

# PROJECT INFORMATION DOCUMENT (PID) CONCEPT STAGE

Report No.: PIDC9635

<b>Project Name</b>	ODRA-VISTULA FLOOD MANAGEMENT PROJECT (P147460)
<b>Region</b>	EUROPE AND CENTRAL ASIA
<b>Country</b>	Poland
<b>Sector(s)</b>	General water, sanitation and flood protection sector (100%)
<b>Theme(s)</b>	Water resource management (100%)
<b>Lending Instrument</b>	Investment Project Financing
<b>Project ID</b>	P147460
<b>Borrower(s)</b>	Republic of Poland
<b>Implementing Agency</b>	Ministry of Environment
<b>Environmental Category</b>	B-Partial Assessment
<b>Date PID Prepared/ Updated</b>	06-Aug-2014
<b>Date PID Approved/ Disclosed</b>	06-Aug-2014
<b>Estimated Date of Appraisal Completion</b>	27-Mar-2015
<b>Estimated Date of Board Approval</b>	02-Jul-2015
<b>Concept Review Decision</b>	Track II - The review did authorize the preparation to continue

## I. Introduction and Context

### Country Context

Since its transition in the early 1990s Poland has consistently applied market-oriented reforms and its economy has experienced sustained growth. Over the past 10 years, Poland's GDP has grown at an average annual rate of four percent, and Poland weathered the 2008 financial crisis relatively well. The country takes pride in its per capita GDP of US\$12,970 (2013, Atlas method) and moderate (and declining) unemployment (10.3%, 2013). In 2004, the country acceded to the European Union (EU), which has been instrumental to modernize many of the country's policies and administrative structures. Poland has also been one of the largest recipients of EU structural funds, including for roads and highways, urban development, environment and, to a lesser extent, water resources management.

Regarding public infrastructure, in the recent past the country has prioritized the construction of transportation corridors and urban facilities. However, devastating flood episodes have reminded the country of its intrinsic vulnerability to flooding caused by the hilly landscape and general under-

investment in water resources management. This vulnerability is forecasted to further increase as climate change projections indicate that the region will become subject to gradually increasing temperatures, drier summers, and more concentrated and more intensive precipitation. Although these changes will evolve slowly, the preparation of river basin studies, mobilization of funds for needed investments, strengthening of sectoral governance, and implementation of flood management measures requires 20-30 years and thus needs to take into account not only immediate needs but long-term climate developments.

Flood damages to the economy in terms of recovery costs and income foregone are significant and recurring, and floods have claimed scores of casualties. Major flood episodes in 1997 affected primarily the Upper Odra river basin, especially the city of Wroclaw, one of the country's growth poles. In 1997 and 1998 the Nysa, a main tributary of the Upper Odra, was severely affected with widespread devastation in the Nysa-Klodzka Valley. In 2006 and again in 2010, the western part of Poland--which comprises 60 percent of the population and 80 percent of the economic productivity--was subjected to severe and prolonged inundations. These years it was especially the Upper Vistula and the Lower Odra basins that were hit, as well as again the Nysa-Klodzka valley. In the Upper Vistula in 2010, Cracow, Poland's second city, was partly inundated for almost two weeks and wide swathes of southern Poland came to a standstill, including the Sandomierz-Tarnobrzeg industrial center in the heartland of the country. Warsaw barely escaped major flooding.

Successive governments have responded to these threats by launching dedicated investment programs to support recovery, improve preparedness, and generally invest in more effective river and flood protection management. In 1997, the Odra 2006 Program was developed with the aim to ensure the protection of the Upper and Lower Odra against 1-in-100-year floods, or better. To date, this Program has helped restructure the administrative tools for flood protection and has funded major investments in a variety of measures and infrastructure to achieve protection levels. In 2010 a similar Vistula Flood Protection Program was set up and the Voivod of Malopolskie appointed as Plenipotentiary. The World Bank, the Council of Europe Development Bank (CEB), and the European Commission have co-financed several of these initiatives, in particular the Odra River Basin Flood Protection Project (P086768) on the Upper Odra, which is currently under implementation.

In March 2014, the Government of Poland requested the World Bank to provide support for the preparation of a second project to complete the protection of the most vulnerable areas in the Odra basin and to implement a first set of measures to begin providing the same level of protection for the Upper Vistula basin.

