are often more expensive (to build and operate) than larger centrally located plants (cluster concept)
- Use of the least amount of land (in the densely populated agricultural areas)
- Low power consumption
- Minimum of mechanical equipment
- Local availability of spare parts

# Suitable technologies

- Any technology which works for larger populations can also be adapted to smaller populations
- Size of plant often determines which technology leads to lower capital costs
- Community often does not care so much about the technology but the location of the plant and the amount of land required (especially where land is a precious commodity (Nile Delta)
- Also environmental nuisances (odor, noise, vectors) can be of concern
- Operation and maintenance of the plant should not require highly skilled labor (employ village people)

# *Anaerobic Aerobic Fixed Bed Reactor (AFBR)*

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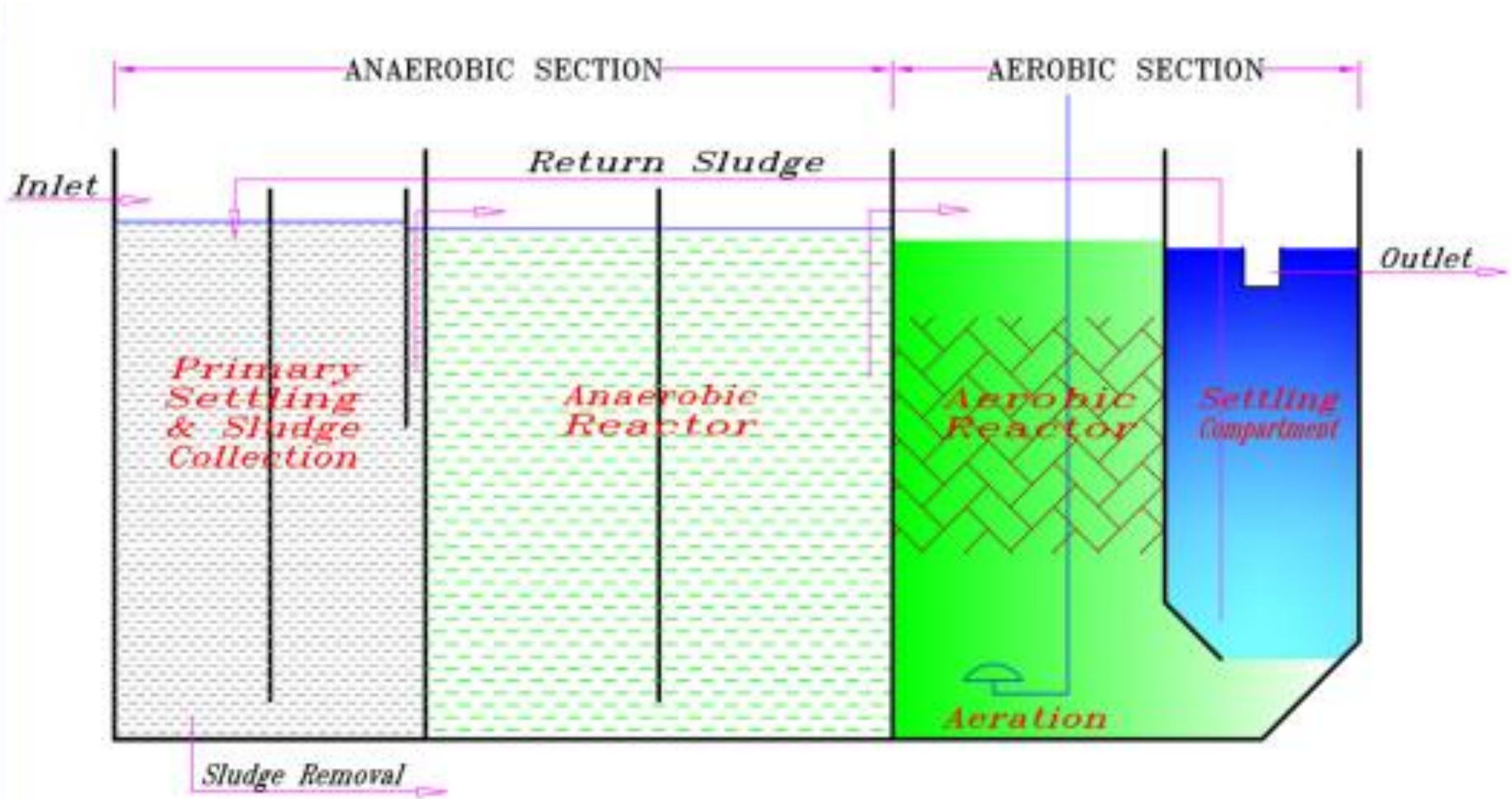

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## *Demonstration Project in Egypt*

HCWW

## What has been done up to date ?

- ✓ Tender Document
- ✓ EIA
- ✓ Call for offers
- ✓ Offers evaluation
- ✓ Contracting the executing firm (TIA Co.Germany/Tatget-Co.Egypt)
- ✓ Implementation : 15 June (4-6 months needed)

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