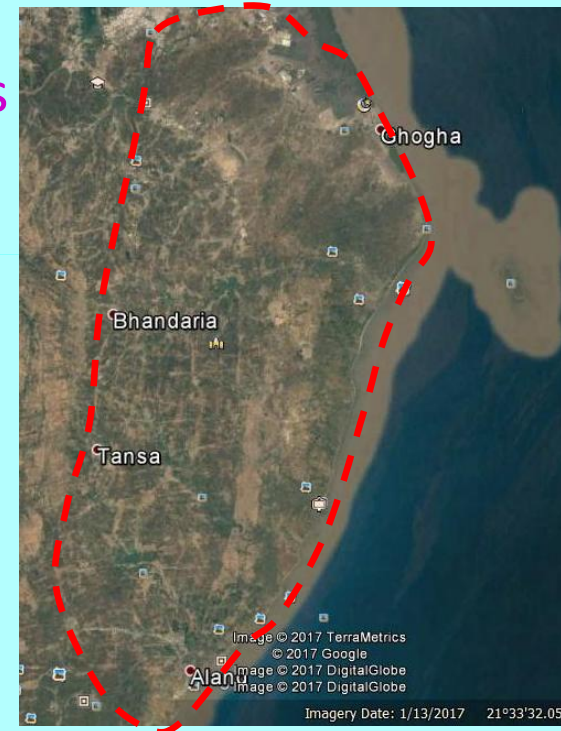


Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

- In the year 2003, WAPCOS was awarded the work of Ghogha Rainwater Harvesting Schemes in 82 villages of Bhavnagar, Saurashtra, Gujarat by WASMO, a Govt of Gujarat undertaking.
- The scope of work included:
 - Identification of sites for rain water harvesting structures
 - Feasibility study of each structure
 - Hydro Geological survey
 - Topographical Surveys
 - Detailed design engineering, Tender preparation
 - Construction Supervision of all Schemes

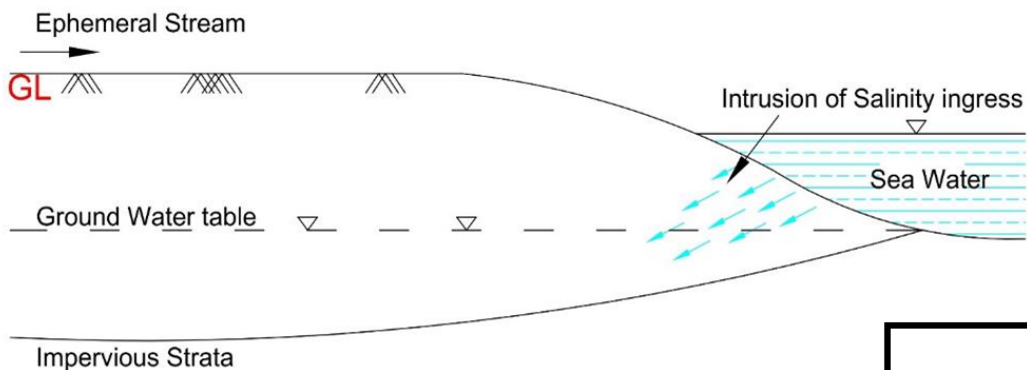


Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005) -A success story 14 years after completion

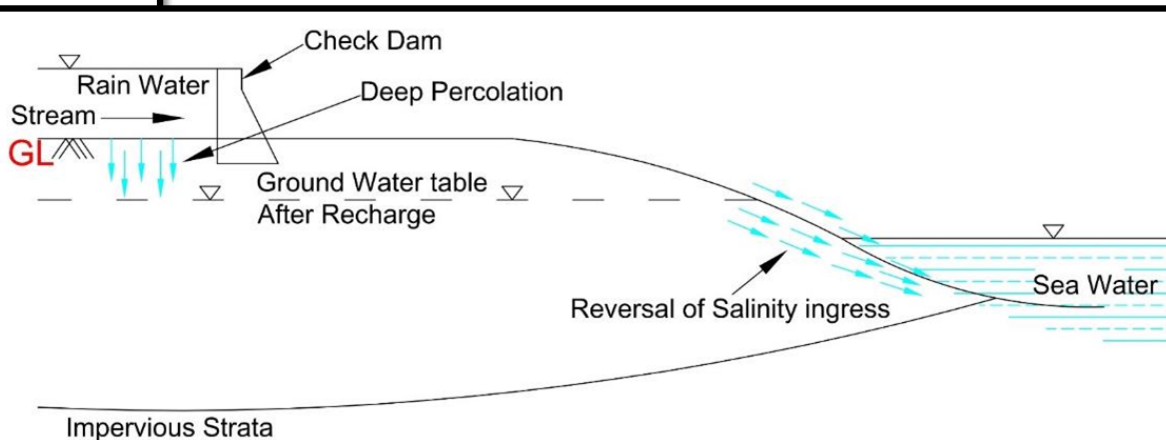
- About 300 Rainwater Harvesting structures were designed and Constructed that included ;
 - Check Dams on various streams.
 - Development of new village ponds.
 - Repair of old village Ponds that included.
 - ❖ Bund Strengthening, pitching etc.
 - ❖ Provision of spill channels for safe passage of surplus floods.
 - ❖ Deeping of ponds.
 - ❖ Diversion of Rain Water into Pond.

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005) -A success story 14 years after completion

Effect of construction of Rainwater Harvesting Structures on Ground Water Recharge



A. Before construction of Rain Water Harvesting structure near Sea Coast.



B) After construction of Rain Water Harvesting structure near Sea Coast.

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005) -A success story 14 years after completion

Ground Water Recharge

Storage capacity of structures: 0.02 to 0.04 MCM (Average capacity : 0.03 MCM)
(about 300 lakh liters)

Annual Recharge : 3 x storage volume

Total volume of Rainwater : 3 x 300 lakh liters say, **900 lakh liters annually**

Domestic Water Demand:

Per Capita demand : 70 lit/capita/day

Therefore, for a village with population of **500 persons**,

Total water demand : 70 x 500 x 365 liter/year = **127.75 lakh liters annually**

Net Ground Water Recharge : Total Rainwater Recharge – Total water demand

: 900 – 127.75 lakh liters = **772.25 Lakh liters (Say, 0.077 Million M³)**

Hence, one rainwater harvesting structure constructed to cater for a village with population of 500 persons would help in 772.25 lakh liters groundwater recharge

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



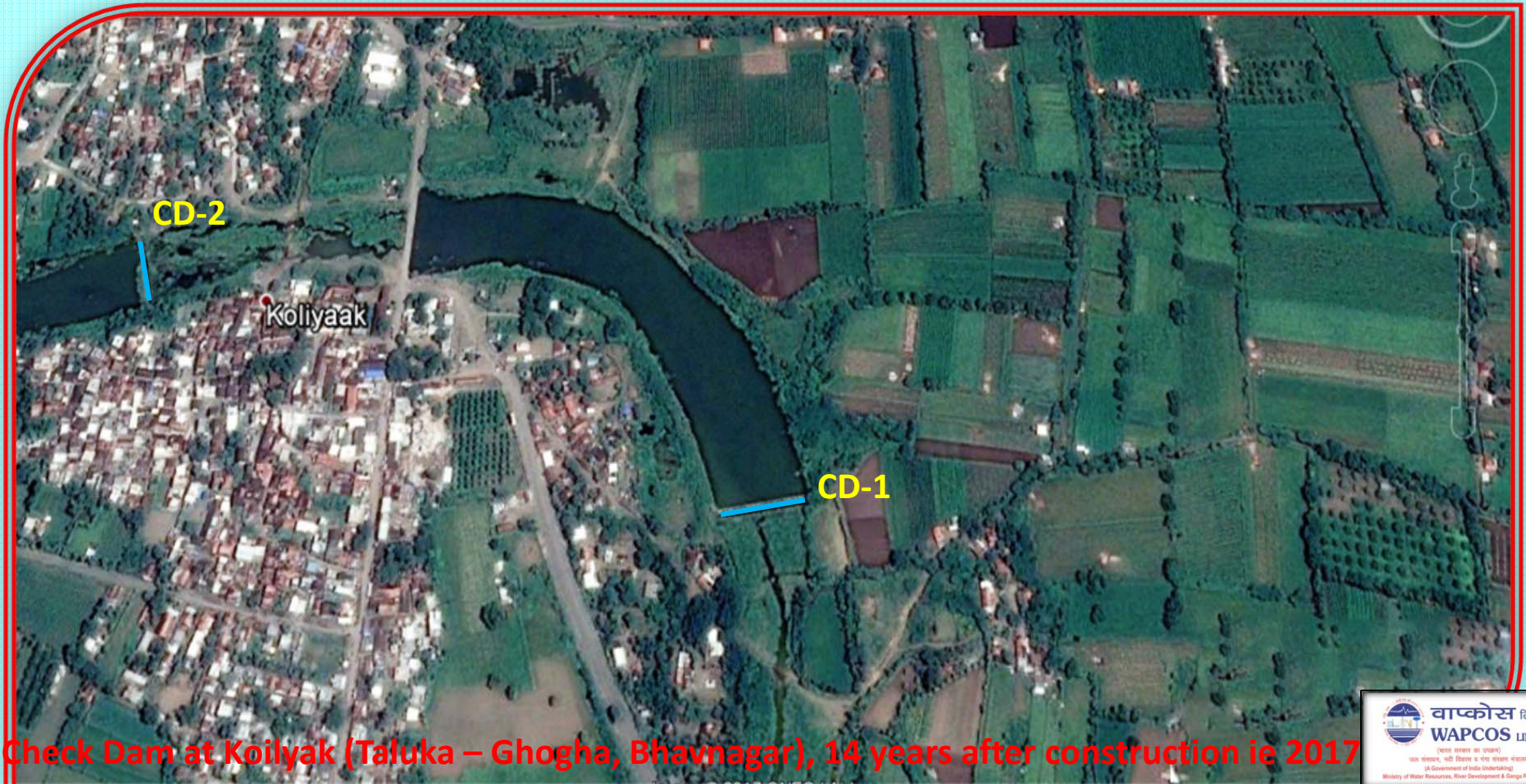
Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Check Dam at Koliyaak (Taluka – Ghogha, Bhavnagar), 14 years after construction ie 2017

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

Check Dam at Malekvadar, Bhavnagar- 14 years after Construction (in 2017)