### **Sectoral and Institutional Context**

With EU accession Poland has had to reform the policies and institutions in its water resources sector to comply with the EU acquis, in particular the Water Framework Directive (WFD) and the Flood Directive. This has led to significant reorganizations since 2004 that have enhanced the sector's performance. Tasks on water and flood management are assigned by territory and divided between the Regional Water Management Agencies (RZGWs) and the Administrations of Rural Land and Water (ZMiUWs). The RZGWs typically are responsible for the main water bodies and rivers within a hydraulically coherent region, such as a large part of a river basin; they operate under the National Water Management Agency (KZGW), which is a semi-independent body under the Ministry of Environment. The ZMiUWs are responsible for rural infrastructure and small water courses, and thus for many of the dike systems. They are administrations of the Voivodships

(comparable to Provinces) and under the authority of the Marshal of the Voivodeship, and therefore funded largely from the budget of the Ministry of Interior. The National Institute for Meteorology and Water Management (IMGW) is responsible for meteorological forecasting and generic modeling of precipitation and run-off. It has four regional offices.

Polish legislation requires the development of integrated River Basin Management Plans for each river basin; these Plans, expected to be completed by end 2014, are expected to be in compliance with the WFD and will likely take the form of Updated Master Plans complemented by Flood Hazard Maps and Flood Risk Maps. These Master Plans will provide the prioritization of all measures based on economic and technical feasibility analysis and would confirm guidance for the coordinated actions of the RZGWs, ZMiUWs, and other agencies. While these Updated Master Plans and Maps are in the last stages of preparation, many measures have already been identified and confirmed as "no regret" measures for the most vulnerable areas. For instance, while implementation of the complete Vistula flood protection program may well take two to three decades and require in-depth analysis to determine the most cost-effective solutions, many measures have already been identified as high priority.

The main Polish rivers, namely the Odra and the Vistula, rise in the southern mountains and flow to the north along a trajectory across hilly areas and flat lowlands before emptying into the Baltic Sea. They count among Europe's largest rivers with a length of their main stems of 854 and 1047 km, respectively. The catchment areas of the Odra and the Upper Vistula together cover 254,380 km<sup>2</sup> or 81.5 percent of Polish territory, underscoring the strategic significance of the proposed project. Despite various investments in the 20th century, flood events have remained a constant and even worsening feature in the basins, however as the basins have evolved into economic growth poles the economic damages now warrant the costs of increased protection levels.

The floods in the Upper Odra and Upper Vistula are typical high-water floods, commonly occurring in spring and early summer. These summer floods are driven by stochastic precipitation patterns. The main flood protection measure consists of passive dike systems of which the crest height can be calculated in order to withstand all high-water waves smaller than the one calculated to occur once in, for example, 100 years (one percent chance of occurrence per year), a common minimally desired protection level for most urbanized areas. While overtopping is the primary cause of flooding, dike bodies can be breached by lower flood waves if they are poorly designed, built, or maintained. Dikes need regular rehabilitation and upgrading to preserve their functionality. Most dikes along the Lower Odra and many along the Upper Vistula are in poor to adequate shape. In addition, the Lower Odra is threatened by winter floods caused by ice floes. On the Lower Odra eight to nine percent of all days the river surface frozen; in about one-fifth of the years there is no ice formation, but in others there is up to 100 days of deep frost (1996). Ice floes damage and weaken dike bodies and other structures in and alongside the river and, importantly, they can build up easily into large ice dams that hinder the flow of water and effectively jam the river. Such ice jams create a triple hazard: (i) they cause the water to back up behind them, thus potentially flooding areas as far as 30 km upstream from the jam; (ii) they create large water pools that, when the ice jam breaks, are released suddenly and create catastrophic inundation downstream of the ice jam; and (iii) they damage river infrastructure and dikes. The most cost-effective technology to demolish ice dams in a controlled way is by icebreaking ships that cut the ice. Finally, many tributary rivers (torrents) to the main rivers originate in hilly or mountainous areas and can create flash-floods. These are very quick moving and short flood waves that require different technologies and management approaches. A recent, detailed forensic analysis of about 600 flood events in the

past 27 years showed, i.a., that the frequency and severity of flood events are increasing since the 1980s caused by a combination of land use change and climate change at a very local level; and that about 10 percent of events is caused by ice jams. The Polish government's objective to develop its national expertise and institutions to better cope with the above-mentioned flood types.

### **Relationship to CAS**

The proposed project would contribute to the Bank's twin goals of sharing prosperity and combating poverty, to which the Bank's FY14-17 Poland Country Partnership Strategy (CPS) is aligned. The proposed project was foreseen in the FY14-17 CPS, under the pillar focused on climate action, in line with the country's development goal of enhancing flood protection. The project also contributes to the CPS's pillar focused on economic competitiveness, and is consistent with the CPS's objective of supporting Poland's convergence process with the EU.

