Environmental Protection of International River Basins Project
Contract No. 2011/279-66

This project is funded by The European Union

A project implemented by a Consortium led by Hulla& Co. Human Dynamics KG

Term of Reference

Pilot project "Flood risk assessment and mapping of the Upper Dnieper basin, including determination most at risk areas, field surveying of critical sites, mapping and initial design of protection measures"

I. Background and Objectives

The consultant will assist Human Dynamics to fulfil its requirements under the EU technical assistance contract 'Environmental Protection of International River Basins (EPIRB)' (Terms of Reference given in Annex 1). The overall objectives of the EPIRB project are:

- To improve availability and quality of data on the ecological, chemical, and hydro-morphological status of trans-boundary river basins including groundwater; and

- To develop River Basin Management Plans for selected river basins / sub-river basins according to the requirements of the WFD.

The project is being implemented in six countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine) and five pilot river basins:

- Akhurian Basin District (Armenia),
- Central Kura (Azerbaijan),
- Upper Dnieper Basin (Belarus, Ukraine),
- Chorokhi-Adjaristskali Basin (Georgia),
- Prut Basin (Moldova, Ukraine)

As part of the River Basin Management Plan development process the project will implement selected number of improvement measures from the overall Programme of Measures (PoM), as defined under the Water Framework Directive. The selected measures have been agreed with the beneficiaries in each country and will be executed in accordance with the EC contractual conditions. In the Republic of Belarus the following measures have been chosen:

- Preparation and legislative approval of methodological documents for EU Water Framework Directive compliant hydro-morphological and biological monitoring programmes.

- Detailed assessment sources of pollution of potable GW sources in the well field "Novinki" on the territory of Minsk. This will include the development of a mathematical model to elaborate potential pollution pathways and identification of protection measures to be implemented.

- Flood risk assessment and mapping of the Upper Dnieper basin, including determination most at risk areas, field surveying of critical sites, mapping and initial design of protection measures

The following Terms of Reference are to develop flood risk assessment in key areas of the Upper Dnieper basin in accordance with the Water Framework Directive.

Floods are the most common disaster in Europe and also most costly. Floods have the potential to cause fatalities, displacement of people and damage to the environment, to severely compromise economic development and undermine the economic activities. Floods are basin wide phenomena which do not respect administrative borders. It is widely recognized that effective flood management requires cooperation within the river basin. European legislation such as the EU Flood Directive strives for framework for measures to reduce the risk of flood damage. The most innovative Directives requirements are to assess and visualize flood risks by establishing flood risk and flood hazard maps at flood prone territories.

Floods can be considered as a significant water management issue at the territory of Dnieper river basin in Belarus, especially in Sozh river sub-basin, including River Iput. According to the Republican center of emergency situations management and reaction (RUE) of the Ministry for Emergency Situationsthe River Iputduring spring floods can significantly affect the city of Dobrush by flooding of residential areas, roads, and other city infrastructure.

Dobrusha city and district in Homel region of Belarus,situated on the banks of rivers Iput and its tributary the River Horoput and has a population of about 20,000 people. From ancient times Dobrush (it was founded in 1590) was the city of crafts. Nowadays there are a lot of developed industrial enterprises in the city (paper mill, porcelain factory, branch of glass factory, large-scale bakery and dairy). In 1899 on the River Iput in Dobrush was build the first mini hydro power plant at the territory of Belarus.

Dobrush is border district of Belarus, both with Russia and Ukraine. River Iput in ancient times was wildly used as thoroughfare and thruway and many goods were transported along the Rivers Iput and Sozh. Now importance of river transport is not so great butIputwater is used for industrial, hydropower and recreation use. In spring Dobrushis negatively impacted the by floods, with hundreds of buildings at risk. As Dobrush is located in the lower Iput catchment and upper catchment is located in the Russian Federation there are few opportunities for direct flood management.

Although Dobrush considered as flood prone territory,there have been no flood risk assessments carried out. Flood risk mapping, in accordance with EU legislation, including flood risk and flood hazard mapping would cover this gap and provide safety of the population living at flood prone territory. Also the realization of this pilot project will serve as practical experience to be disseminated to other flood prone territories in Dnieper river basin and increase capacity building in flood management in Belarus.

