

Remote sensing solutions and applications for Oil&Gas market

The Planetek group

Parent company: Planetek Italia s.r.l. Bari

Subsidiaries: Planetek Hellas EPE Athens
GAP s.r.l. Bari
GEO-K s.r.l. Rome



Who we are



Planetek Italia is an Italian SME (Small and Medium Enterprise), established in 1994, which employs 45 men and women, passionate and skilled in Geoinformatics, Space solutions, and Earth science.

We provide solutions to exploit the value of geospatial data through all phases of data life cycle from acquisition, storage, management up to analysis and sharing.

We operate in many application areas ranging from environmental and land monitoring to open-government and smart cities as well as scientific missions and planetary exploration.

Our main activity areas are:

- Satellite, aerial and drone data processing for cartography and geo-information production;
- Design and development of Spatial Data Infrastructures for geospatial data archive, management and sharing;
- Design and development of real-time geo-location based solutions, through positioning systems such as GPS/Galileo/GNSS and indoor location systems;
- Development of software for the satellite on-board data and image processing and for ground segment infrastructures.

Planetek Italia is also a dealer of Hexagon Geospatial software and a data provider of satellite images.

The Planetek group consists of four companies based in Italy and Greece and is active in both national and international markets.

Planetek Italia is structured in Strategic Business Unit focused on different markets: Government & Security, European Institutions, Space Systems, Business to Business.

Business Units



Business to Business

It offers solutions to companies operating in the Oil & Gas, Water, Renewable Energy, transport (railways, roads) sectors and engineering works and infrastructure activities.

Its products range from systems for business intelligence on geographic data to the creation of geo-informative products and to value-added data from Earth observation.

SpaceStream

The target market consists of space agencies (e.g. the Italian Space Agency with the COSMO-SkyMed program, and the European Space Agency with the Sentinel program), those related to them (such as Galileo) and the major players in the aerospace market.

It develops and integrates hardware and software infrastructures for the acquisition, processing and distribution of remote sensing data along their entire chain of production: from Earth Observation to Deep Space; from the Space Segment to the Ground Segment and to the User Segment.

The main responsibilities of the SBU fall into Systems and Software Engineering with strong verticalization towards Space Mission Analysis and Design (SMAD).

Government & Security

It offers application solutions and services in the Public Administration market at national and international levels, and for the Defence, Educational and scientific research markets in Italy.

It provides geospatially powered solutions to the agencies and institutions of the European market such as the European Environment Agency, the European Defence Agency, the European Union (EC, REA, JRC).

It develops solutions for the Earth observation using optical and radar data from satellite, aircraft and drones.

It develops Spatial Data Infrastructures (SDI) compliant to INSPIRE, based on the Cart@net® platform, using Free Open Source and commercial software from major vendors. It offers solutions for the creation of open data geographies and metadata catalogs.

It distributes remote sensing satellite data from major international operators through the Preciso® product family.

It looks after the distribution of Hexagon Geospatial products within the Italian market.



O&G solutions

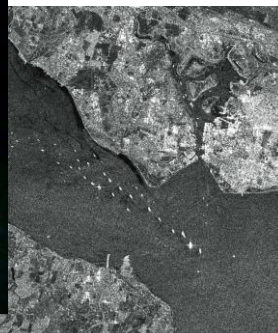


The Earth Observation using **satellite** technologies is firmly embedded within the oil and gas industry, through the whole **Oil & Gas lifecycle** from pre-acquisition to full operations.

Earth Observation can save costs and support health and safety, often at the same time. Considering that legislative constraints for **environmental sustainability** are getting more and more stringent, the remote sensing will probably play a crucial role for this market in fulfilling these requirements.