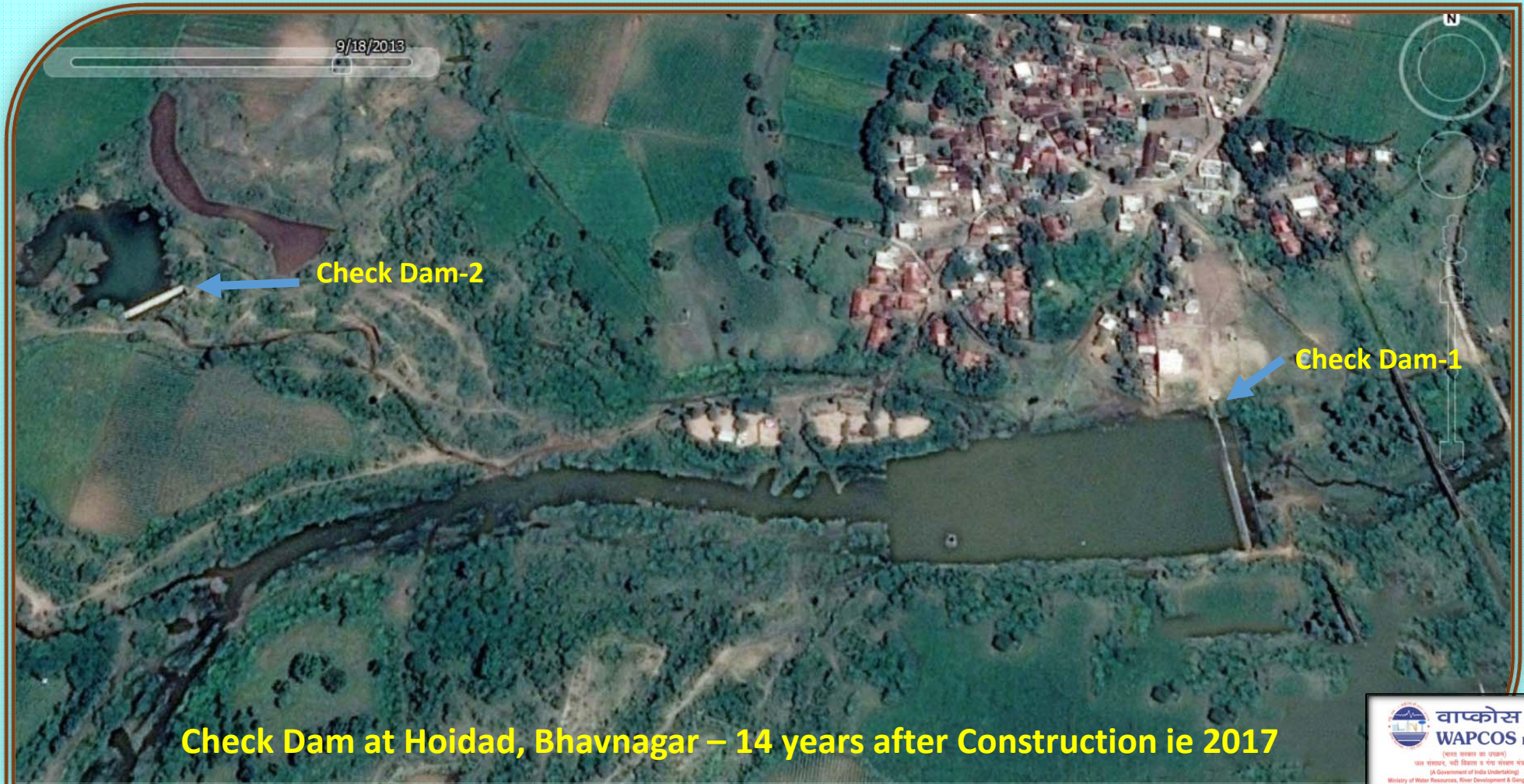


Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

2010
Check Dams at Hoidad, Bhavnagar – Before Consturction (2003)



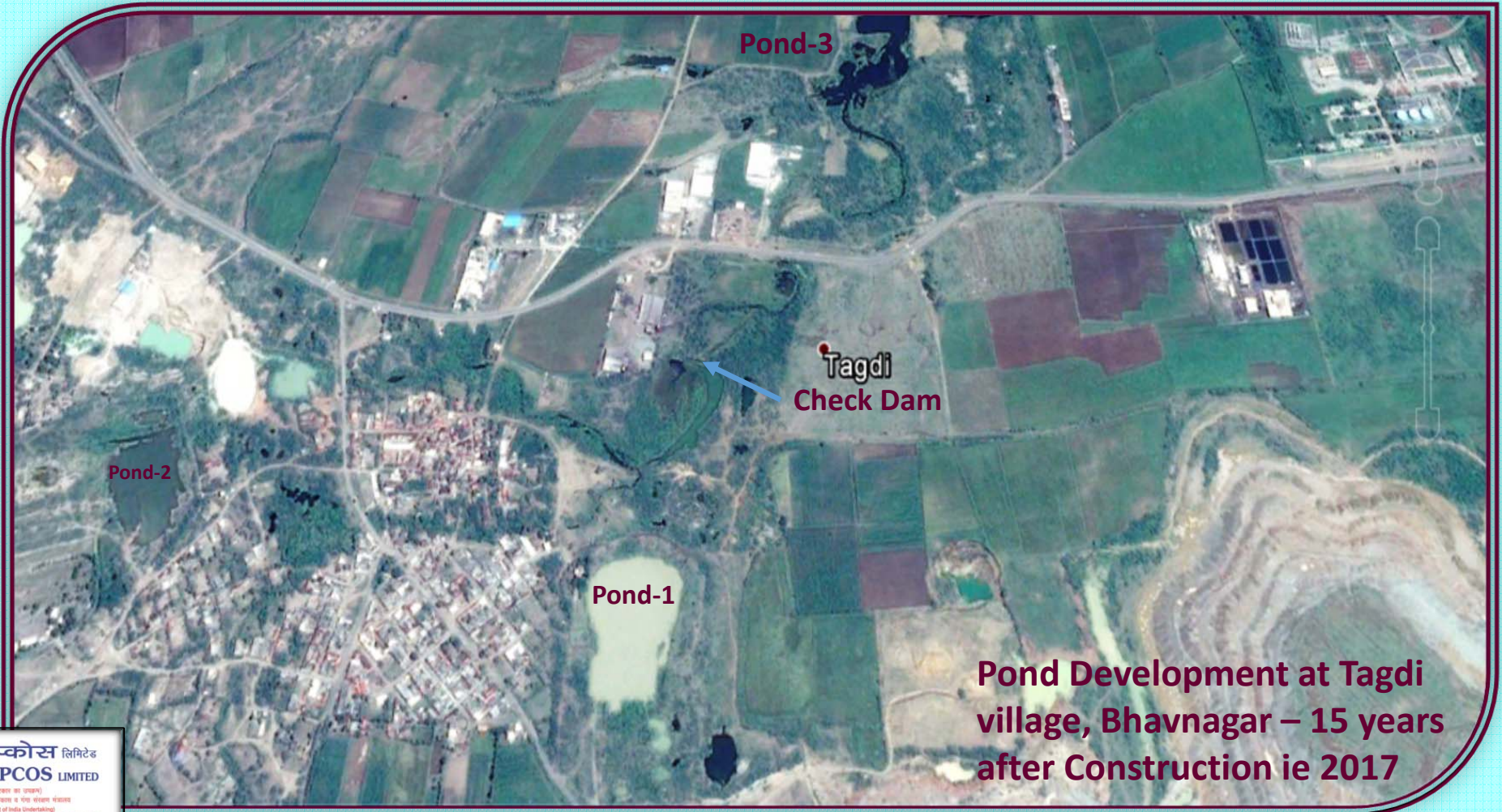
Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



