

**Document of
The World Bank**

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Report No: 31771-PL

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

**IN AN AMOUNT EQUAL TO EURO 140.1 MILLION
(US\$ 184.0 MILLION EQUIVALENT)**

TO THE

REPUBLIC OF POLAND

FOR THE

ODRA RIVER BASIN FLOOD PROTECTION PROJECT

February 21, 2007

**Sustainable Development Sector Unit
Europe and Central Asia Region**

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CURRENCY EQUIVALENTS

(Exchange Rate Effective December 14, 2006)

Currency Unit = Zloty (PLN)
 1 US Dollar (\$) = 2.80 PLN
 1 Euro (€) = 1.3137 US\$ or 3.68 PLN

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

| | | | |
|---------|---|--------|--|
| ARPA | Agricultural Real Property Agency | NGO | Non-Governmental Organization |
| CEB | Council of Europe Development Bank | ONDR | Office of National Disasters Recovery |
| CNS | Conservator of Nature of Slaskie | ORFPP | Odra River Basin Flood Protection Project |
| CPS | Country Partnership Strategy | OCC | Opportunity cost of capital |
| DZMiUW | Lower Silesia Board of Amelioration and Water Structures | ORB | Odra River Basin |
| EA | Environmental Assessment | PCU | Project Coordination Unit |
| EBRD | European Bank for Reconstruction and Development | PMF | Probable Maximum Flood estimated based on probable maximum precipitation |
| EFRP | Emergency Flood Recovery Project | PSC | Project Steering Committee |
| EIB | European Investment Bank | RAP | Resettlement Action Plan |
| EMP | Environmental Management Plan | RDLP | Regional Directorate of State Forests |
| FMS | Financial Management System | RZGW | Regional Authority for Water Management |
| GDP | Gross Domestic Product | RZGWGL | RZGW-Gliwice |
| GDLP | General Directorate of State Forests | RZGWWL | RZGW-Wroclaw |
| GOP | Government of Poland | RZMiU | Provincial Board for Amelioration and Hydraulic Structures |
| GPN | General Procurement Notice | SA | Social Assessment |
| IRR | Internal Rate of Return | SMOK | System of Hydro-Meteorological Forecasting |
| ERR | Economic Rate of Return | WFS | Wroclaw Floodway System |
| EU | European Union | | |
| IMGW | Institute of Meteorology and Water Management | | |
| KZGW | State Water Management Authority | | |
| MIA | Ministry of Interior and Administration | | |
| M&E | Monitoring and Evaluation | | |
| NFOSiGW | National Environmental Protection and Water Management Fund | | |
| NDP | National Development Plan | | |
| MOE | Ministry of Environment | | |
| MOF | Ministry of Finance | | |

| | |
|--------------------------|------------------------------|
| Vice President: | Shigeo Katsu, ECAVP |
| Acting Country Director: | Edgar Saravia, ECCU7 |
| Sector Manager: | Marjory-Anne Bromhead, ECSSD |
| Task Team Leader: | Masood Ahmad, ECSSD |

POLAND
ODRA RIVER BASIN FLOOD PROTECTION PROJECT

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Maps

IBRD 33309
IBRD 33310
IBRD 33311

POLAND
ODRA RIVER FLOOD PROTECTION

PROJECT APPRAISAL DOCUMENT

EUROPE AND CENTRAL ASIA

ECSSD

| | |
|---|--|
| Date: February 21, 2007 | Team Leader: Masood Ahmad |
| Country Director: Edgar Saravia (Acting) | Sectors: Flood protection (80%); General water, sanitation and flood protection sector (20%) |
| Sector Manager: Marjory-Anne Bromhead | Themes: Water resource management (P); Social risk mitigation (S); Biodiversity (S) |
| Sector Director: Peter D. Thomson | Environmental screening category: A Full Assessment |
| Project ID: P086768 | Safeguard screening category: Significant impact |
| Lending Instrument: Specific Investment Loan | |

Project Financing Data

Loan Credit Grant Guarantee Other:

For Loans/Credits/Others: Euro 140.1 million

Total Bank financing (€M.): Euro 140.1 million

Proposed terms: Euro denominated fixed spread variable rate loan with 15 year maturity, including a five year grace period, with level repayment of principal.

Financing Plan (Euro Million)

| Source | Local | Foreign | Total |
|--|-------|---------|--------|
| Borrower | 30.0 | 00.0 | 30.0 |
| International Bank For Reconstruction and Development (IBRD) | 35.1 | 105.0 | 140.1 |
| EC: European Commission | 40.0 | 90.0 | 130.0 |
| Council of Europe Development Bank (CEB) | 59.9 | 145.0 | 204.9 |
| Total: | 165.0 | 340.0 | 505.00 |

Borrower: Republic of Poland

Responsible Agency: Ministry of Finance and Ministry of Environment

Estimated disbursements (Bank FY/Euro million)

| FY | FY07 | FY08 | FY09 | FY10 | FY11 | FY12 | FY13 | FY14 | FY15 |
|------------|------|------|------|------|------|------|-------|-------|-------|
| Annual | 2.0 | 10.0 | 15.0 | 20.0 | 20.0 | 20.0 | 25.0 | 20.0 | 8.1 |
| Cumulative | 2.0 | 12.0 | 27.0 | 47.0 | 67.0 | 87.0 | 112.0 | 132.0 | 140.1 |