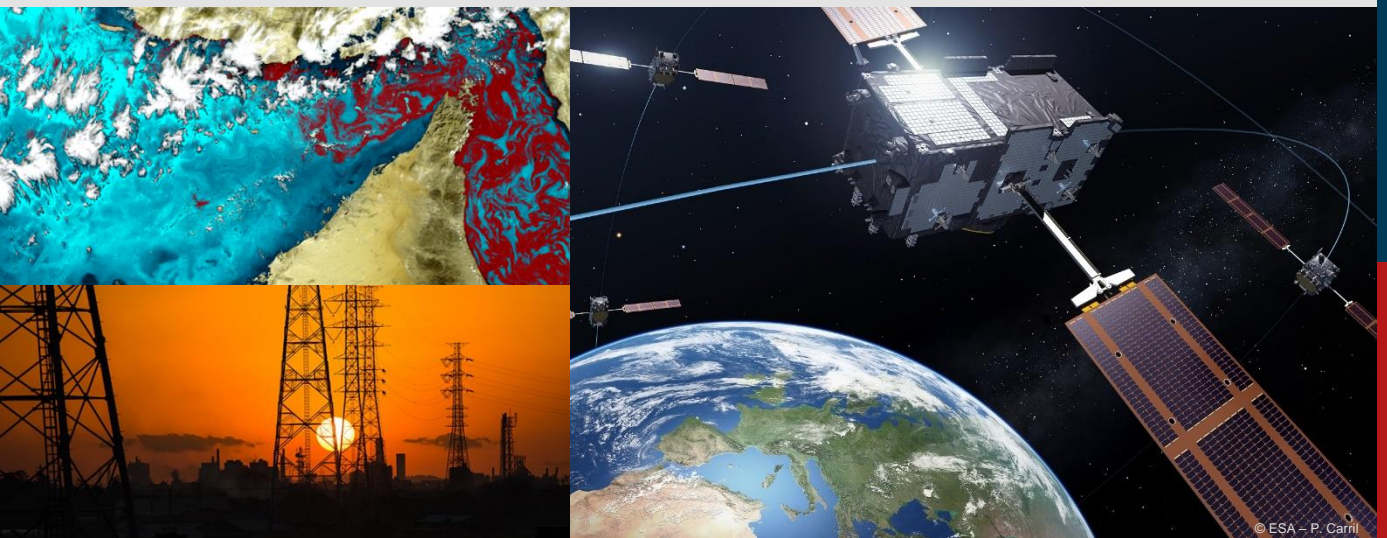
Earth Observation from satellite sensors can provide many applications for the Oil & Gas industry throughout the various phases of **exploring, developing and exploiting** as well as **decommissioning** of a hydrocarbon field, depending on its location:

- **Onshore:** remotely sensed data can be used to assist the initial geological environmental assessment, but also the evaluation of geohazards or emergency analysis, civil engineering, heritage mapping etc.;
- **Offshore:** EO data can help to describe the marine environment in terms of turbidity, total suspended matters, temperature and all the properties related to water quality and clarity, with the purpose of assisting the engineering activities and the plant monitoring phases.



Success Stories

A glance at some of our services and success stories in the Oil&Gas market.



Seismic Logistics

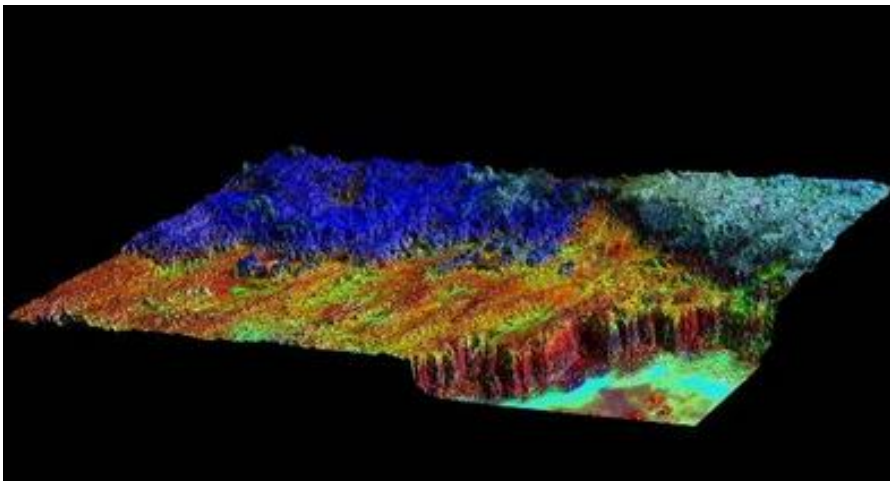
Mapping seismic survey operations

Satellite images of the Earth's surface give important information for planning **seismic surveys**.

Using combinations of images from different portions of the electromagnetic spectrum, geoscientists can discriminate land use, type of vegetation, lithology, elevation and surface roughness.