**Pond Development at Tagdi
village, Bhavnagar – 15 years
after Construction ie 2017**

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

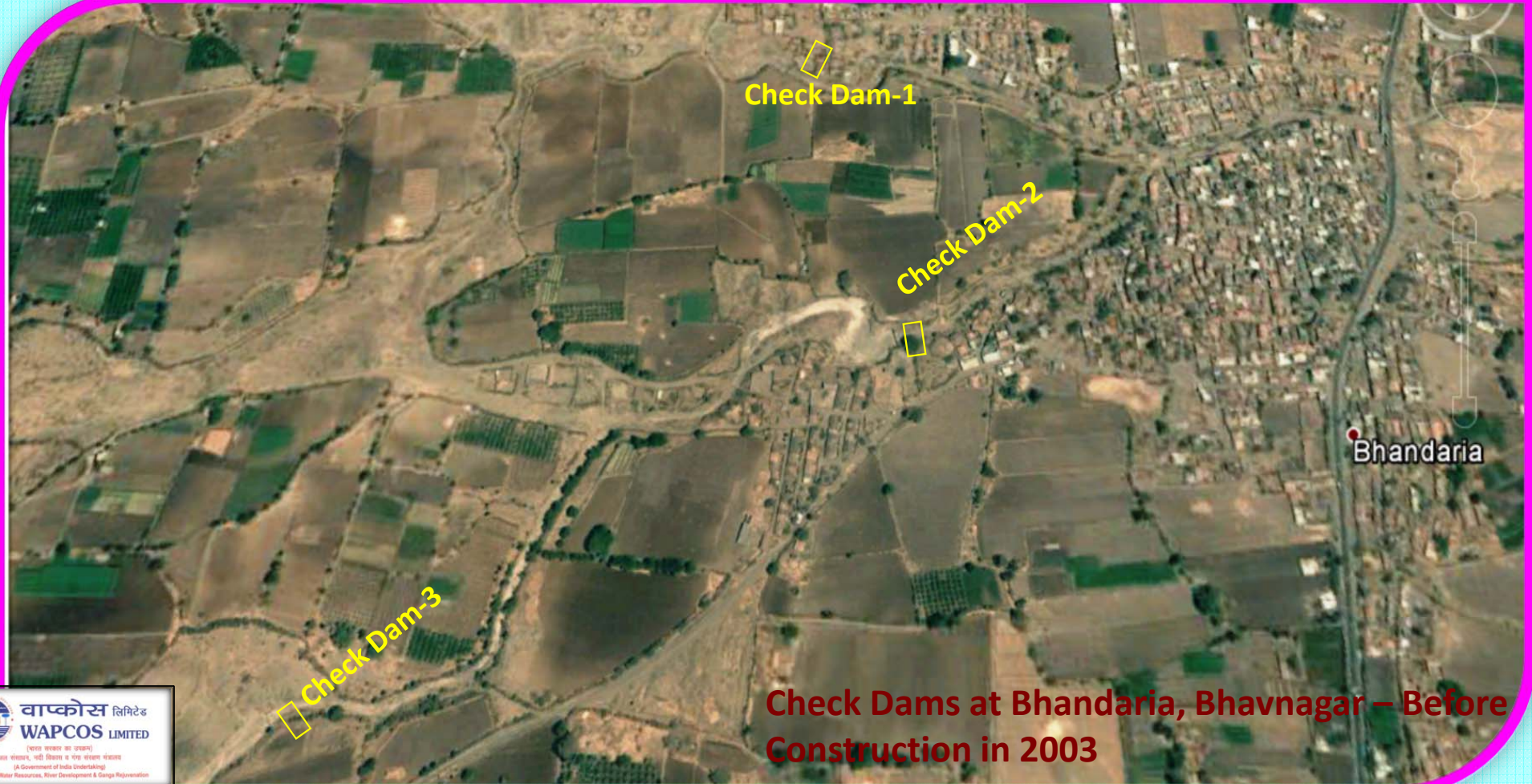


Pond Development,
Kobadi, Bhavnagar –
Before Construction 2003

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

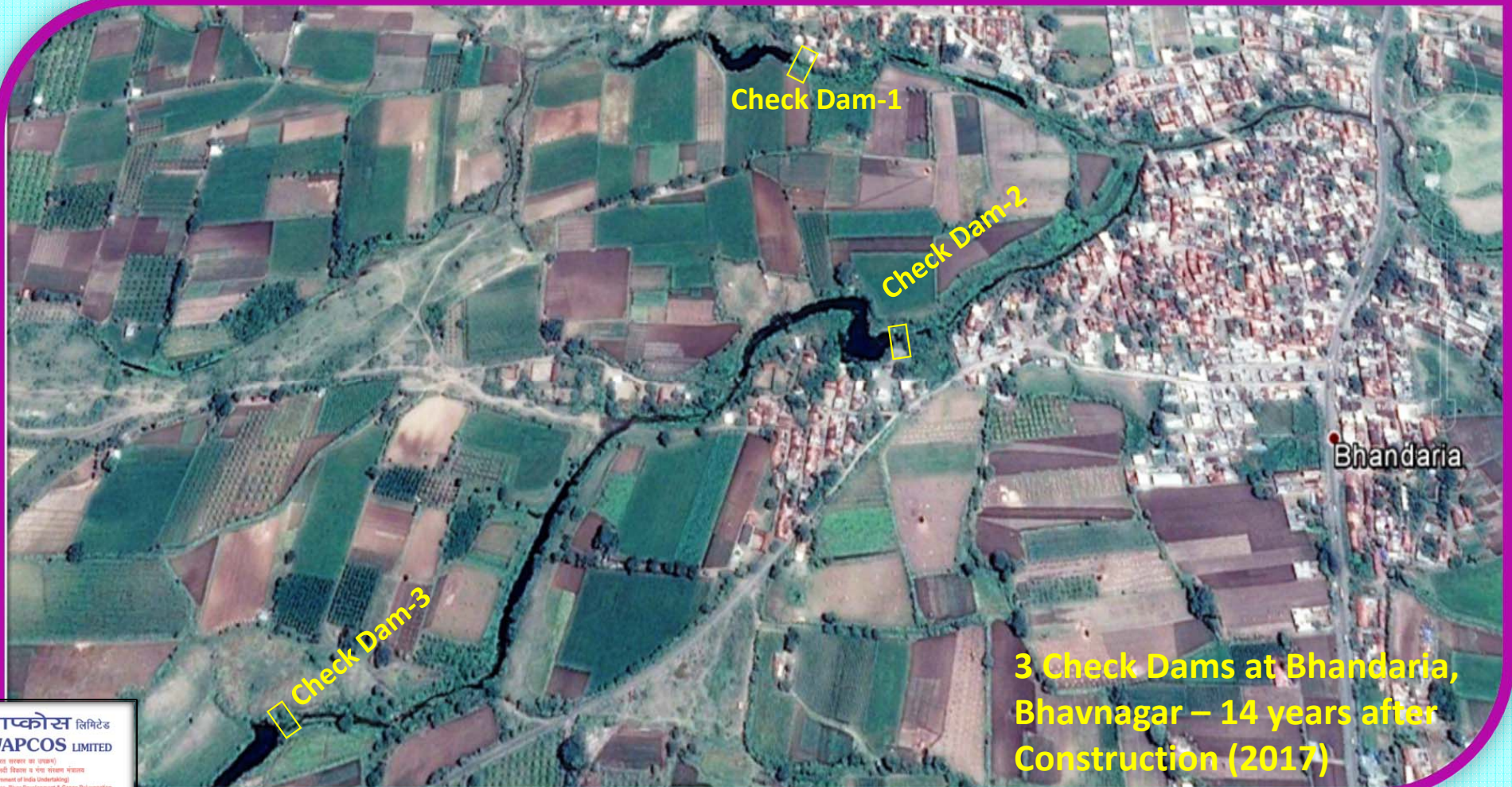


Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Check Dams at Bhandaria, Bhavnagar – Before Construction in 2003

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



3 Check Dams at Bhandaria,
Bhavnagar – 14 years after
Construction (2017)

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Tansa

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

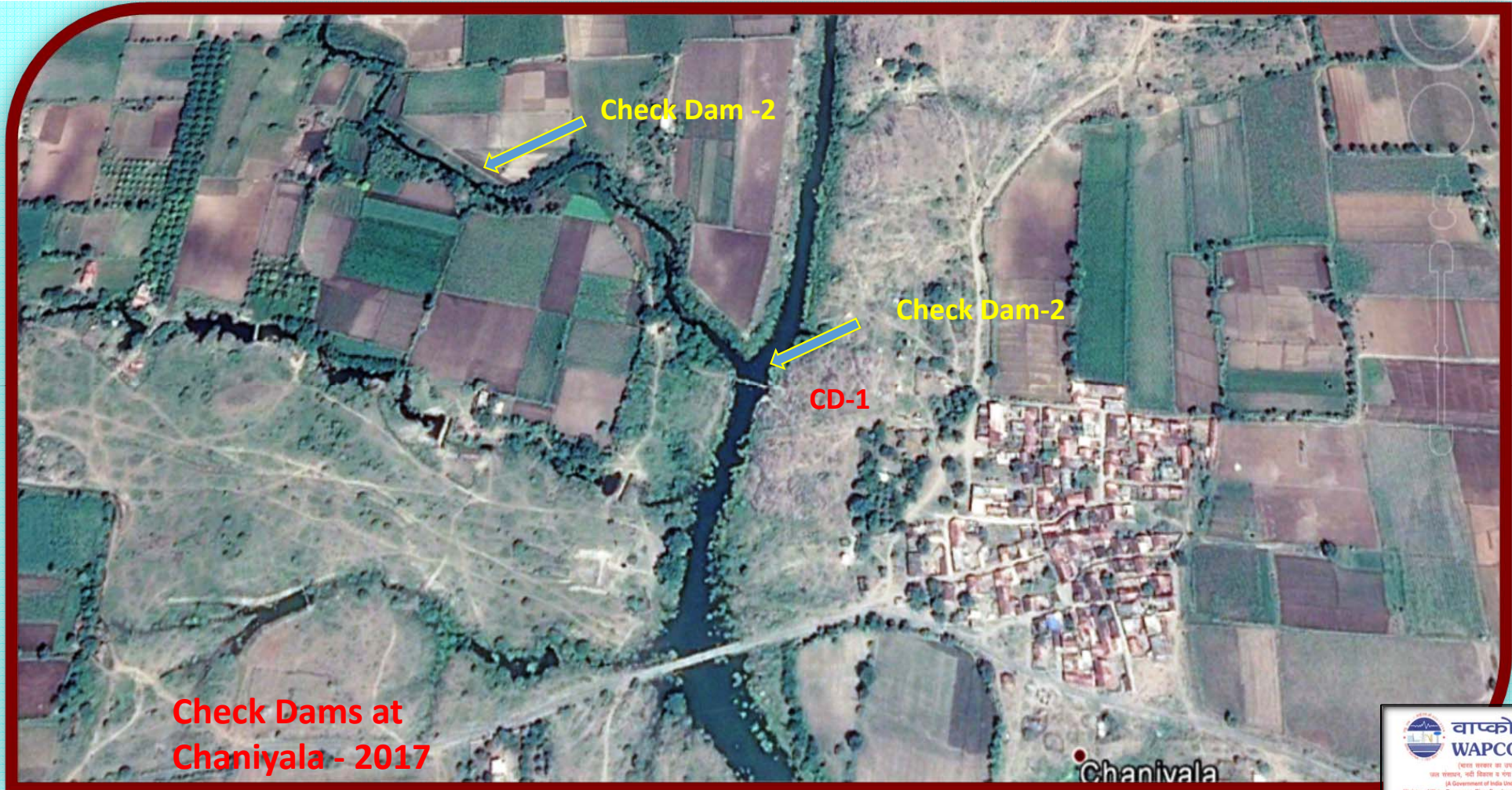


Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



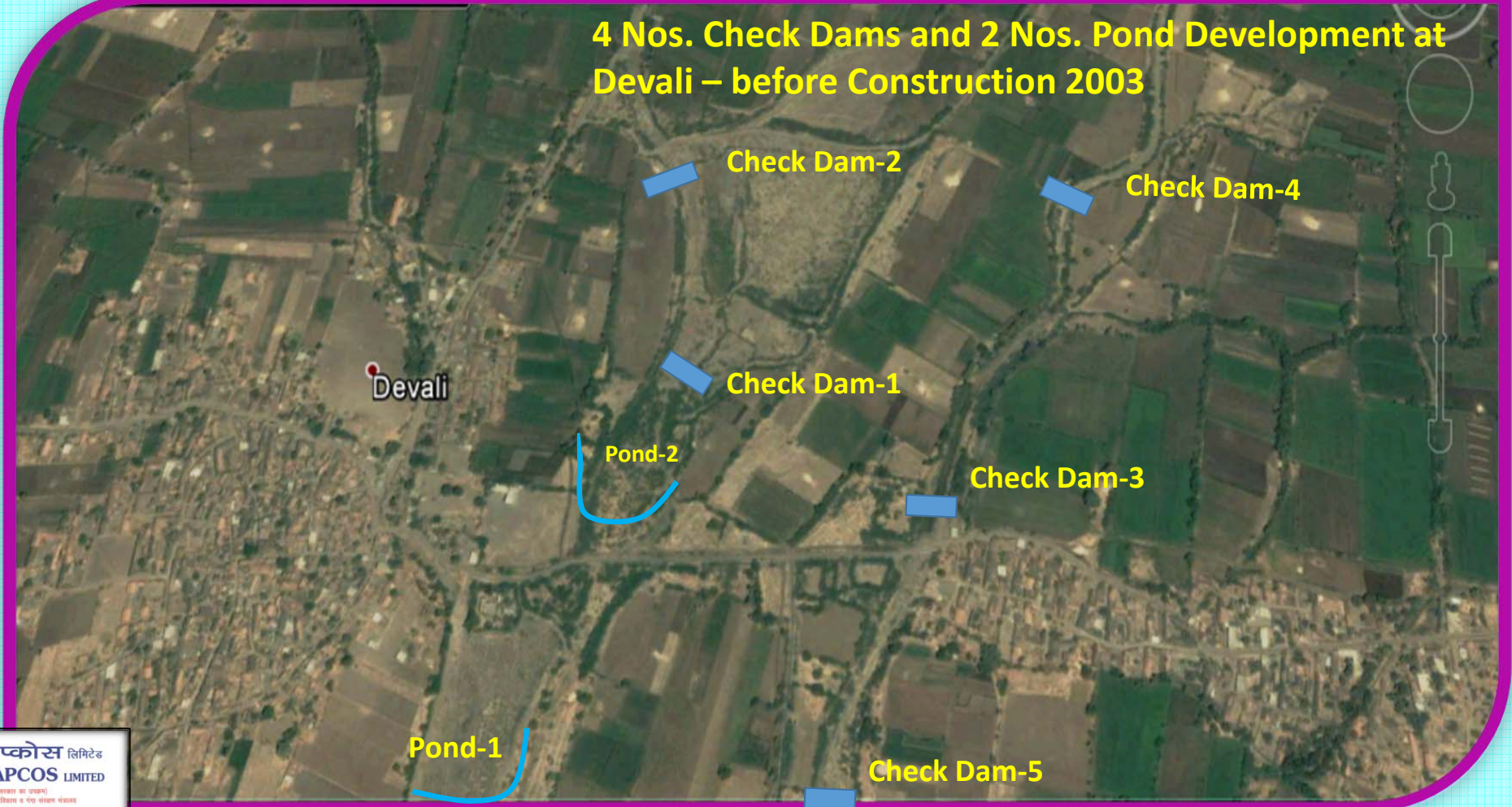
2 Check Dams at Chaniyala,
Bhavnagar – Before
Construction 2003