The 1997, 2006, and 2010 flood episodes highlighted that Poland's large manufacturing and commercial centers, which provide jobs and contribute most to the national economy--including Wroclaw, Opole, Szczecin, Tarnobrzeg, Sandomierz, Cracow, Nowa Huta--are particularly vulnerable to floods. Many of these centers are located along transport corridors and are effectively in former floodplains. In addition, the area upstream of Sandomierz is Poland's most agriculturally productive region with high added-value from orchards and horticulture. The nature of the floods have been such that these industrial centers and much of the transportation corridors had to shut down for several weeks and even months following floods for water to drain and repairs to production equipment and other assets completed. Such events negatively impact Poland's industrial and agricultural output and investment climate.

The proposed project would also address poverty. In an industrializing economy such as Poland's household income is closely tied to jobs. With floods reducing job opportunities, household incomes and thus poverty rates can be negatively impacted. In addition, disaggregation of the data shows that of the sub-regions that are impacted by floods and that would benefit from the proposed project, most score at higher-than-average poverty vulnerability (with at-risk of poverty population higher than 20 percent), in particular in the sub-regions of Nysa-Klodska in the Upper Odra, several counties along the Lower Odra, and most of the central and eastern parts of the Upper Vistula basin (Mapping Poverty at the Level of Subregions in Poland Using Indirect Estimation. Polish Statistical Office, Poznan, November 2013). Finally, asset and real estate values and household wealth are strongly correlated to the likelihood of flooding and water damage. As a rule, low-lying town quarters that are prone to flooding or regular inundation, have cheaper housing, receive fewer services and attract poorer occupants. This can be observed in quarters neighboring the river in Wroclaw, Cracow, and other locations. Thus, even within richer sub-regions (such as Cracow) flood protection will extend to all income categories, but it will be the poorer groups that in most cases will benefit most.

In addition, in line with the CPS's focus on supporting Poland's role as a development partner, in light of the heavy floods in the Balkans in May 2014, the Bank is facilitating a twinning arrangement whereby the Polish agencies would share their flood forecasting and protection experiences with the International Sava River Basin Commission and the Sava riparian countries.

## **II. Proposed Development Objective(s)**

### **Proposed Development Objective(s) (From PCN)**

The proposed project's objectives are to strengthen the institutional administrative capacity and technical expertise of the government to address summer, winter, and flash-floods more effectively; and develop such flood protection to selected areas of the Odra and the Upper Vistula river basins.

### **Key Results (From PCN)**

The proposed project would provide three distinct areas with flood management infrastructure and related measures: (i) the Lower Odra; (ii) the Nysa-Klodska valley, a large sub-basin of the Upper Odra; and (iii) the Upper Vistula. The population of the regions that will be in the proximity of the proposed works and measures is estimated to be about 23 million, of which it is estimated that about half is directly exposed to flood-related impacts, physically, economically and/or socially. The precise numbers and the nature of the impacts will be further specified during project preparation. The proposed project would further strengthen the national flood forecasting and operational capability (for existing and new infrastructure, such as locks, weirs, barrages, reservoirs, etc.) of south Poland through more advanced equipment and mathematical simulation models that would inform faster decision-making regarding the need to evacuate and take precautionary measures.

The proposed project will build on the lessons learned in the ongoing Odra River Basin Flood Protection Project. The proposed project would notably help demonstrate new approaches and support alignment with the EU WFD and Flood Directive--an area where the government is still struggling. To allow an expedient start the proposed project would focus on the "hot spots" in the basins (i.e., the most vulnerable parts) and the "no regret" measures where technical merits are sufficiently clear that no additional studies or approvals are needed and which will be listed in Poland's Updated Master Plans and/or Flood Risk Managements Plans for the River Basins, to be ready by the end of 2014. The national flood strategy and the EU Flood Directive advocate the integration of passive protection of local relevance (mostly, dike construction) with active measures with regional impacts, such as temporary overflow areas and dry polders that create "space for the river" to allow the river expand occasionally. Such combination is usually cost-effective as well as sustainable. Notably, the (re-)creation of such overflow capacity through wetlands can absorb flood waves and at the same time improve environmental values. This would be a subordinate objective with the rehabilitation of a large wetland upstream of Szczecin on the Lower Odra.

