





Reducing Environmental Footprint

We follow CNPC's global HSE culture, strictly abide by relevant laws and regulations on environmental protection promulgated by the Myanmar government, and implement the concept of environmental protection throughout the whole process of pipeline construction, in order to reduce the environmental footprint.

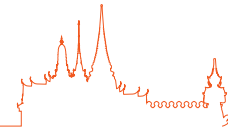


Interview with Chief Safety Officer of SEAP of CNPC



Cui Xinhua, Chief Safety Officer

How does the company guarantee that pipeline construction and operation are in compliance with high environmental standards?

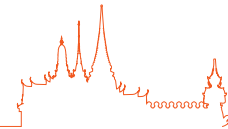


To ensure the safe and sound operation of the pipelines, we make great efforts in technology, construction management and operation safety. According to the principle of “synchronized project development and environmental protection”, light detection and ranging (LIDAR) technology and trench-crossing technology are adopted to minimize the impact on the ground and vegetation.

In the design phase, our environmental design was reviewed by a third party environmental supervisor to ensure its compliance with environmental assessment

and protection requirements. In the preparatory phase, we signed agreements with local entities for camp solid/liquid waste treatment, and checked if the environmental measures were maintained in place at pipe storage yards and construction camps. In the construction phase, we supervised the contractors in their implementation of environmental measures in various conditions. For instance, culvert pipes were laid to supply water for irrigation when work was taking place in paddy fields, and the farmland water system were restored in a timely manner after the construction work was completed.

How does the company guarantee the long-term safe and stable operation of the pipelines?



According to the requirements of Pipeline Integrity Management and the QHSE System, we basically realized a cathodic protection rate of 100%, and ensured pipeline safety. Over 100 personnel are assigned to patrol the pipelines and over 50 personnel supervise the valve chambers around the clock. Before each flood season, major potential hazards are checked and investigated; during the flood season, emergency rescue is provided in a timely manner, and after the flood season, hydraulic protection works are actively repaired.

100%

As required in pipeline integrity management and the QHSE system, we provided 100% cathodic protection for the Pipeline project



What is Cathodic Protection?

The buried pipeline is susceptible to corrosion, which may damage the pipeline. Usually, impressed current is applied to connect the pipeline with the negative electrode of the DC power supply, making the pipeline a large cathode. Thus, the corrosion current is eliminated and corrosion is avoided.

We have set up a standardized pipeline maintenance & emergency repair center with three maintenance & emergency repair teams, and formulated over 170 site disposal plans. All technicians and security personnel are organized to participate in skills training. In terms of pipeline safety, pipeline safety information is collected from all sources, in order to timely identify and handle any hazard, to constantly ensure the safety of the personnel and the pipeline.

We spare no efforts to protect the marine ecology during operations at the port. Multifunctional vessels and tugboats equipped with domestic sewage disposal units and oil-water separators are used to ensure the domestic sewage and oily sewage are discharged after disposal. By the end of 2016, no marine oil pollution or major ecological accident occurred.

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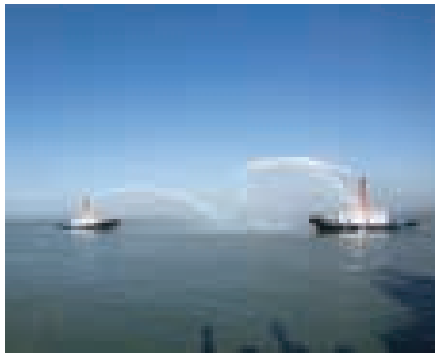


Waste classification



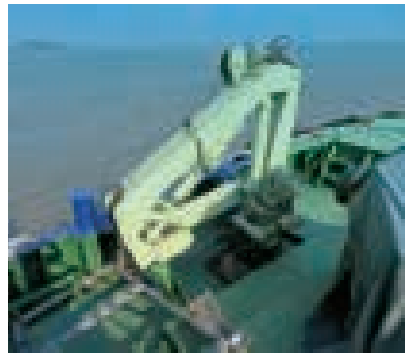
The tugboats used on Madè Island have the following functions

Seawater fire fighting system



Spraying seawater and foams for fire fighting

Deck cranes and waste bins



Collecting waste at sea

Oil dispersant sprinkler



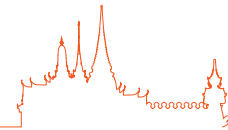
Spraying dispersants on sea to reduce the pollution of waste oil to the marine environment

Lamor oil recovery system



Recovering oil spills at sea to the slop tank on board

What measures have been taken to ensure the health of employees?