Then pre-survey evaluation of these remote sensing attributes helps to quantify risk factors during seismic campaigns for source and receiver signal quality, for vehicular and personnel access and for potential survey damage to the environment.

Nevertheless, data from satellite surveys give map and elevation views of features on and just below the surface, as well as giving an idea of the rock type.



Monitoring gas extraction and the surrounding environment

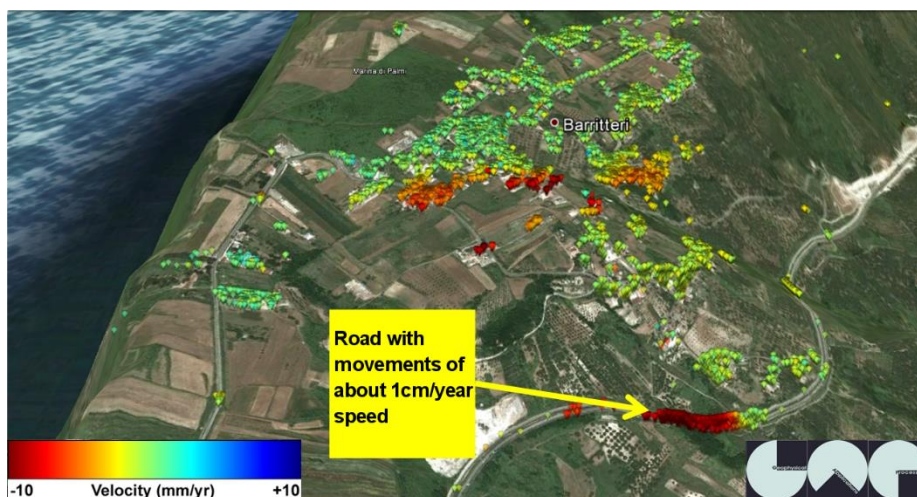
Subsidence control in response to underground gas extraction and storage operations

The stability of infrastructures in close proximity to underground storage sites is a very critical issue. Scientific studies have proved that on-shore drilling and gas storage activities, if performed without any control or regulation, can cause or worsen phenomena of variation of the earth surface, called **subsidence**.

Regular monitoring of gas storage sites ensures that reservoir and environmental integrity is not compromised by exceeding safe pressure levels.

Surface deformation measurements, together with injected and produced gas volumes, can be used to refine storage actions and to monitor the maximum safe working limits of the reservoir.

Planetek, using **radar** satellite technologies, can deliver subsidence maps – related to hydrocarbons extraction activities – at various spatial and temporal resolution, with the aim of monitoring operations and simplifying decision support tasks.



Natural Oil seeps Detection

Oil Slick Monitoring for Offshore Explorations

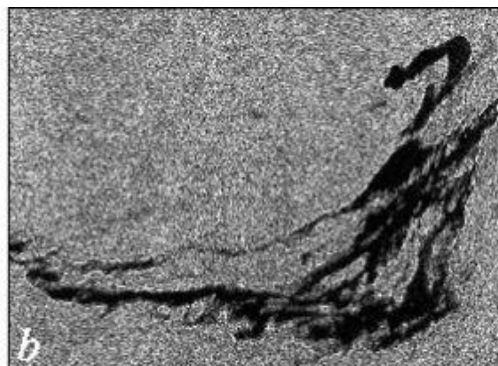
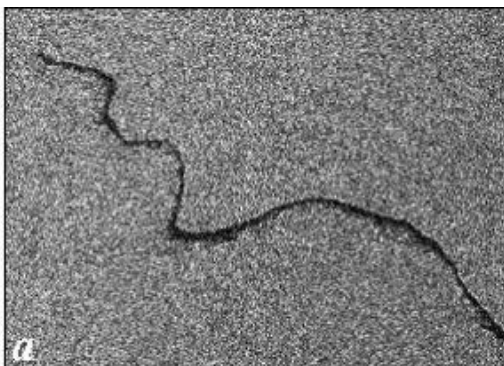
Oceans can give big opportunities to Oil&Gas companies for new giant hydrocarbons discoveries, considering that almost 95% of them are unexplored.

The detection and monitoring of **oil slicks** on the sea surface might be fairly considered a clue of the presence of a new Oil field.

The research for offshore natural oil sources can be helped by the usage of radar images acquired from satellite. The application of specific algorithms on these images allows Oil Seep Mapping at wide scale, driving the searching activities.