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

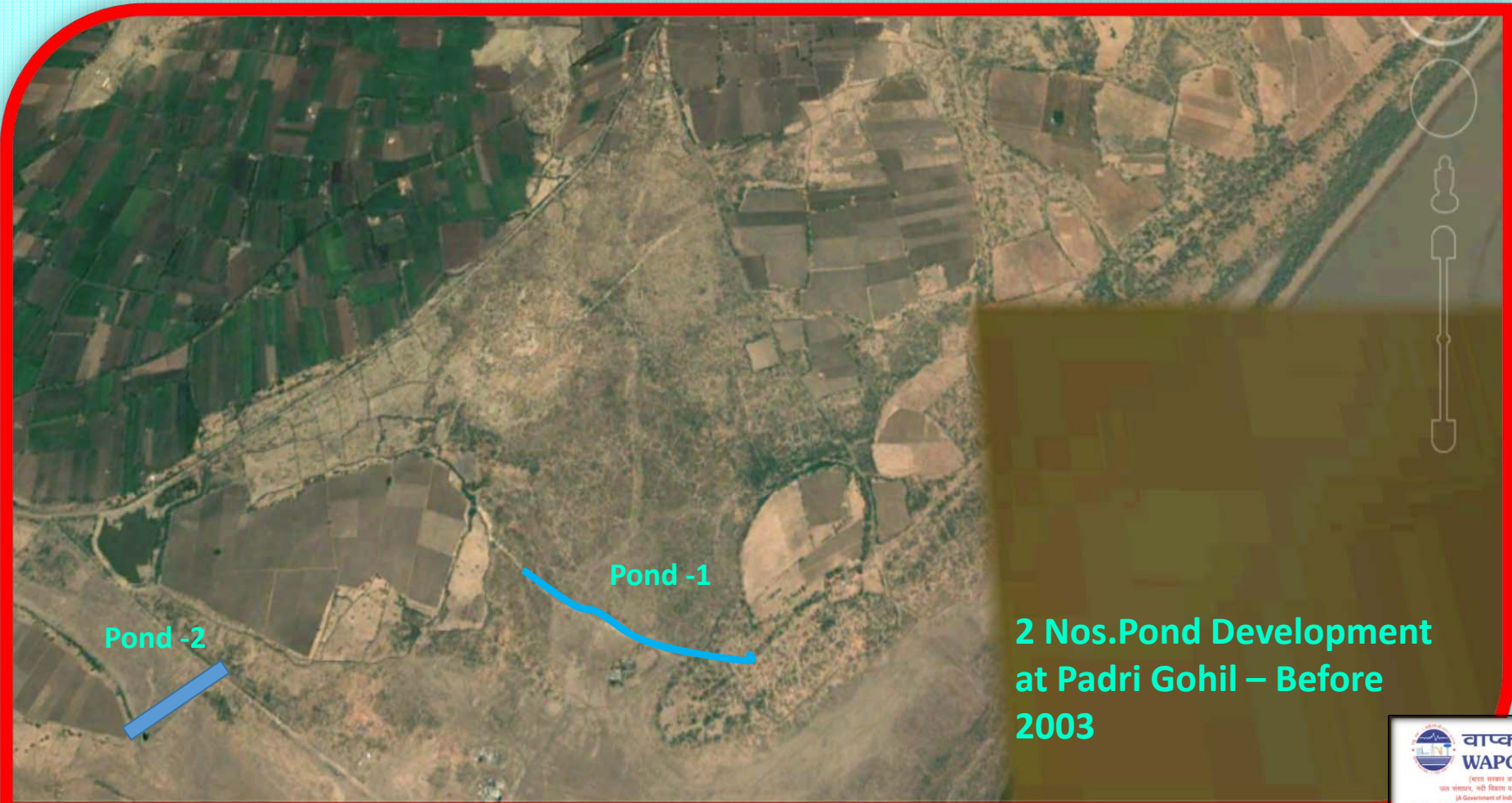


Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

4 Nos. Check Dams and 2 Nos. Pond Development at
Devali – before Construction 2003

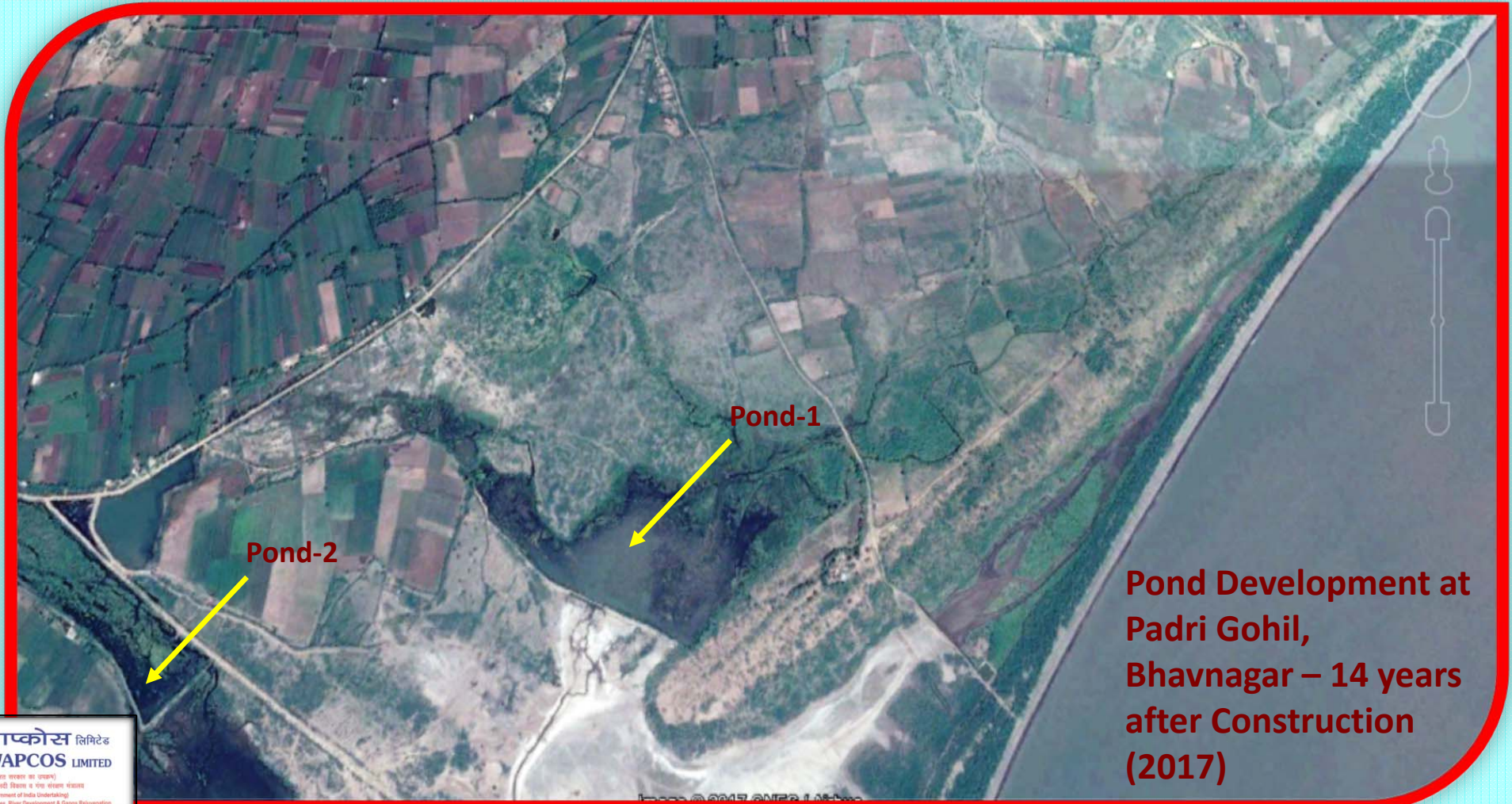


Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



2 Nos.Pond Development
at Padri Gohil – Before
2003

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



1 No. check Dam and 1 No Pond
Development at Bharapara,
Bhavnagar – Before Construction
(2003)

Pond Development

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



1 Nos. Pond Development and 1
Check dam at Bharapara,
Bhavnagar – 14 years after
Construction (2017)

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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



3 No Check Dams at Mithivirdi – 14 years after Construction (2017)

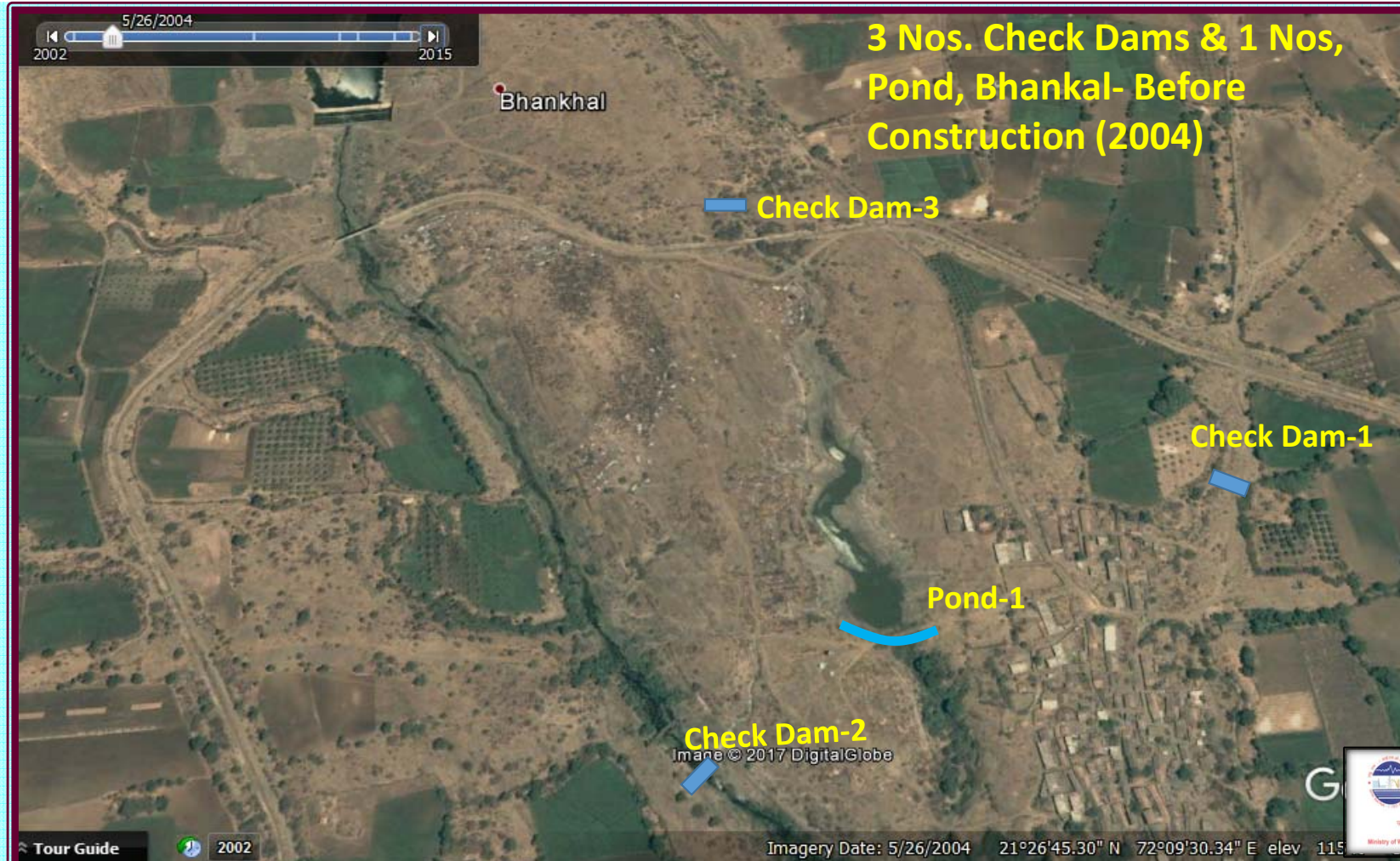
Image © 2017 CNES / Airbus

Check Dam Nos 1 and Tidal Control Structure

Image © 2017 CNES / Airbus

Imagery Date: 12/30/2012 21°29'29.53" N 72°14'08.05" E

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

3 Check Dams & 1 Pond,
Bhankhal – 10 years after
construction (2013)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