We pay particular attention to all workplace hazards that may endanger employee health and safety. Due to the special field conditions in tropical regions, and the shortage of medical equipment, employees are prone to infectious and occupational diseases.

We have set up a health supervision mechanism and issued the *Employee Health Instructions* brochure for our staff to learn more about health and emergency rescue. Physical examinations are provided to all employees and the occupational disease rate has remained at zero. During the construction phase, health supervisors inspected construction sites and camps every month. Supervision meetings were held regularly to present the performance and problems related to occupational health. Contractors, project managers, technical supervisors and other relevant personnel attended special meetings to discuss major occupational health risks and measures to correct irregularities, in order to eliminate potential hazards endangering employees' health.

We have made great efforts to prevent, identify, and control snake bites, malaria, dengue fever and other tropical diseases and endemics. From the start of the project in 2010 to December 2016, all employees were safeguarded from these risks to their health.

100%

Physical examinations are provided to all employees and the occupational disease rate has remained at zero



From the start of the Project in 2010 to December 2016, no one was bitten by the snake, or suffered from dengue fever or malaria

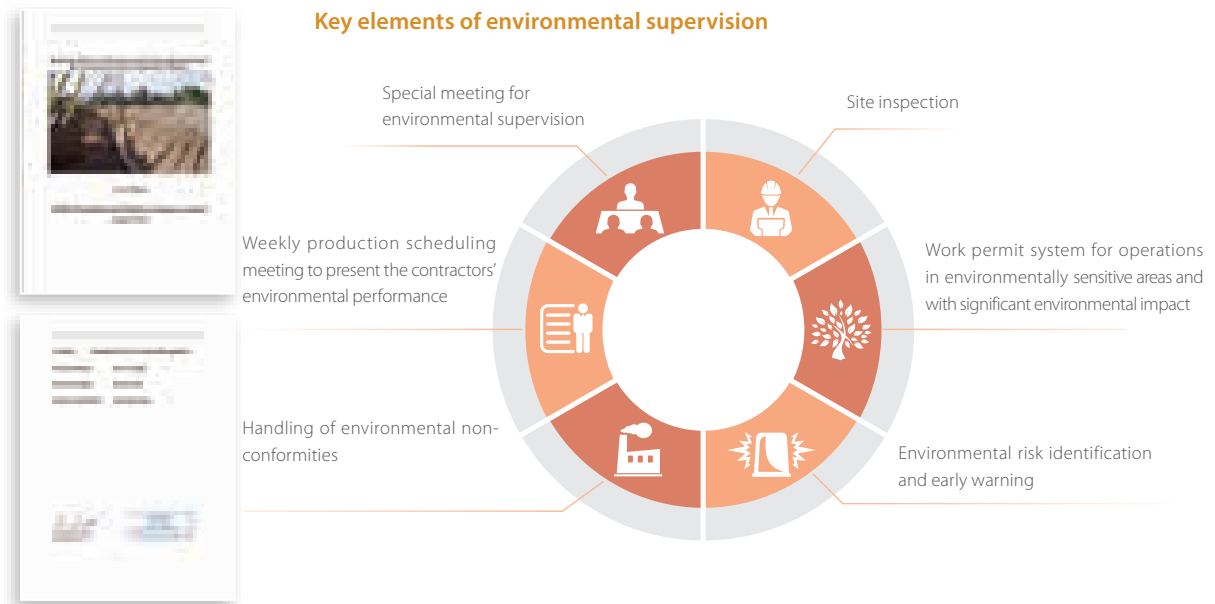


We conducted the Environmental Impact Assessment (EIA) according to the widely accepted Equator Principles and the World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines) before construction. The pipelines were routed to bypass ecologically sensitive areas and heritage conservation areas in the design. The terms of environmental protection were included in the EPC contract, and professional environmental supervisors were invited to carry out environmental supervision and management of the contractor. The goal of “zero accidents and zero pollution” was achieved during the entire construction process.