Maps and indicators, usable for example by desktop, web or mobile interfaces, of the areas interested by oil seeping, can be extracted, providing detailed information about their geographical extents, the type of spill, the confidence level assigned to it.

Very **high spatial resolutions** can be achieved (1 to 5 m). The obtained information can allow Oil&Gas exploration companies to efficiently inspect areas just a few hours after the satellite acquisition, as well as the possibility to plan focused researches and geochemical surveys, with a big saving in terms of time and money.



Pipelines and infrastructures Mapping

Remote sensing support for pipelines and infrastructures

The need for topographic information is an important part of the exploration and development process, from structural analysis to pipeline feasibility studies.

Accurate mapping is a critical element throughout the life of a project. The versatility of remotely-sensed data, in terms of spatial and temporal resolutions acquirable, allows the provision of suitable solutions, from regional information at the conceptual stage to high-resolution interpretation at the detailed design stage.

With remote sensing, Planetek can support **pipeline and infrastructure planning**, terrain mapping and routine monitoring.

According to the project requirements, it is possible to provide precise and reliable plano-altimetric data (*Digital Elevation Models*) with a wide spatial resolution choice, from 1m to 20m, using high resolution satellite imagery.

A set of auxiliary layers (optical images, land cover maps, soil sealing maps, vegetation maps) can be extracted and delivered, granting a high level of knowledge of the environment, which is fundamental for building sustainable projects.



Drinkable water production

Red Tide detection and water quality monitoring in support of human health and desalination plants operation

Planetek has matured a great experience in the field of water quality monitoring. This aspect can be considered crucial, if related to the need for protecting the marine environment and also allowing the treatment of sea waters for desalination purposes.

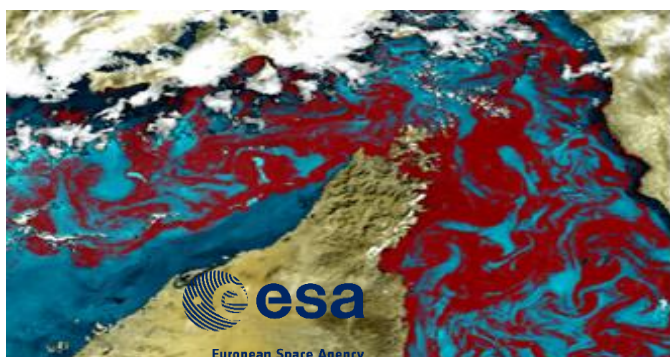
For these targets, a wide suite of EO products and data services has been developed and is now part of the Planetek portfolio.

A valuable case study is represented by the Project C-WAMS, developed by the Planetek group and other international partners, for the monitoring of the coasts of the United Arab Emirates and the Oman Seas. The main goal of the project was to monitor water quality and harmful and non-harmful algae blooms, targeting two sectors: waste waters treatment and desalination plants.

The project has reached these main results:

- To define and setup feasible service and products for supporting user activities in waste water and desalination plants;
- To implement and demonstrate those products and services over two test areas chosen by the users;
- To elaborate a plan for a wide service uptake within the framework of international obligations (e.g. European Marine Directive).

More information on this project <http://cwams.eu/en/>



Water turbidity and Posidonia monitoring

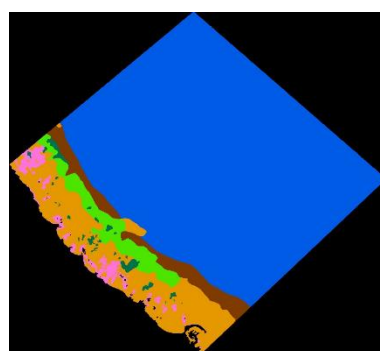
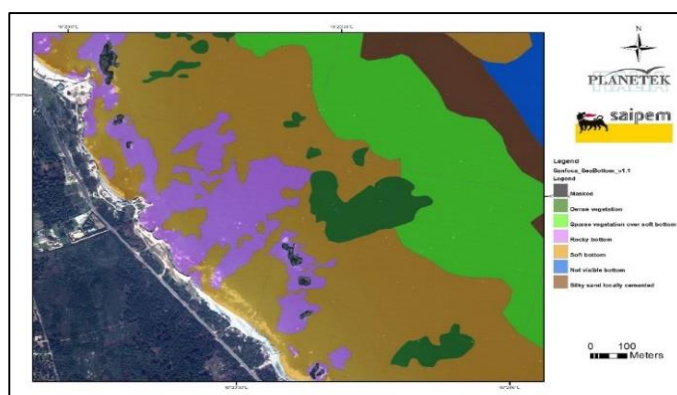
The use of very high-resolution images for off-shore activities: Water turbidity and Posidonia monitoring