1 Pond Development at
Rampar, Bhavnagar – 14 years
after Construction 2017

Image © 2017 CNES / Airbus

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



1 Check Dam,
Velavadar,
Bhavnagar -
2003

Goog

Image © 2017 DigitalGlobe

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)



1 Check Dam at Velavadar,
Bhavnagar – 14 years after
Construction (2017)

Image © 2017 DigitalGlobe

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

Pond Development at
Bhadbhadiya, Bhavnagar –
Before Construction 2003



2003

Imagery Date: 12/22/2003

21°35'02.27" N 72°

Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

Pond Development,
Bhadbhadiya – 14
years after work (2017)

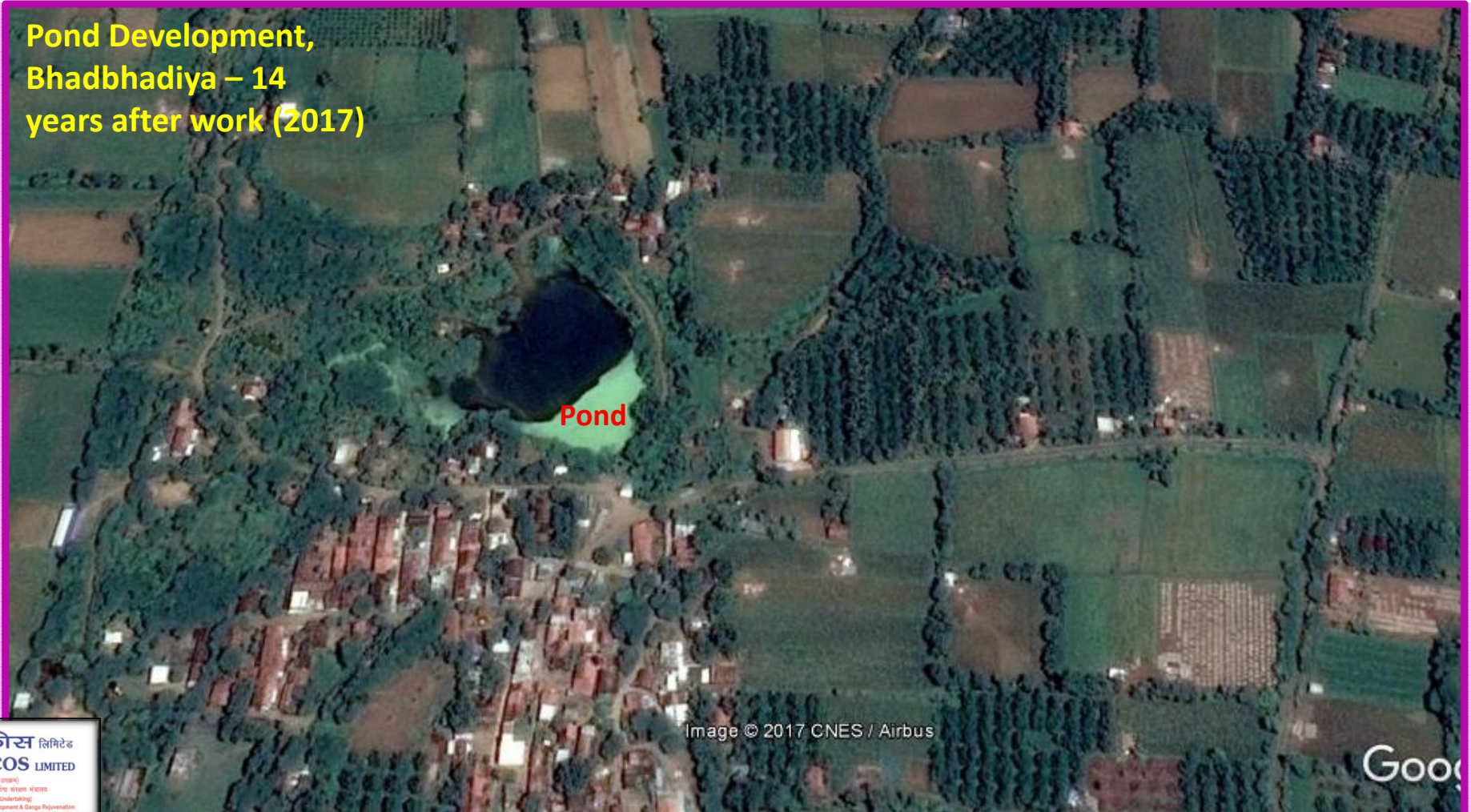


Image © 2017 CNES / Airbus

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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

Check Dams at
Tarasara, Bhavnagar –
before Construction
(2003)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005)

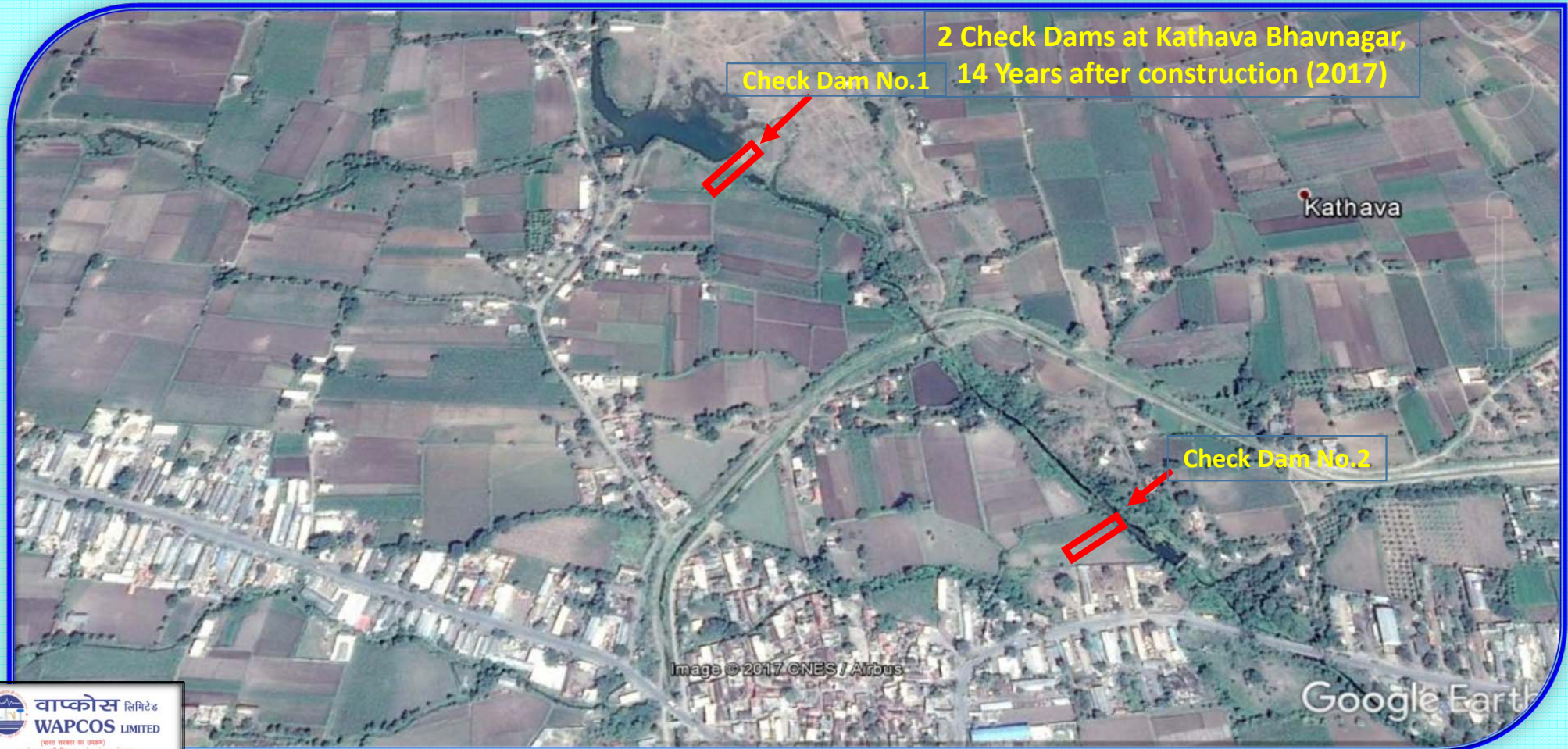
Check Dams at Tarasara, Bhavnagar
– 14 years after Construction (2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2002-2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2002-2017)



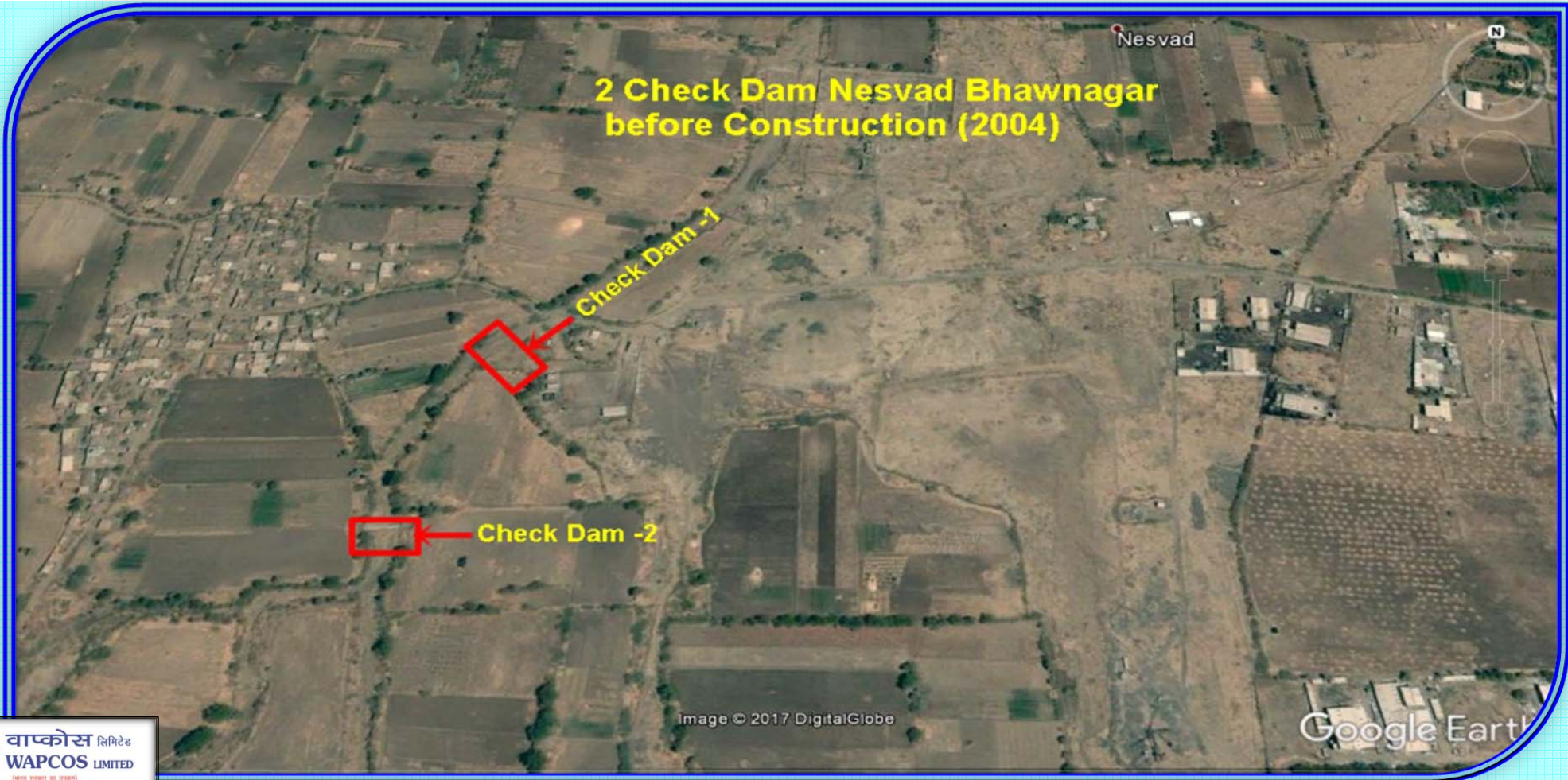
Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2002-2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2002-2017)