Nine Principles of HSE Management

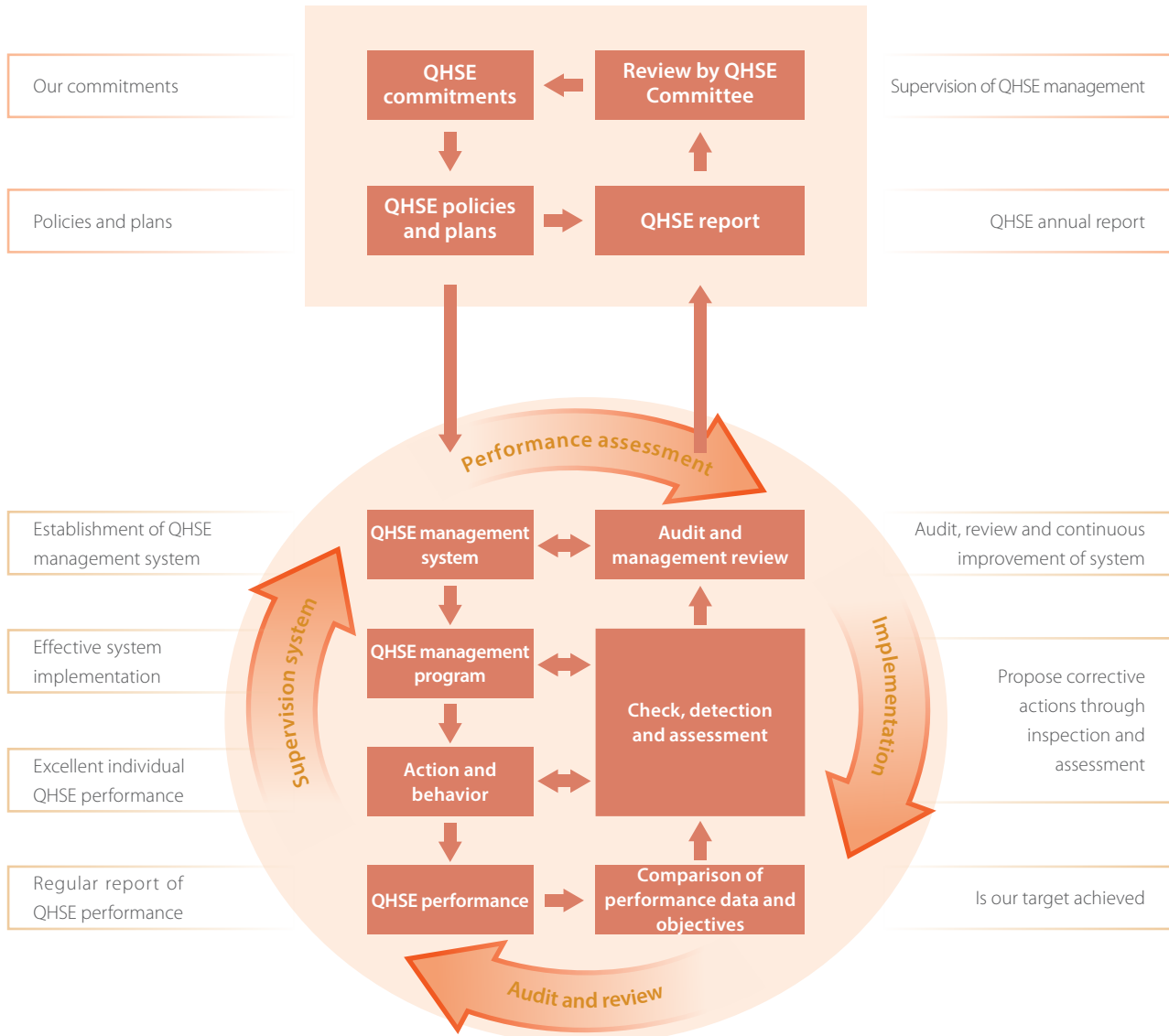


Key elements of environmental supervision



Environmental Impact Assessment Report for Myanmar-China Gas Pipeline Project issued by Thailand's International Environmental Management Co., Ltd (IEM)

PDCA Model under SEAP's QHSE Management System



Bypassing Environmentally Sensitive Areas

Located in the tropical and subtropical zone, Myanmar enjoys diverse types of ecological environment, a long history and a brilliant culture. During the design stage of the pipelines, protection of ecological diversity and historical and cultural heritage was taken into consideration, as the pipelines were arranged to bypass pagodas, temples, schools, cemeteries, and wildlife and plant protection areas. For instance, a detour was made to avoid Mount Popa, a national religious and cultural tourist spot in Myanmar.