Turbidity is one of the parameters which allow the evaluation of the water quality, relating it to their final use. **Low turbidity level**, for example, is one of the most appreciated features for tourism purposes, while high turbidity level over one area could suggest that **excavation activities** will have a minor impact on turbidity change, instead of excavating in a low turbidity area.

Employing high resolution 8 bands multispectral images from WorldView-2 and WorldView-3 satellites, Planetek has studied methods to obtain surface water measurements (in the first 50 cm) using algorithms which evaluate the spectral characteristics of water in the bands of a specific satellite sensor, concerning the light absorption by water suspended particles, and therefore turbidity.

With remote sensing, is also possible to evaluate the presence of **Posidonia Oceanica**, an important marine vegetable species, which can act as an ecosystem protector and as a barrier against coastal erosion. The design of coastal and offshore infrastructures must consider the presence of this fundamental vegetable species.

A time-tested experience gained in several research projects in the field of Earth/Marine Observation, let Planetek make available a sound technological expertise, providing services for submerged vegetation analysis and mapping, starting from visual and automated image interpretation of high resolution images, giving thus an appreciated contribution to several projects.



Near real-time monitoring

Monitoring turbidity and water quality during dredging activities for the installation of off-shore infrastructures

Satellite remote sensing may support the monitoring of water quality during **dredging activities** for the installation of new off-shore infrastructures.

The use of traditional monitoring techniques (sampling at sea, measures, laboratory analysis) are certainly effective, but they present logistical and operational obstacles and long processing times, often incompatible with the need to obtain the information collected in real-time. Furthermore, field observations and measurement, although frequent, are not able to provide a complete and exhaustive spatial answer to describe all the phenomena in progress.

Planetek has developed water monitoring services which integrate traditional methods **with daily collections of high-resolution satellite** images over the area of interest. All the monitoring phases are accurately planned: the programming of the satellite acquisitions, the data collection, the ingestion and processing. Within a few hours, accurate and validated information are delivered, useful for the quantitative and spatial definition of phenomena of sediments dispersion during dredging operations.



Client



Asset Monitoring

Asset Monitoring: mapping security for human resources and facilities

Assets in the oil and gas industry include all physical infrastructure and equipment in the production area, such as buildings, roads and heavy equipment. Assets monitoring is required during operations to mitigate **various kinds of risks throughout the project lifecycle to ensure firstly the safety of employees and secondly the performance of the operations.**

Common monitoring systems can be supported and enhanced with EO techniques. Both optical and radar datasets can contribute to asset monitoring, with high resolution EO data typically required.

Near real-time image delivery is available, which may be important for the targets of the process. Very high resolution **radar** can help to mitigate cloud cover issues, and InSAR techniques support asset monitoring in areas susceptible to land deformation.

Asset monitoring can include a suite of products and services:

- Awareness of third party encroachment, especially in remote, socially unstable areas.
- Information about flooding, forest fires, or other environmental hazards. requires greater spatial coverage and can be mapped at lower resolutions.
- Surface deformation, which may affect the physical condition of infrastructure.
- Localization of equipment, which may integrate EO image data and tracking using satellite communications.



Geological Interpretation & Consultancy Services

Geological mappings services with satellite imagery

Planetek can offer a wide range of onshore **geological mappings** services, including structural and lithological interpretation and detailed fracture analysis, utilizing various sources of satellite imagery and digital elevation models.

Accurate geological assessments are critical to successful resource development. The resulting strategies meet our clients' needs with scientifically sound analyses from an impartial perspective.

