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INFORMATION PAPER

SUBJECT: Groundwater Modeling Project, Mongolia

1. Purpose. To enhance water resources practitioners with a diversified understanding of groundwater principles, aquifer characterization, and data acquisition needed to design, construct, and use groundwater models.

2. Background. Water resource management has become a vital issue in Mongolia. Climate change is affecting the variability of water resources, urbanization in Ulaanbaatar is increasing the demand for water in Mongolia's capital, and resource extraction and agricultural practices are putting extensive demands and water quality concerns on irregular resources. In response to these challenges, many government institutions, international organizations and non-governmental organizations have come up with a set of recommendations for action. Since the water supply of Ulaanbaatar is dependent on groundwater, the uncertainty around the sustainability and long-term effects of pumping rates, demand growth, and climate impacts are critical to understand. Improved groundwater modeling and monitoring design will enable Mongolia to better inform implementation of Integrated Water Resource Management (IWRM) and reduction of risk from extreme climate events. IWRM integrates the objectives of economic growth, environmental quality, social well-being and financial sustainability in planning and investments. Mongolia has already started implementing IWRM solutions, and the theme carries prominently through its "Water Action Plan" established by the National Water Committee. In particular, multi-objective planning under possible conflicting interests requires including a robust groundwater model into the Shared Vision Planning (SVP)/IWRM decision model to examine trade-offs and prioritize among measures and policies to ensure water security. As Mongolia's water demands grow, groundwater modeling and IWRM techniques will become even more important to ensure the success and prosperity of the country, reduce water scarcity concerns and provide clean and sustainable resources for future generations.

3. General Description.

a. In partnership with the Mongolia Ministry of Environment, Green Development, and Tourism (MEGDT), the U.S. Army Corps of Engineers (USACE), with the support of the U.S. Geological Society (USGS), Fresh Water Institute (FWI) and others, proposes to assist the Government of Mongolia with groundwater modeling capacity building.

b. This USACE project will support strategic water security decision-making by developing and improving groundwater models for the Tuul River Basin aquifer which supplies 98% of the water for Ulaanbaatar, Mongolia. Due to the rapid influx of rural regions into the capital of Ulaanbaatar, the population of the city has expanded to include half of Mongolia's population, and continues to increase. This significantly impacts water usage rates, and the groundwater resources are being depleted without clear understanding of how long they will last. The Government of Mongolia has requested assistance in assessing current and future water

resources capabilities, impacts of existing and proposed pumping rates, zoning policies, measures, and development. This project will support water security, disaster risk reduction, and emergency preparedness.

c. In September 2014, at the U.S. Pacific Command (USPACOM) sponsored IWRM/SVP training workshop with decision-makers, MEGDT leadership requested additional capacity on groundwater modeling, monitoring, design, and strategic decision-making for environmental and water resources security. They indicated that significant needs existed for expertise on groundwater modeling, as the capital and the largest segment of the Mongolian population which is located there, are dependent on groundwater. This project will serve to integrate previous Hydrologic Engineering Center River Analysis System (HEC-RAS) surface water analyses for the Tuul River Basin (FY2013) into the IWRM/SVP decision model (FY2014) to better inform strategic decision-making for water security in Mongolia.

d. The USGS, in collaboration with USACE, will provide groundwater training and capacity building in MODFLOW (3D finite-difference groundwater model) for Mongolia from 30 March – 3 April 2015. The goal of the training is to provide understanding of groundwater principles, aquifer characterization, and data acquisition needed to design, construct, and use groundwater models.

e. The second phase of the project will include an additional training workshop no later than September 2015 on more advance groundwater modeling topics, including sensitivity analysis. It will teach participants how to couple the MODFLOW groundwater model with the HEC-RAS surface water model to characterize the groundwater-surface water dynamics. This will take the model development further toward use in IWRM decision-making and illuminate remaining data gaps and monitoring information for participants and MEGDT to build on for future use.

4. Objectives. The objectives of the Groundwater Modeling project, Phase I, are:

- Assist Mongolia to respond to the emerging challenges of integrated water resource management, with particular focus on groundwater modeling capacity building;
- Support Mongolia to address issues of water availability for Ulaanbaatar in the context of global climate change using the latest groundwater modeling tools and techniques;
- Enhance water modeling and risk analysis techniques for improved water resource management utilizing software and methods developed by USACE and USGS; and
- Advance Mongolian capability to make progressive decisions related to water security and sustainability in benefit of the civilian populace.

5. Point of Contact.

Mr. Justin Pummell
Geographer
U.S. Army Corps of Engineers
Institute for Water Resources
justin.d.pummell@usace.army.mil