

CASE STUDY FROM WISH: HOW QATAR IS TACKLING DUST WHILE BUILDING FOR THE 2022 WORLD CUP

In 2022 Qatar will host the first football World Cup to be held in the Arab world. Hosting a global sporting event requires new stadiums, infrastructure, and hotel, residential and commercial buildings. Huge construction projects have a negative impact on the environment and human health, including by generating airborne particulate matter, which is a particular problem in arid settings already exposed to desert dust.

In response, Qatar is promoting construction standards endorsed by FIFA – international football’s governing body – that aim to improve local air quality, noise control, and waste management at construction sites.

“Our aim is to inspire the construction sector by disseminating . . . best practices, and to encourage the implementation of some or all of these practices on construction sites,” writes Yousef Mohammed Alhorr, the founding chairman of Qatar’s Gulf Organisation for Research & Development (GORD), a non-profit group charged with helping the Supreme Committee for Delivery & Legacy reduce the environmental impact of the World Cup.

“Our efforts come from our firm belief that improving dust management practices will contribute to a healthier life for us and our community,” he writes in GORD’s report *Dust Management Best Practices for Construction: Case studies from stadium sites in Qatar*.

<LINK TO: <https://www.gord.qa/admin/Content/Link772020121636.pdf>>

GORD hopes that showcasing Qatar’s efforts could help other nations in the Middle East and beyond reduce harms from construction dust.

Harms from dust

Dust is linked to respiratory disease, including asthma, as well as cancer, stroke, heart disease, and deaths. Construction workers and local residents may be most at risk. GORD’s research suggests that extended exposure also reduces workers’ productivity, especially those in physically demanding occupations.

Particulate matter with a diameter of 10 µm or less (PM10), can lodge deep inside the lungs. Particles with a diameter of 2.5 µm or less (PM2.5) can pass into the blood, posing even greater risk. The health impacts of dust exposure are well researched: even at low concentrations, exposure increases morbidity and mortality, and prolonged exposure can cause greater harm.

Design, materials, and operational practices for most of the World Cup’s major projects are specified by the Global Sustainability Assessment System for Design & Build (GSAS-D&B), GORD says. Construction practices carried out by contractors and builders can follow GSAS Construction Management (GSAS-CM) guidelines, developed by GORD. The GSAS-CM requires dust monitoring and mitigation for certification.

All World Cup stadiums, and many other construction sites, are following this standard, monitored and verified by third-party auditors, Qatar says. Five out of eight stadiums have received certification so far.

GSAS-CM certification requires project documentation and site audits to confirm strategies to reduce dust have been implemented. Projects can score higher ratings by demonstrating that PM10 and PM2.5 concentrations are below $PM_{10} < 150 \mu g/m^3$ or $PM_{2.5} < 35 \mu g/m^3$ in different stages of the project.

Average PM10 and PM2.5 are monitored for several days upwind and downwind to estimate only the dust emanating from the site. Several stadium sites have implemented continuous dust monitoring. For example, GORD reports that monitoring for two-and-a-half years at the Education City Stadium found daily averages of PM10 42.0 µg/m³ and PM2.5 15.5 µg/m³.

Mitigation strategies operate at several levels. The Supreme Committee's contracts require projects to have an environmental management plan, including dust control. Contractors, project management, and supervision teams are required to have GSAS-CM expertise. A system exists to resolve non-compliance with GSAS-CM and to document best practice. All staff and workers receive training on dust control, especially machinery operators and drivers.

Wind, machines and water

The action of the wind on stockpiles is a key source of dust at construction sites. Usually, stockpiles are covered with plastic mesh, which eventually gets weather damaged. At Lusail Stadium thicker, more durable tarpaulin is being used. Withheld moisture stabilizes the stockpile, saving water that would have to be used.

Al Janoub Stadium used asphalt emulsion to stabilize the soil where building supplies are received and stored, reducing dust generation, GORD says. To avoid soil contamination when removing this covering, the area was situated at the site of a future parking lot.

Dust from preparing huge quantities of concrete is almost unavoidable. Silos release cement dust. Handling of aggregates generates dust. Unfortunately, wetting can affect the product, so the plant is best located downwind of workers' accommodation and offices.

Wetting dry soil and aggregates can reduce dust during loading and unloading. Ras Abu Aboud and Lusail Stadiums use pressurized sprays to trap airborne dust, consuming less water than traditional hoses. All stadium sites use treated sewage effluent instead of potable water. When available, Ras Abu Aboud Stadium, Al Janoub Stadium, Al Thumama Stadium, and Education City Stadium use groundwater.

All stadiums crush excavated materials for reuse. At Al Thumama and Al Janoub Stadiums, excavated materials are wet first and crushing machines are enclosed by screens sprayed with water.

Water is often sprayed on unpaved internal roads to mitigate a major source of dust. Paved roads lead to less dust and save water, as at Education City and Ras Abu Aboud Stadiums, which used recycled milled asphalt reclaimed from repaving public roads.

Trucks are washed as they leave construction sites to reduce spread of dust-generating materials. Ras Abu Aboud Stadium and other sites reuse washing water. Plastic netting is used to cover materials being transported. Nearby roads are swept of dust-generating waste.

"Dust emissions can be reduced drastically through effective management practices throughout the construction process, starting at the planning stage," GORD's report concludes. "The measurable impacts of these practices were evident during the construction of stadiums."

Figure 1: Best practices in dust management



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