Our consultancy services cover both onshore and offshore exploration:

- Pipeline and facilities planning and monitoring
- Geological mapping
- Environment, health & safety
- Offshore oil slick mapping
- Seismic planning
- Near-real-time services
- Hydrogeology
- GIS & data management
- Consultancy & training



Decommissioning Offshore Platforms

Supervised monitoring of Decommissioning tasks

The decommissioning of oil and gas offshore installations is a very complex task, ruled by strict laws and regulations. They require that wells are zonally isolated, while platforms and supporting infrastructure that have been idle for a certain number of years must be removed safely and without corrupting the surrounding environment.

From the side of the project management, the planning of a decommissioning requires several activities: review of contractual obligations, engineering analysis, operational planning, contracting.

Moreover, much of the decommissioning process requires contractors who specialize in a specific part of the process: cutting, civil engineering, diving services and so on.

Planetek offers **earth observation services** especially addicted to decommissioning tasks:

- accurate mapping / change detection analysis / near real-time monitoring;
- oil spill monitoring (see next page);
- modelling of meteorological and oceanographic parameters.

The use of this services and products dramatically increases **time and money savings** for decommissioning operations, reducing the risks for personnel, assets and the environment.



Oil spill Monitoring

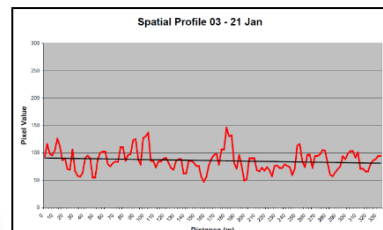
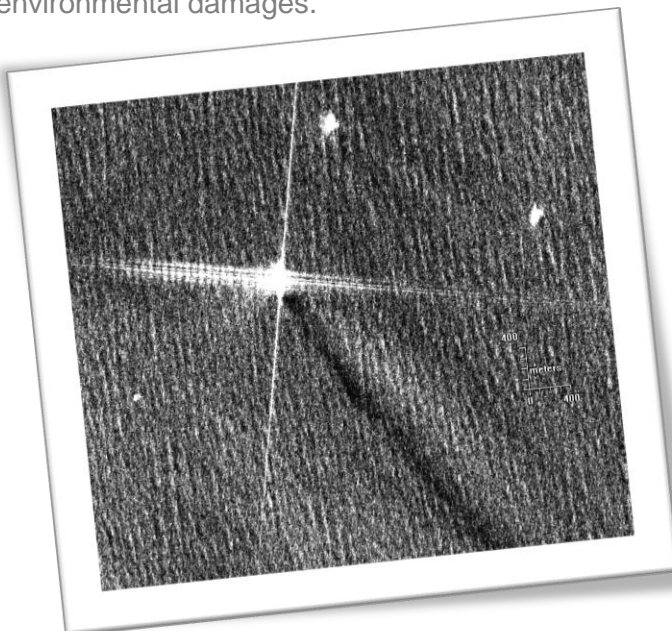
Oil Spill Monitoring for Marine Environmental Protection

The exploration of seas and oceans, searching for possible hydrocarbons spills involves both International Institutions and Oil&Gas companies, besides the search for new offshore oil fields, also for the control and monitoring of existing infrastructures, ensuring marine environmental protection.

These activities can be effectively supported by satellite technologies and, among these, by **Radar SAR** (Synthetic Aperture Radar) sensors. The technical principles that make SAR valuable for such activities are very simple. The presence of hydrocarbons on the water surface damps the motion of the waves causing the reflection of electromagnetic energy emitted from the satellite sensor in the specular direction. In this way, the measured reflected energy is minimal and the areas interested by **oil spills** appear on the radar datasets **as dark patches**, easily and automatically identifiable.

A successful analysis was conducted by Planetek for EDISON S.p.A., an important Italian O&G company. Radar images were used to detect the possible presence of Oil Spills as a consequence of warnings from other vessels close to an Edison off shore platform.

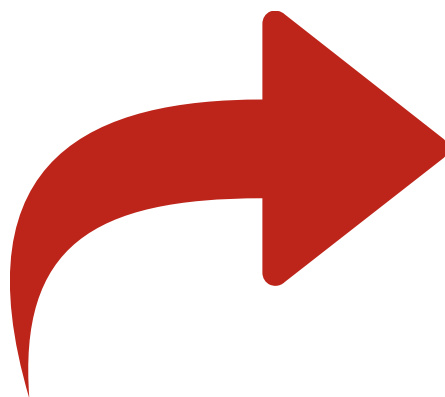
Radar Images and wind analysis models were used to exclude possible environmental damages.



Client



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