## **III. Preliminary Description**

### **Concept Description**

The proposed project would provide three distinct areas with flood management infrastructure and related measures: (i) the Lower Odra; (ii) the Nysa-Klodska valley, a large sub-basin of the Upper Odra; and (iii) the Upper Vistula. The proposed project would further strengthen the national flood forecasting and operational capability of south Poland, through more advanced equipment and mathematical simulation models that would be able to inform decision-makers faster and more reliably about the need to evacuate and take precautionary measures. Project components are proposed as follows:

- Component 1: Lower Odra. To protect Szczecin, Słubice, Gryfino, and other towns. Revitalize the Międzyodrza wetland upstream of Szczecin harbor.
- Component 2: Nysa-Klodska valley. To protect Klodsko town and other valley towns, as well as Bardo at outlet of valley. Protect the downstream Wocław conurbation as the Nysa is the main tributary to the Upper Odra.
- Component 3: Upper Vistula. To protect the Craców conurbation, the Sandomierz-Tarnobrzeg industrial and agricultural area, and selected towns on tributaries.

- Component 4: Forecasting and operational water management capacity. To improve the protection level of South Poland by enhancing the preparedness along the main rivers and their tributaries. Improve early-warning for flash-floods.
- Component 5: Project management and studies. The studies will notably cover the preparation of flood risk management plans (i.a. for the Cracow area), and the strategic plans to manage flood risks by creating more "space for the river", simultaneously enhancing the natural values.

Floods are very visible phenomena with clear relation between the imminent cause (excessively high local water levels) and the damage. However, due to the complex hydraulic and hydrological processes causing the high water levels, flood management generally necessitates an array of physical and programmatic measures and activities that function in complementarity and are integrated into one management strategy. While a local dike can indeed help mitigate the risk of a local flood, principles of equity and cost-effectiveness impose an integrated approach and strategy at the scale of the complete river basin, in order to avoid that protection in one (upstream) location displaces the risk to a different location along the same river (usually, downstream). The activities and measures that would be funded under the proposed project comprise:

- “Passive” infrastructure, such as dikes and river bank stabilization works (revetments, foundations, parapets, etc.), through rehabilitation, modernization or expansion of existing structures.
- “Active” infrastructure, such as dry polders and overflow areas (wetlands, agricultural lands) to allow absorption and temporary retention of the peak of flood waves.
- River training, such as the rehabilitation or reconstruction of groynes and breakwaters in the river to create and maintain specified water depths to allow floodwater to discharge rapidly, and icebreakers to navigate; dredging (to allow floodwater to discharge rapidly); and related measures such as increasing the vertical clearance under bridges (to allow modern-class icebreakers to pass underneath).
- Improvement of the forewarning time and accuracy in the forecasting capability for high waters, and enhanced remotely controlled operation of infrastructure (weirs, locks, reservoirs, dry polders, etc.) in such ways as to mitigate high water levels.

To capitalize on existing knowledge and for continuity purposes, the Project Coordination Unit (PCU) of the Odra River Basin Flood Protection Project will coordinate preparation of activities under this proposed project. The PCU will work with prospective Implementing Agencies. For the proposed activities under Components 2 and 4 and for some of the activities under Component 1, the Project Implementation Units (PIUs) will be the same as under the Odra Project, again providing continuity and ensuring that lessons from the current Project will transfer to the new project. The PCU and prospective PIUs have prepared preliminary Concept Notes for the above-listed Components, and the nature of activities to be financed was determined based on the Concept Notes and discussions and field visits.

The identification of overflow areas and dry polders that are capable of absorbing a significant part of the floodwave in a cost-effective manner is complex and requires ample study. The Upper Odra basin has benefited from such studies over the past century and a reasonably complete assessment is available of suitable sites, of which some are in use (such as the Bukow dry polder upstream of Raciborz, the Olawa polder upstream of Wocław, and the Wilkanow and Ladek Zdroj dry polders built before WWII in the Nysa-Kłodzka Valley), while others are under construction (the large Raciborz dry polder) or planned (four medium-sized dry polders in the Nysa-Kłodzka Valley). In

the Middle and Lower Odra, several natural areas alongside the river give the river space to expand; immediately upstream of Szczecin the vast Międzyodrze wetland, situated between the two parallel Odra Channels, fulfills the same function. On the other hand, the studies of the Vistula, being a larger and more complex hydrological system, will need to be continued to identify all required and cost-effective options. The proposed project would fund investments in medium-scale overflow polders that are located in strategic locations, but will not yet provide the final required space for flood wave absorption; thus, the proposed project will also support further in-depth studies to identify and prepare additional overflow areas.