II. Scope of Work and Deliverables

Flood hazard and flood risk maps are an effective tool for information about floods, as well as valuable basis for priority setting and decision making with regard to technical financial and political issues. A set of maps is to be developed for different hydrological conditions.

The flood hazard maps will contain the following graphic information:

-flood extent;
- water depth or water levels, as appropriate; and
- flow velocity (m/s) and specific discharge (m^3/s), as appropriate.

Flood risk maps show potential vulnerability associated with flood scenarios and contain the following information:

-indicative number of inhabitants potentially affected;
- type of economic activities of the area potentially affected;
- installations which might cause accidental pollution in case of flooding and potentially affected protected areas;
- environmentally important areas;

- other information that is considered useful, such as indication of areas where floods with high content of transported sediments and debris can occur and information of other significant sources of pollution.

The major steps/phases and deliverables for each phase are described below:

Phase 1 Inception phase

Deliverable 1: Inception report, containing implementation strategy and data needs

Phase 2 Hydrological, spatial cameral studies and field surveys with cross-section measurements, including:

- Collection and processing of initial hydrological information of river Iput and other watercourses in Dobrush.
- Preparation of raster of the Dobrush city for GIS project in scale 1:10 000.
- Collection and processing of initial information on land use in Dobrush and providing spatial analysis.
- Water flow calculations for different hydrological conditions - maximum water discharges of spring floods of 0.5%, 1%, 10%, 25% probability and maximum water discharges of flash floods with 10% probability.
- Development of digital elevation model (DEM) for the pilot project territory including watercourses.
-Cross-section measurements at watercourses in Dobrush city.
- Definition of flow velocity regime of watercourses at cross-section points.
- DEM cut of flood prone areas and with addition to cross-section.
- Land use and hydraulic structure inspection.

Deliverable 2: Report with Dobrush watercourses flow calculations, outlining maximum water discharges of spring floods of 0.5%, 1%, 10%, 25% probability and maximum water discharges of flash floods with 10% probability.

Deliverable 3: GIS layers of raster in scale 1:10 000 and DEM of pilot territory.

Deliverable 4: Field survey report outlining cross-section measurements at Dobrush watercourses and definition of flow velocity regime at cross-section points.

Phase 3 Hydraulic calculations and flood maps compilation, including:

-Development of 1-d mathematical model of watercourses in Dobrush.
- Hydraulic calculations with definitions of water levels and water velocities of watercourses in Dobrush for different hydrological conditions - maximum water discharges of spring floods of 0.5%, 1%, 10%, 25% probability and maximum water discharges of flash floods with 10% probability.
- Development of GIS layers, visualizing water levels for different hydrological conditions - maximum water discharges of spring floods of 0.5%, 1%, 10%, 25% probability and maximum water discharges of flash floods with 10% probability.
- Development of GIS layers of land use and city infrastructure in Dobrush.
- Development of flood hazard maps for Dobrush for different hydrological conditions - maximum water discharges of spring floods of 0.5%, 1%, 10%, 25% probability and maximum water discharges of flash floods with 10% probability, containing following information:
    - flood extent;
    - water depth;
    - flow velocity (m/s) and specific discharge (m^3/s).
- Development of flood risks maps for Dobrush for different hydrological conditions - maximum water discharges of spring floods of 0.5%, 1%, 10%, 25% probability and maximum water discharges of flash floods with 10% probability, containing following information:
    -indicative number of inhabitants potentially affected;

- type of economic activities of the area potentially affected;
- installations which might cause accidental pollution in case of flooding and potentially affected protected areas;
- environmentally important areas;
- other information that is considered useful.

- Drafting programme of measures to improve flood situation in Dobrush.

Deliverable 5: Report with Dobrush watercourses hydraulic calculations, outlining maximum water levels of spring floods of 0.5%, 1%, 10%, 25% probability and maximum water levels of flash floods with 10% probability.