Warning tips and posters are in place to remind our people of protecting the environment

Reducing Land Usage

During construction, according to the principle of “minimizing land occupation and protecting arable land”, we optimized the pipe laying technical program, and used warning strips to separate land borders, in an effort to ensure the minimum width of the operating zone in different geographical conditions. For instance, in the Nantang River Grand Canyon, which is sandwiched between steep slopes and cliffs and has a maximum gradient of 79.5 degrees and a maximum drop of 203.5 meters, the pipelines are routed in a “V” shape. The operating belt width was reduced from 60 meters to 40 meters to minimize damage to vegetation; and temporary platforms were set up on the slope for the storage of raw materials to reduce the impact on arable land. All construction and transportation activities were conducted in the operating zone which had a width of 40 meters. In the forest area of the Rakhine Mountains and northern Myanmar, the pipelines were laid in the same trench, so that the width of the operating zone was reduced to 25 meters, reducing the forest occupation area by 92 hectares.



The width of the operating zone was reduced from 60 meters to 40 meters

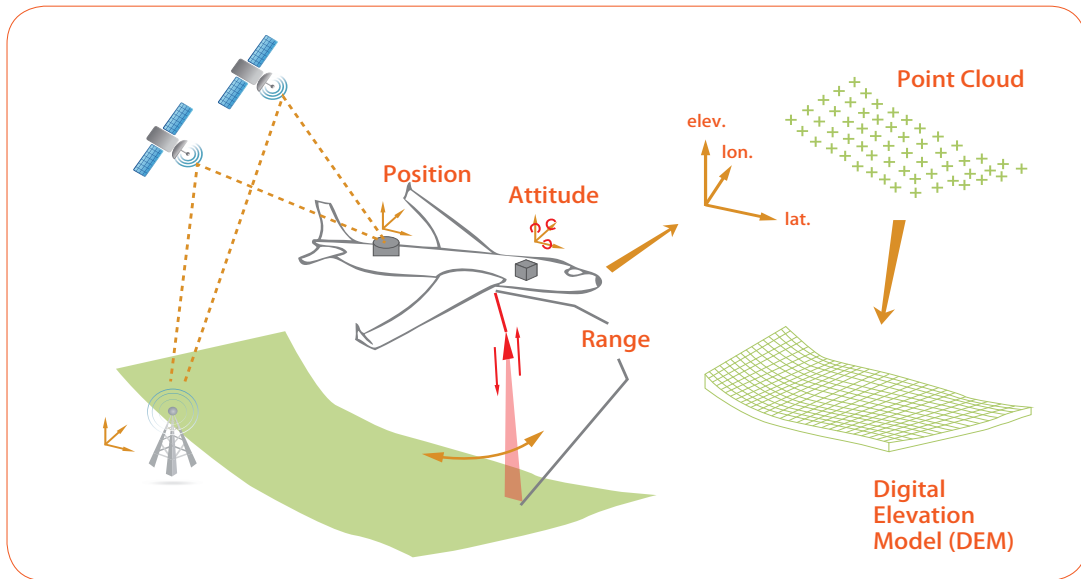


In the forest areas in Rakhine Mountain and in northern Myanmar, the Pipeline project were laid in the same trench, so that the width of the operating zone was reduced to 25 meters, cutting forest occupation by 92 hectares



Reducing Surface Disturbance with Cutting-Edge Technology

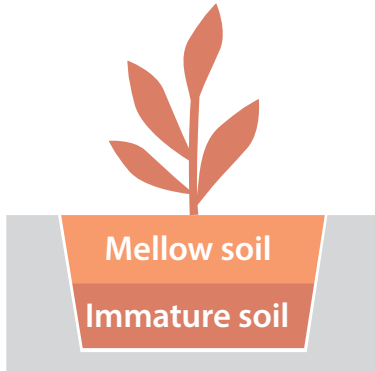
We honor our commitment to building an environmentally-friendly enterprise and strive to reduce the impact of pipeline construction on the environment. For instance, in the reconnaissance phase, we used Light Detection and Ranging (LIDAR) technology instead of the traditional manual GPS technology to avoid damaging forest vegetation in the Rakhine Mountains and northern Myanmar. During oceanic trench-crossing construction, the directional drilling technology was adopted to replace heavy excavation. Both the entrance point and the excavated point were arranged on the land, thus the marine ecosystem and the mangroves on both shores were protected to the greatest possible extent.