The proposed project would be active 2016-2022, in synchrony with the new Perspective of EU Cohesion Funds, maximizing the potential to attract funding from Cohesion Funds.

In order to adequately assess the possible environmental impacts of the proposed project and plan to mitigate possible negative environmental impacts of proposed investments, the Environmental Management Framework (EMF) will be prepared and disclosed. Based on the available information, the project is expected to have significant positive environmental impacts in terms of protection of floodplains, aquatic ecosystems, and surrounding areas. At the same time, the main potential threats are related to change of water regime and consequent impacts on flora and fauna in the periodically-flooded areas, which if not properly managed could create significant changes to local habitats.

According to available information, most of the investments which include rehabilitation of the already existing structures would have a neutral to beneficial impact on environmental conditions, particularly those related to restoration of the flood plains and bank stabilization/dredging. However, activities related to the construction of dry polders would need to be carefully evaluated in both positioning, sizing, and impacts to ensure that possible adverse effects are minimized and adequately mitigated. Beside the project-scale EMF, separate site-specific Environmental Management Plans (EMPs) would be prepared for all identified investments. It is likely that material to be dredged from the river bed, notably in the Dąbie Lake near Szczecin, is suitable for further use and is not contaminated; however, this would need to be reconfirmed during the preparation of EMF.

About 160km of the Odra's 854km of total length is the so-called Border Odra (a sparsely populated part of the Lower Odra) which is shared by Poland and Germany. The Odra river basin measures 122,000km<sup>2</sup>, of which 90 percent lies on Polish territory, and five percent each on German and Czech territory. A Polish-German Government Commission for Cross-Border Cooperation is active at Ministerial level, with involvement of, on the Polish side, the Voivodes, and on the German side, the Länder representatives. In parallel, the trilateral Odra River Commission addresses the technical aspects of the river issues of common interest. The Odra Commission has agreed on the technical specifications of flood protection along the Border Odra. For the proposed project's purposes, the Polish government would soonest initiate the procedure of Notification of the riparians to inform them of the project. Similarly, a very small part of the upstream waters of the Vistula are on Ukrainian and Czech territory; during project preparation the Bank will determine whether it would be necessary to also issue a notification to these riparians.

While information will be further refined during project preparation, based on currently available information, the proposed project is expected to have significant positive social impacts in terms of protection of life and property, and also through short term job creation linked to construction activities. The proposed project's key potential adverse social impact would likely relate to land acquisition that could lead to displacement of population and/or economic activities which, if not

properly managed, could generate community opposition and construction delays. According to the information provided, some of the works under consideration would involve the rehabilitation of existing infrastructure in mostly government-owned lands located in sparsely populated peri-urban and rural areas (e.g., rehabilitation of existing dikes and groynes). In these cases the impacts related to land acquisition would be limited. However, other interventions under consideration, such as construction of new structures and dry polders, particularly in the Nysa-Kłodzka Valley and some locations in the Upper Vistula, would require land acquisition involving economic displacement (e.g., from agricultural lands) and resettlement of a number of households that likely will be small. In order to adequately plan and manage this impact the Borrower will prepare a Land Acquisition and Resettlement Policy Framework (LA&RPF) for the whole project, including principles and procedures for preparation of site-specific LA&RAPs for relevant sub-projects once they are identified. The LA&RPF will follow Polish regulations and the World Bank's policy on Involuntary Resettlement (OP 4.12), and it will incorporate lessons learned from the Odra River Basin Flood Protection Project.

#### IV. Safeguard Policies that might apply

Safeguard Policies Triggered by the Project	Yes	No	TBD
Environmental Assessment OP/BP 4.01	x		
Natural Habitats OP/BP 4.04	x		
Forests OP/BP 4.36			x
Pest Management OP 4.09		x	
Physical Cultural Resources OP/BP 4.11			x
Indigenous Peoples OP/BP 4.10		x	
Involuntary Resettlement OP/BP 4.12	x		
Safety of Dams OP/BP 4.37		x	
Projects on International Waterways OP/BP 7.50	x		
Projects in Disputed Areas OP/BP 7.60		x	

#### V. Financing (in USD Million)

Total Project Cost:	1300.00	Total Bank Financing:	260.00
Financing Gap:	0.00		
<b>Financing Source</b>		<b>Amount</b>	
Borrower		65.00	
International Bank for Reconstruction and Development		260.00	
EC European Commission		130.00	
EC Council of Europe's Social Development Fund		390.00	
EC European Investment Bank		390.00	
POLAND Polish ECOFUND		65.00	
Total		1300.00	

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