Deliverable 6: Set of flood hazard maps for Dobrush for spring floods of 0.5%, 1%, 10%, 25% probability and flash floods with 10% probability in GIS and pdf formats.

Deliverable 7: Set of flood risk maps for Dobrush for spring floods of 0.5%, 1%, 10%, 25% probability and flash floods with 10% probability in GIS and pdf formats.

Deliverable 8: Report containing preliminary programme of measures to improve the flood situation.

III. Schedule and Implementation Modality

Duration of the assignment is 12 months. The expected commencement date for implementation of the assignment is August 1, 2014, and completion date – July 31st, 2015. The assignment is divided into four phases with following general schedule:

Flood hazard and flood risk maps establishment phases	2014								2015			
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Phase 1: Inception phase												
Phase 2: Hydrological, spatial cameral studies and field surveys with cross-section measurements												
Phase 3: Hydraulic calculations and flood maps compilation												

Summary of the work schedule and deliverables for flood hazard and flood risk maps establishment for Dobrush is presented in following table:

Deliverable	Language of deliverable	Start date	Due date for draft version	Finalization
Deliverable 1: Inception report, containing implementation strategy and data needs	Russian / English	1.08.2014	15.08.2014	30.08.2014
Deliverable 2: Report with Dobrush watercourses hydrological calculations	Russian / English	15.08.2014	15.09.2014	30.09.2014
Deliverable 3: GIS raster and DEM for the pilot territory	Russian / English	15.08.2014	30.10.2014	15.11.2014
Deliverable 4: Field survey report with cross-sections measurements	Russian / English	15.09.2014	15.11.2014	30.11.2014
Deliverable 5:Report with Dobrush watercourses hydraulic calculations	Russian / English	30.11.2014	30.12.2014	31.01.2015
Deliverable 6: Set of flood hazard maps for Dobrush	Russian / English	30.01.2015	31.03.2015	30.04.2015
Deliverable 7: Set of flood risk maps for	Russian /	28.02.2015	30.04.2015	31.05.2015

Dobrush	English			
Deliverable 8: Report containing preliminary programme of measures to improve the flood situation	Russian / English	30.04.2015	15.06.2015	15.07.2015

The contractor shall hold following consultation meetings:

- First consultation meeting – due date 15.10.2014
- Second consultation meeting – due date 15.06.2015

IV Management Arrangements and budget

The contractor shall report the EPRIB Team leader, regarding overall deliverables and EPIRB Country Water Management Expert (CWME), for all day-to-day management issues.

In implementation of the above deliverables, national flood maps development teams will be established with representatives from the beneficiary, the contractor and the EPIRB CWME. The EPIRB CWME will ensure coordination between the EPIRB project team and the REC public involvement strategy team.

The flood maps development teams will have collective responsibility for data collection and provision and with provide day-to-day project guidance and coordination. The draft deliverables reviewed by the beneficiary and the project team members and final approval of deliverables will be given by the EPIRB Team Leader.

Drafting, reporting and implementation of above deliverables will be coordinated, advised and monitored by the EPIRB project team, led by Team Leader. In addition, the target and other beneficiary institutions, as well as members of the National Coordination Committee (NCC), Regional Committee of the Natural Resources and Environmental protection will take an active part in collecting data, reviewing of deliverables.

Payments shall be made on approval of deliverables and divided into three (3) tranches given below:

Tranche 1: ***20% on acceptance of Phase 1 deliverables.***
Tranche 2: ***40% on acceptance of Phase 2 deliverables.***
Tranche 3: ***40% on acceptance of Phase 3 deliverables.***

IV. Qualifications and requirements to the service provider/contractor

- Experience in flood risk assessment and mapping
- Experience in basin planning and demonstrated working relationship with the main beneficiary
- Demonstrated knowledge of WFD and IWRM principles and experience of implementing these principles in the country/region
- Existence of qualified staff able to fulfill above mentioned tasks and demonstrated commitment to involve other national/international professional consultants

The assignment shall be implemented by a company or consortia of companies that are NOT representing the project beneficiaries.