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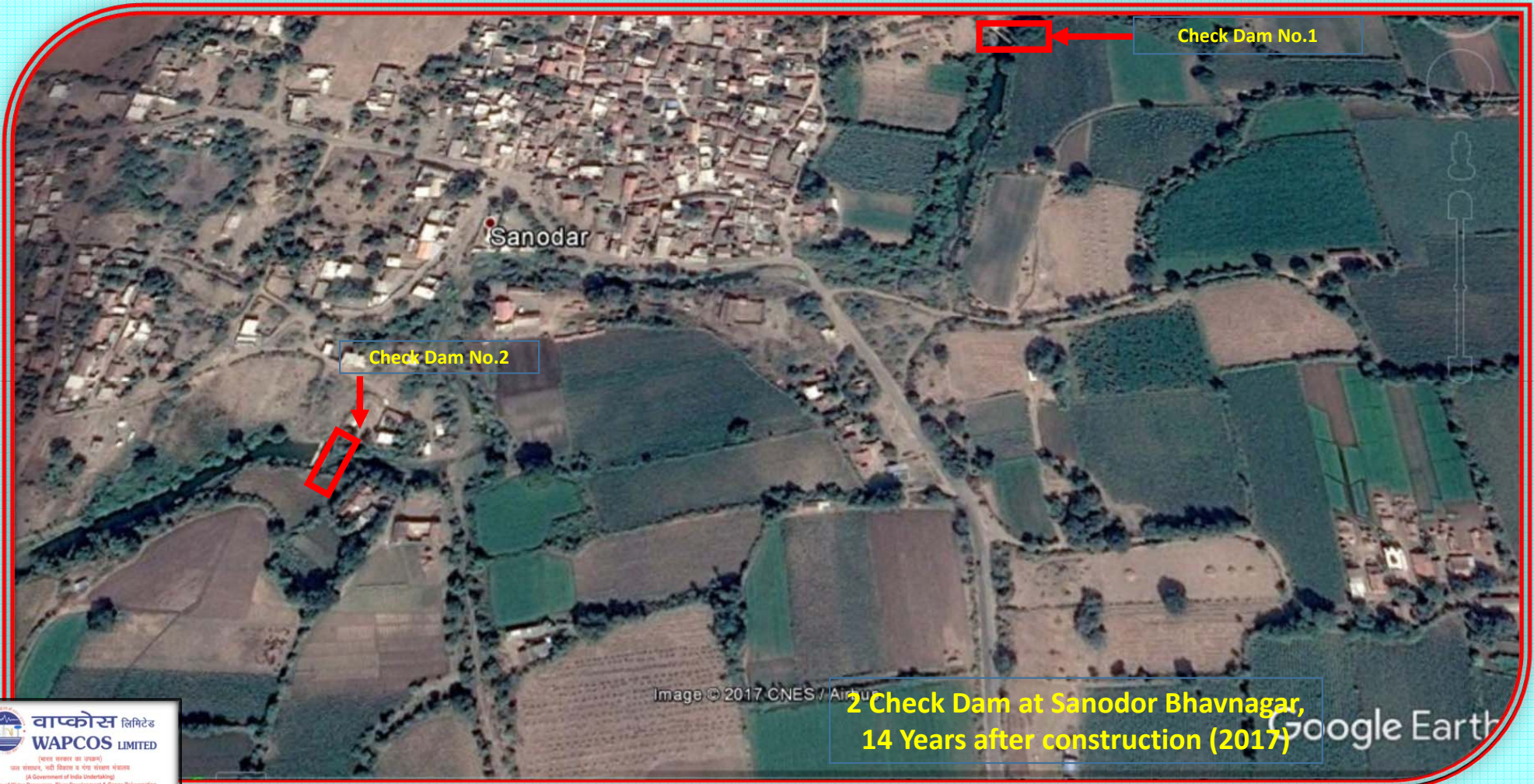
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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2004-2017)



