

Case Study: Durable and Efficient Water Wells Will Complement an Innovative Agricultural Plantation in Ethiopia

Introduction

In Ethiopia, an emerging plan is underway for an innovative agricultural plantation in the northwest corner of the Somali Region near Dire Dawa (which means “empty plain”). The area, characterized geologically by the Rift Valley and expansive volcanic rock, presents difficult drilling conditions and a challenging setting for ground water well design. Added to these considerations are elevated ground water temperatures and generally corrosive, mineralized conditions. The project itself is ambitious with plans for a large-scale agricultural plantation whose success demands an available, reliable and efficient water supply. This memorandum describes how the designers and planners intend to maximize both water production and efficiency in the source water wells that will serve as the backbone of a thriving and enduring plantation project.

Background

Agropeace Bio Ethiopia has embarked on an ambitious plan to develop several thousand hectares to grow various crops, most prominently those used for the production of biofuel. However, the potential for successful implementation of this plan hinges on having a reliable water source that can meet the water demand that will grow as the plantation expands. Because there is no local water supply system at the plantation site, the developer (Agropeace Bio Ethiopia, P.L.C.) must develop its own integrated irrigation system that will rely upon production from a new well field.

Well design in much of Ethiopia, including Dire Dawa, is fraught with challenges. Hard, fractured volcanic rock makes for extremely difficult drilling. However, when properly located and constructed, well yields from the volcanic aquifers can be substantial and reliable. In some areas, such as near Dire Dawa, the volcanics also include interbedded sedimentary layers (e.g., conglomerates) that are permeable and have good potential for appreciable ground water production. These are key targeted zones along with the fractured volcanics for ground water production for the plantation well field.

From the outset in its planning, Agropeace Bio clearly appreciated that its water system would have to be efficient and well managed to support its agricultural plan in the arid region of Dire Dawa. This is where Roscoe Moss Company was able to assist by providing efficient louvered well screens that far exceeded the operational characteristics of mill-slotted pipe. With its inherently high efficiency and strength, the louvered well screen manufactured by Roscoe Moss Company is perfectly matched to the design objectives (i.e., strength, reliability, efficiency and adaptability) as laid out by Agropeace Bio.

Agropeace Bio has made a concerted effort to design-in the above-mentioned attributes so as to extend the useful life and efficiency of its on-site water system. Efficiency in the well field will be vital because reducing power costs of pumping wells that minimize drawdown will

benefit Agropeace Bio throughout the useful life of each well. Collectively, the power savings will be significant.

Well Screen and Casing

Agropeace Bio selected Roscoe Moss Company's louvered well screen with 2 mm-wide slots; the range of available slot sizes is 1.3 mm to 6.4 mm. This range is important because Agropeace Bio can move forward with its well field knowing that it has flexibility in the slot sizes to meet the gradation of any sedimentary units found at the plantation site.

The Rift Valley presents another challenge to well casing and well screen. Ground water in the region exhibits characteristics, such as high temperature, gases and chemical constituents that have potential for corrosion to steel. Low carbon steel (also known as mild steel or black steel) has no inherent corrosion resistance and can be corroded (to the point of structural weakening) in a relatively short time. Therefore, corrosion resistant steel may be needed to extend the useful life of the wells. Here again, Roscoe Moss Company can provide blank casing and louvered well screen in a variety of corrosion-resistant steels such as copper-bearing steel, high-strength low alloy steel, and stainless steel. This will allow Agropeace Bio to make its steel selection for casing and well screen to meet the site-specific conditions.

Summary

Designing wells that maximize production and efficiency along with durability and long-life is not difficult. However, it does require the designer (and contractor) to understand that one must design-in the necessary attributes when selecting the types of steel and well screen for each well. Agropeace Bio has made a concerted effort to guarantee that its well field will perform as planned. Preliminary results suggest that Agropeace Bio will realize its objectives for the new wells.

About the Author

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