Schematic diagram of LIDAR technology



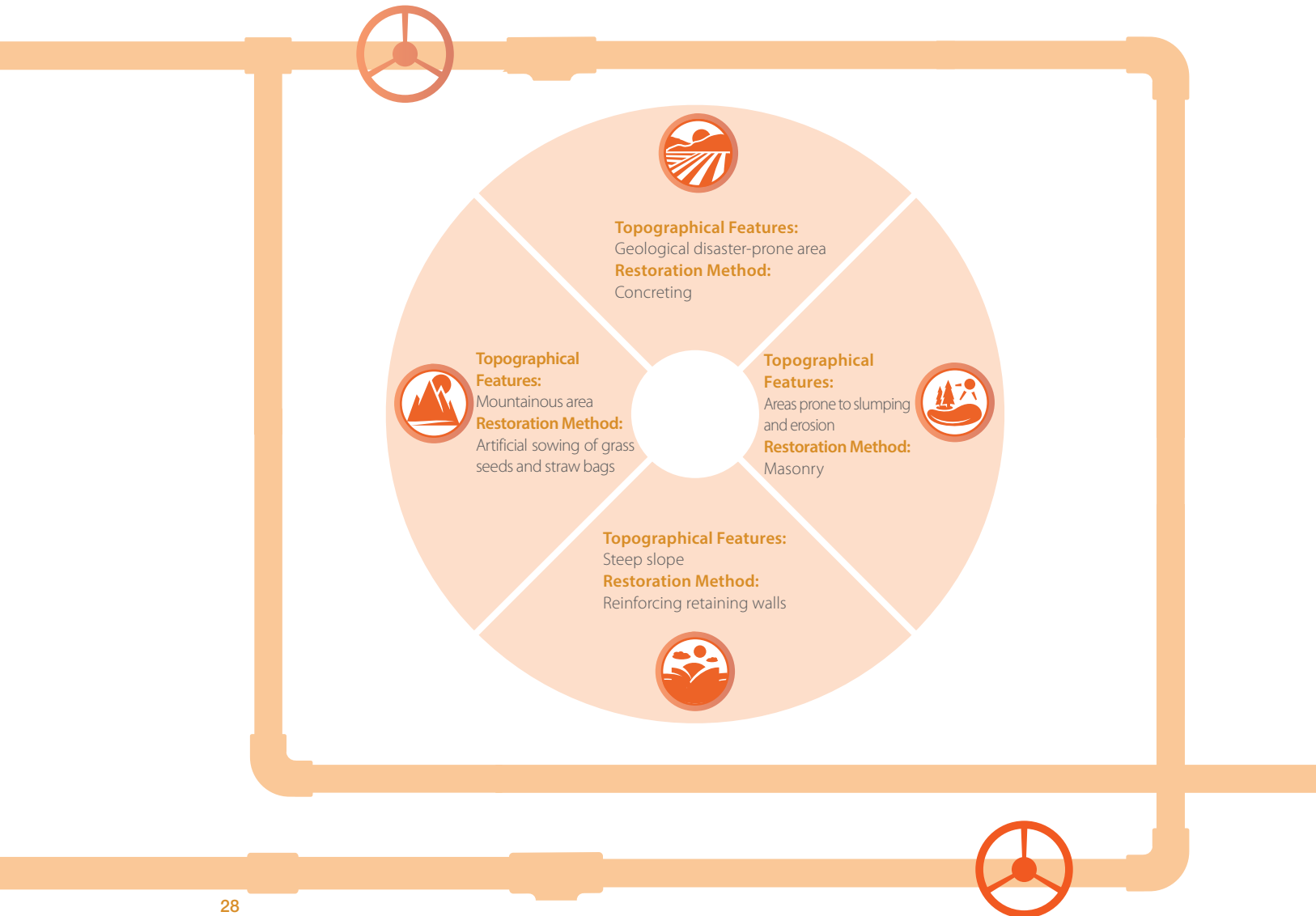
Protection of mangroves during construction



Ecological Restoration

The “Land Restoration Requirement” was included in the special provisions of the EPC contract, with detailed requirements regarding its implementation. For instance, during trench excavation, topsoil and subsoil were separately stacked. Mellow soil was backfilled above immature soil to reduce soil fertility loss. According to different geomorphologies along the pipelines, appropriate soil and water conservation programs were developed to avoid the impact on crop cultivation in surrounding areas. Specifically, in the Rakhine Mountains and northern Myanmar, terraces and bamboo fences were used to prevent soil erosion. We repaired the operating zone in a timely manner to restore the landform and vegetation upon completion of pipeline construction. Concrete pouring was adopted in No. 1 Cliff and No. 2 Cliff on the north bank of the Myitnge River, the north bank of the Nantang River, and other areas frequently affected by geological disasters.

Practices of Ecological Restoration and Soil & Water Conservation during Construction





Farmland restoration in construction areas



Vegetation restoration



Green grass on both sides of Myitnge River