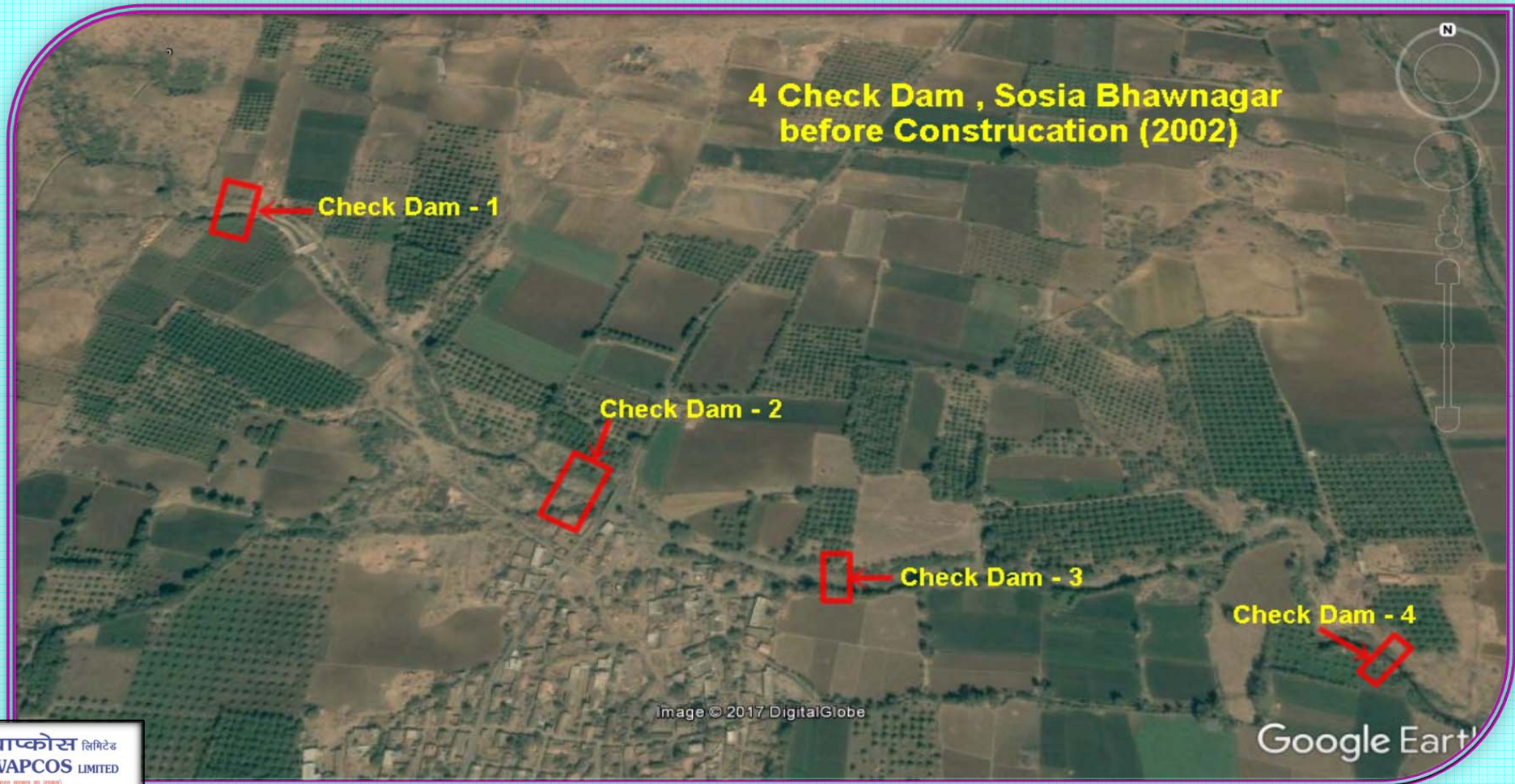
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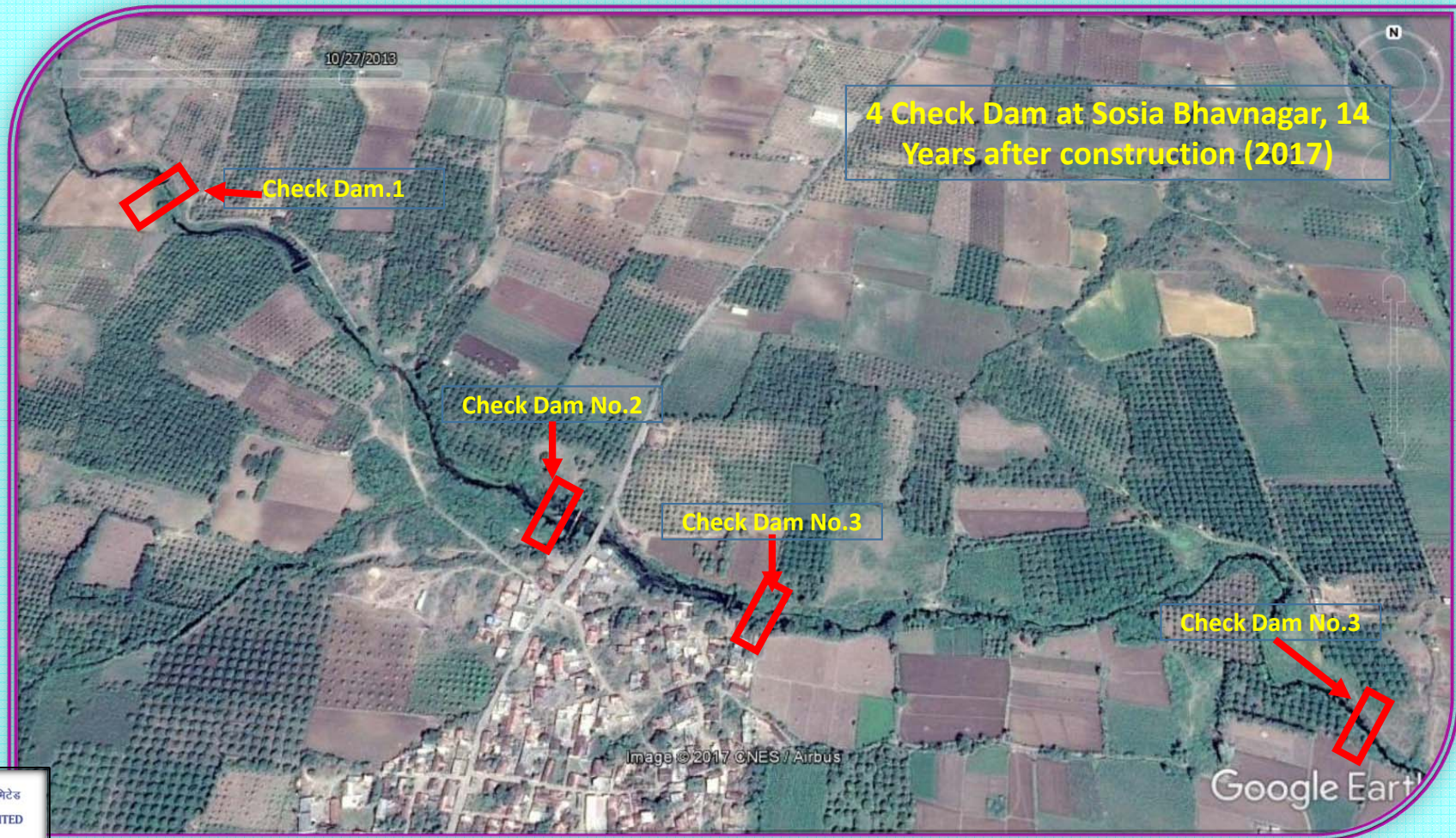
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एनएसएसएस, एनएसएसएस व एनएसएसएस
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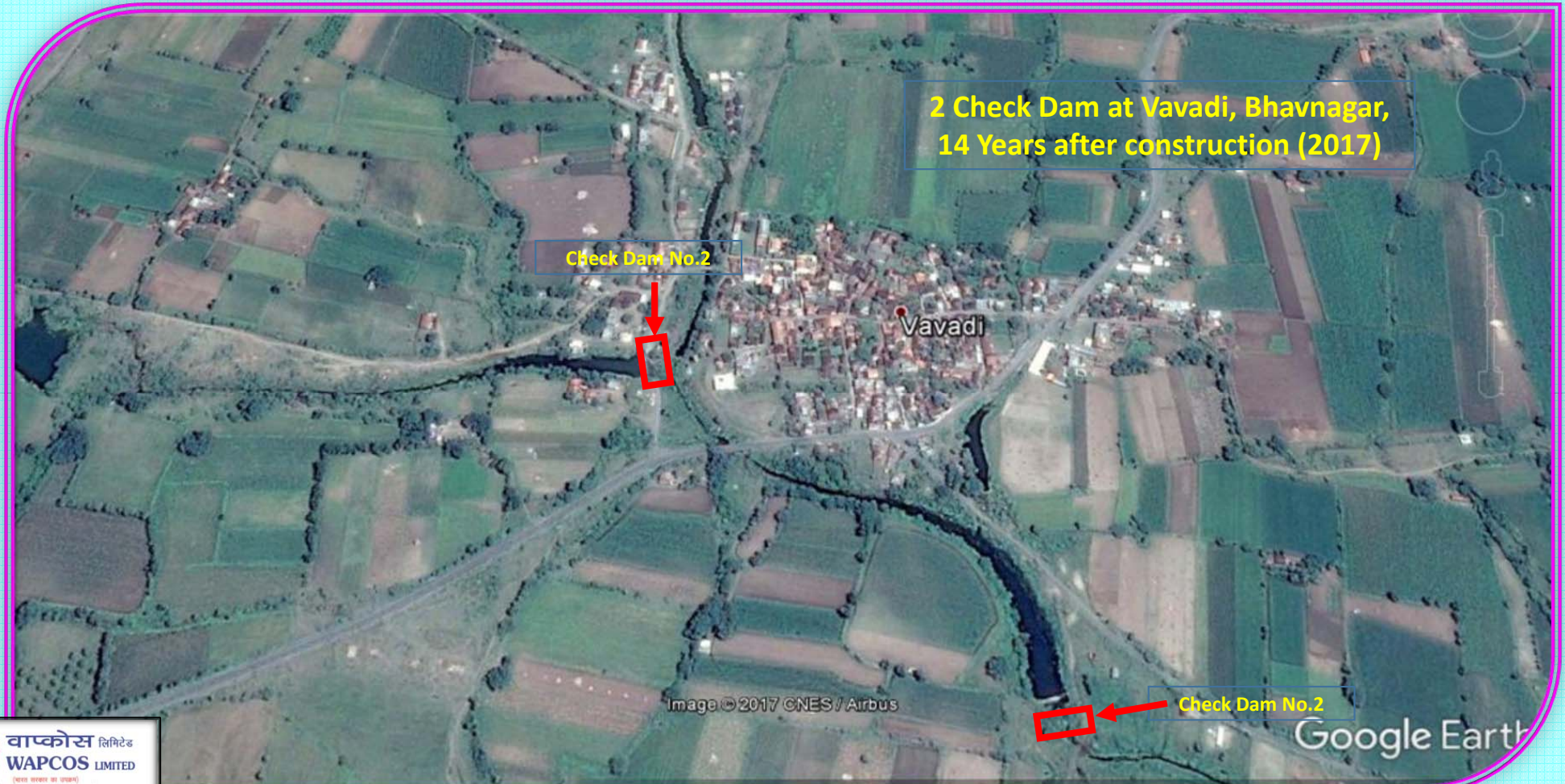
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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2017)

