

Assignment Name: (Ref No 14) Hydrological Study of the Licungo Basin		Country: Mozambique												
Location within Country: Mocuba		Professional Staff Provided by Firm: 3 No.												
Name of Client: ANE Roads Authority for Mozambique		No. of Key Staff: 3 No.												
Address: Avenida Julius Nyerere no 1 A, Maputo, Mozambique.		No. of Staff Months: 4												
Funding Agency: European Union		Overall project Value (in current Euro): N/a												
Start Date: 09-2015	Completion Date: 04-2016	Approx. Value of Service (in current Euro): €87,000												
Name of Associated Firm (if any): N/A		No. of Months of Professional Staff Provided by Associated Firm: N/A												
Name of senior professional staff of your firm involved and functions performed: <table border="1"> <thead> <tr> <th>Senior Staff</th> <th>Name</th> <th>Functions Performed</th> </tr> </thead> <tbody> <tr> <td>Project Director</td> <td>Jerry Cronin</td> <td>Client Coordination & Document Review</td> </tr> <tr> <td>Project Manager / Design Engineer</td> <td>Barry Dunphy</td> <td>Client Coordination & Document Preparation</td> </tr> <tr> <td>Project Hydrologist / Modeler</td> <td>Dr. Mesfin Desta</td> <td>Hydrological analysis, hydraulic modelling</td> </tr> </tbody> </table>			Senior Staff	Name	Functions Performed	Project Director	Jerry Cronin	Client Coordination & Document Review	Project Manager / Design Engineer	Barry Dunphy	Client Coordination & Document Preparation	Project Hydrologist / Modeler	Dr. Mesfin Desta	Hydrological analysis, hydraulic modelling
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Project Hydrologist / Modeler	Dr. Mesfin Desta	Hydrological analysis, hydraulic modelling												
Narrative Description of Project: In January 2015, heavy rains in north and Central Mozambique caused severe flooding and in the Zambezia province, in particular, a lot of damage was done to critical infrastructure. Within about 150km of the Milange – Mocuba Phase II Project, three bridges and three culverts were severely damaged. The heavy flooding caused the northern and southern approach embankments to the bridge over the Licungo River at Mocuba to be washed away. Further north on the N1 Road, two other bridges and three culverts were damaged. The Mutuasse Bridge, about 150km north of Mocuba, had a central pier undermined and the Namilate Bridge about 60km north of Mocuba was completely washed away. In August 2015 Nicholas O'Dwyer were engaged by ANE and the EU to undertake a hydrological study of the Licungo Catchment and assess the climate resilience and positive impact of the rebuilt infrastructure at Licungo, Mutuasse and Namilate Bridges and culvert locations at Nivo, Serema, and Mudora.														
Description of Actual Services Provided by Staff: - Carry out a hydrological assessment of the Licungo River Basin determining catchment extent, topography, geomorphology, land use and inline hydraulic structures and controls such as bridges, weirs, etc. including the Lugela River and other significant tributaries - Carry out flood frequency analysis and determine peak flood flows for a 1 in 20, 50, and 100-year flood events - Assess magnitude and return period of the flood event that occurred in January 2015 - Construct a hydraulic model (HEC-HMS) of the Licungo River basin and HEC-RAS model of Ligungo River at Mocuba as well as other rivers at 3no. bridge, 3 no. culvert locations and verify against observed levels during the January 2015 event - Prepare a detailed description of changes in hydraulic behaviour of the river upstream and downstream of the bridge structures including the effects on water levels, streamflow velocities, scour/siltation - Prepare an outline design of measures needed to mitigate any identified hydraulic changes if required and a description of these mitigation measures to justify the proposed economics of rebuilding interventions and to set into perspective the expected life cycle costs of the flood mitigation measures. - Preparation of cost estimates and quantities for replacement of culverts and bridges for Contractor pricing - Procurement and management of topographic and channel surveys														