2 No. Pond deepening, Thalsar, Bhavnagar
before Construction (2003)

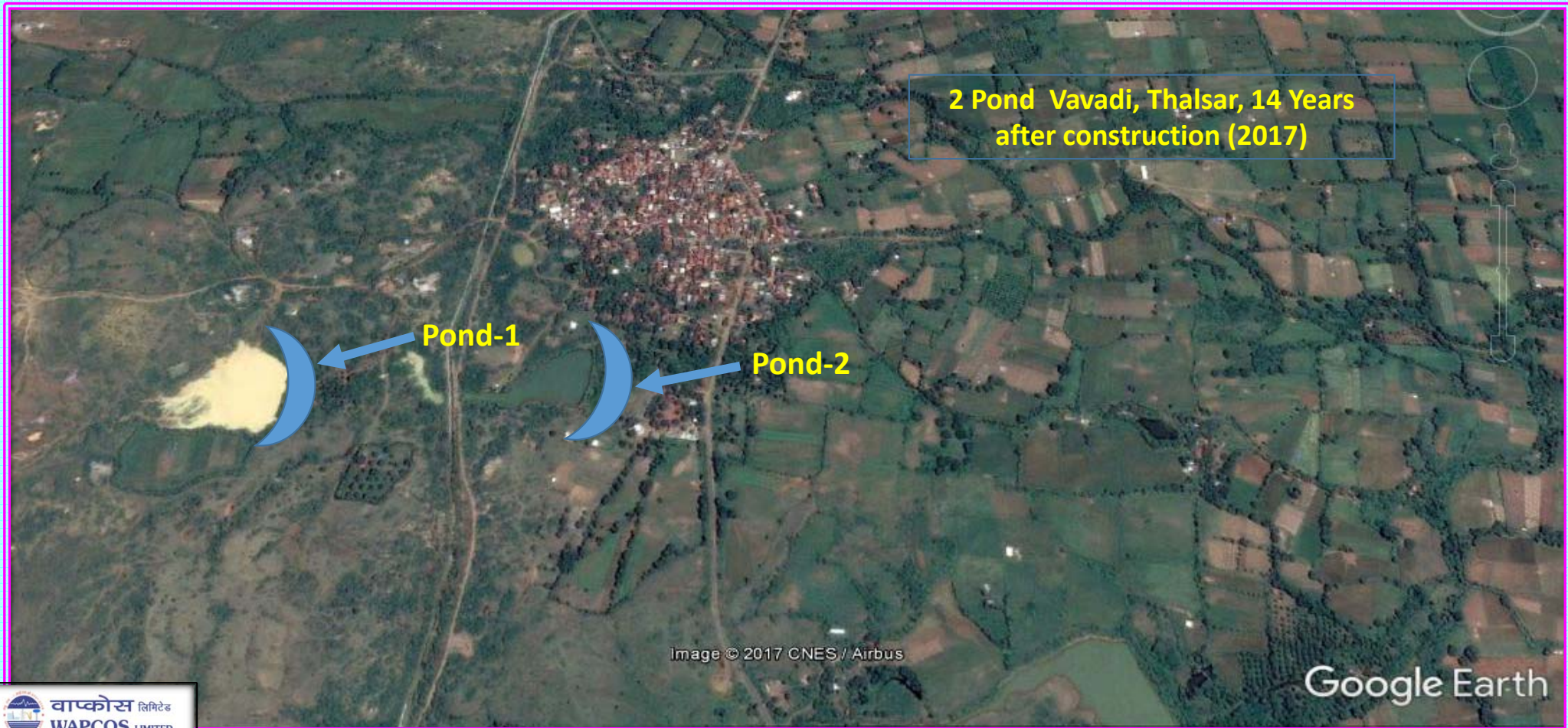
pond-1

pond-2

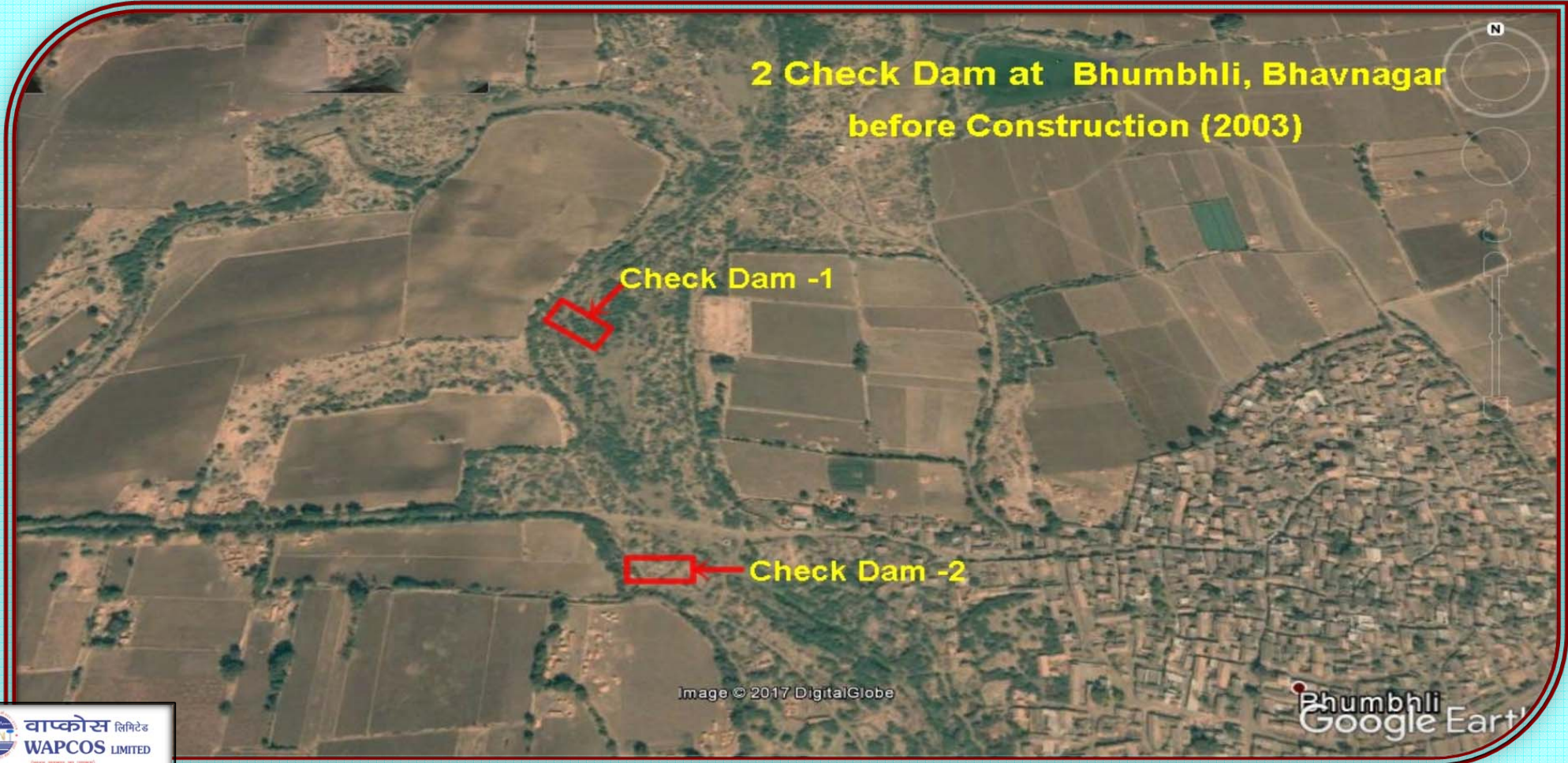
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Image NASA

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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2017)

2 Check Dam, Bhuteshwar
before Construction-(2003)

Check Dam -2

Check Dam -1

Bhuteshwar

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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2017)

2 Check Dams at Khadasaliya, Bhavnagar,
14 Years after construction (2017)

Check Dam -1

Check Dam -3

Check Dam -2

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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2004-2017)



1 No. check dam and 1 no. pond development, Thordi, Bhavnagar – Before construction (2004)

Check Dam

Thordi

Pond

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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2004-2017)

10/27/2013

1 No. check dam and 1 no. pond development, Thordi, Bhavnagar
—14 years After construction
(2017)

Check Dam

Thordi

Pond

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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2004-2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2004-2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2002-2017)

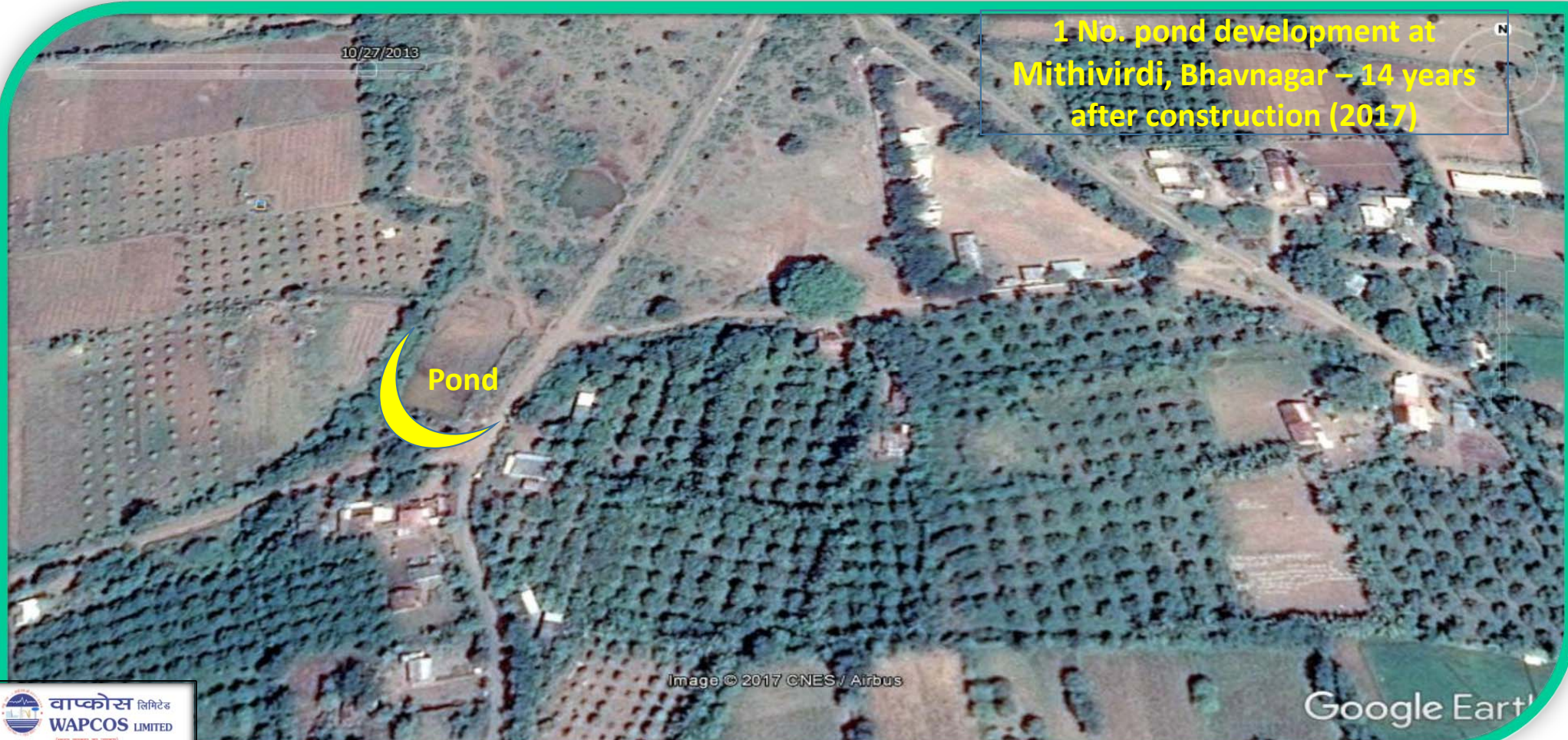
1 No. pond development at
Mithivirdi, Bhavnagar – Before
construction (2002)

Pond

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Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2002-2017)

2 Check Dam 1 No. Pond development at
Pithalpar, Bhavnagar – before
construction (2004)

Check Dam

Check Dam

Pond

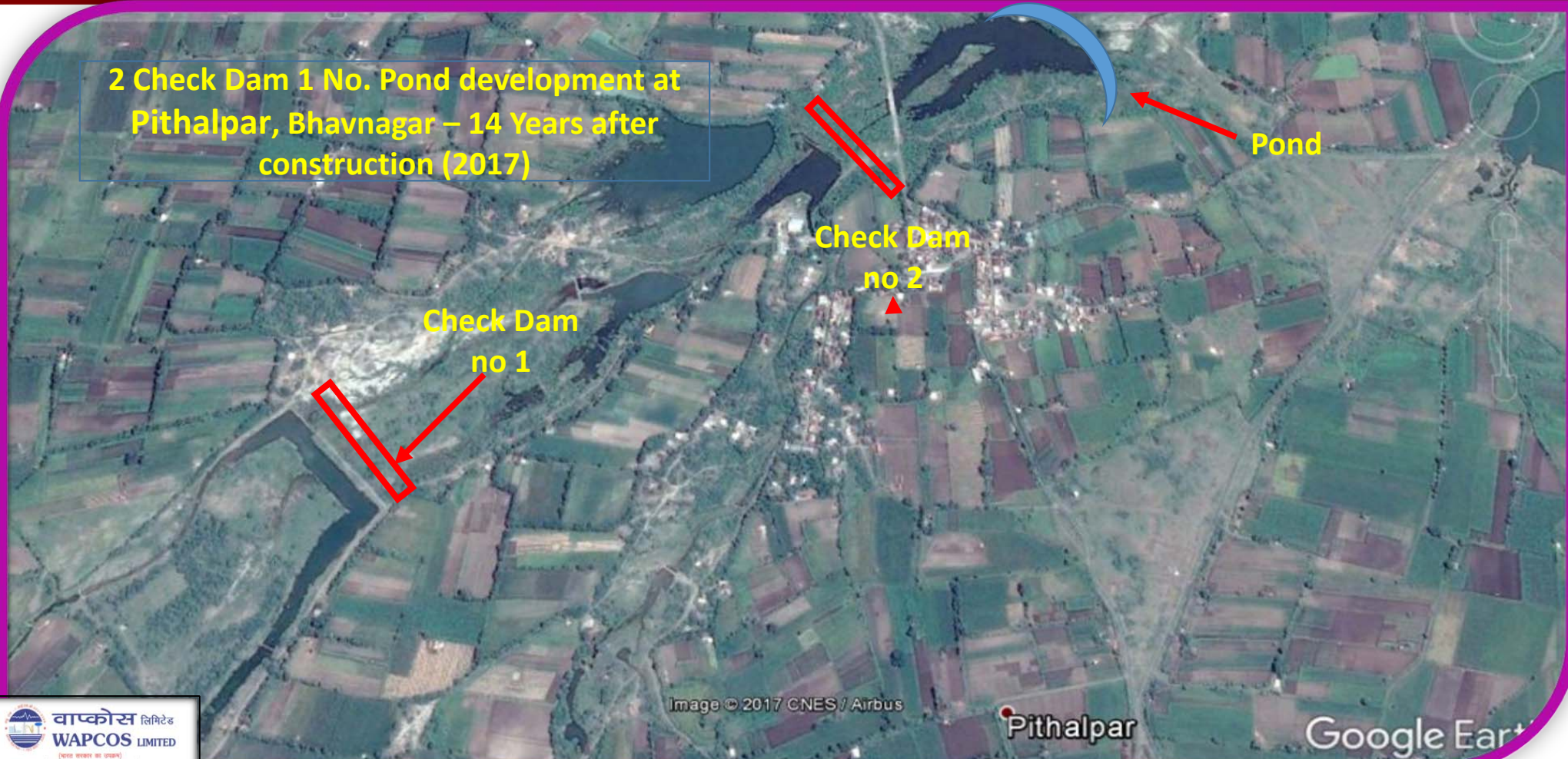
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Pithalpar

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2 Check Dam 1 No. Pond development at
Pithalpar, Bhavnagar – 14 Years after
construction (2017)



Ghogha Rainwater Harvesting Scheme including Construction Supervision in 82 villages of Saurashtra, Bhavnagar (2003-2005) -A success story 14 years after completion

Conclusion - The area where WAPCOS proposed Rain Water Harvesting structures were constructed has resulted in:

- Development and enhancement of ground water resources
- Improvement in ground water quality, due to dilution of dissolve impurities due recharge.
- Checking salinity ingress near coastal area, which is evident from increase in greenery after construction.
- Social and financial impact due to increase in crop and dairy production.
- Improved availability of drinking water.