Project implementation period: Start: July 1, 2007 End: May 31, 2014

Expected effectiveness date: July 1, 2007

Expected closing date: November 30, 2014

Does the project depart from the CAS in content or other significant respects? *Ref.* **PAD A.3** Yes No

Does the project require any exceptions from Bank policies? *Ref.* **PAD D.7** Yes No

| | |
|---|--|
| Have these been approved by Bank management? | [] Yes [] No |
| Is approval for any policy exception sought from the Board? | [] Yes [N] No |
| Does the project include any critical risks rated “substantial” or “high”? <i>Ref. PAD C.5</i> | [Y] Yes [] No |
| Does the project meet the Regional criteria for readiness for implementation? <i>Ref. PAD D.7</i> | [Y] Yes [] No |
| Project development objective <i>Ref. PAD B.2, Technical Annex 3</i> | |
| <p>The main development objective of the Project is to protect the population in the Odra River Basin against loss of life and damage to property caused by severe flooding. This would be achieved by (i) reducing the extreme flood peaks through storage in a dry polder on the Odra River just upstream of Raciborz town, enabling a reduction of the flood peak downstream of the reservoir and allowing better control of the operation of the river system; and (ii) by increasing the flood carrying capacity of the Odra River channels through and around Wrocław. The Project would protect more than 2.5 million people against flooding in several towns such as Raciborz, Kedzierzyn, Kozle, Krapkowice, Opole, Brzeg, Olawa and Wrocław, and settlements in the three vovoidships of Slaskie, Opolskie and Dolnoslaskie.</p> | |
| Project description [<i>one-sentence summary of each component</i>] <i>Ref. PAD B.3.a, Technical Annex 4</i> | |
| <p>Component A: Construction of Raciborz Dry Polder (€218.3 million). A dry polder would be created on the Odra River not far from the border with the Czech Republic near the town of Raciborz to retain flood water. Total capacity of the reservoir would be about 185 Mm³.</p> | |
| <p>Component B: Modernization of Wrocław Floodway System (€253.9 million). The flood protection system of the Wrocław city would be modernized by improving the flood protection dikes, capacity of the hydraulic structures, improving the capacity of the flood bypass channel namely Widawa River transfer.</p> | |
| <p>Component C: Improving Flood Management, Monitoring and Evaluation, and Supervision of the Environmental Management and Resettlement Action Plans (€27.0 million). In addition the component would include support to the flood forecasting, and implementation of ecological enhancement works in the Odra River channel.</p> | |
| <p>Component D: Project Management, Technical Assistance and Training (€5.8 million).</p> | |
| Which safeguard policies are triggered, if any? <i>Ref. PAD D.6, Technical Annex 10</i> | |
| Environmental Assessment (OP/BP/GP4.01) | Natural Habitat (OP/BP 4.04) |
| Cultural Property (OPN 11.03) | Involuntary Resettlement (OP/BP4.12) |
| Safety of Dams (OP/BP 4.37) | Project on International Waterways (OP/BP/GP 7.50) |
| Significant, non-standard conditions, if any , for: None <i>Ref. PAD C.7</i> | |
| Board presentation: Re-activation of PCU. PCU was reactivated on January 9, 2007 | |
| Loan/credit effectiveness: CEB Loan Agreement has become effective. | |
| Covenants applicable to project implementation: | |
| (i) maintaining proper staffing and institutional structure for project implementation, and project accounting and management information systems; | |
| (ii) proper implementation of agreed environmental and resettlement action plans; and | |
| (iii) project mid-term review by July 31, 2011. | |

A. STRATEGIC CONTEXT AND RATIONALE

1. Country and sector issues

1. **Country Assistance Strategy.** The Country Partnership Strategy (CPS) for Poland (discussed by the Board on March 29, 2005) aims to align the World Bank's program both with Poland's development agenda as a new European Union (EU) member and with the Government's decision-making processes. The CPS developed in partnership with Poland, on the basis of collaborative approach is geared to provide the flexibility and capacity for rapid response that are required for the Bank to remain relevant in helping to meet the challenges that face Poland as an upper middle income country and a new member of the EU. The Government's development strategy is contained in the National Development Plan (NDP) 2004-2006, and in the National Development Strategy (NDS) 2007-2015. The strategy has as its overriding objective to put the economy on a path of high and sustainable growth, through improved competitiveness of firms and regions, to contribute to the recovery of employment, and promote strong social cohesion. Its overarching priority is to improve the quality of life of all Poles. For the environmental protection and water resources management sector, the NDS identified two priority areas: (i) improving quality of surface water and quality and distribution of drinking water; and (ii) securing flood safety.

2. The Government's strategy provides a good basis for support from Poland's partners, most notably the EU through structural and cohesion funds, the European Investment Bank (EIB), the Council of Europe Development Bank (CEB), and the European Bank for Reconstruction and Development (EBRD), and the World Bank. The strategy recognizes the need to manage the economy prudently in order to increase employment and reduce poverty, converge, in the medium to long-term, to average European income levels, and meet the requirements for the adoption of the euro.

3. The World Bank's activities in Poland under the partnership arrangement are focusing on areas that are consistent with the development priorities of Poland as laid out in the NDS and where: (a) significant policy or structural issues are involved; (b) the Bank can add value, as perceived by the Polish authorities in terms of technical excellence and comparative advantage, taking into account the cost of financing; and (c) effective partnerships are continued both with Polish partners, including private sector, youth and civil society organizations, and with external partners, including the EU, EIB, EBRD, Organization for Economic Cooperation and Development (OECD), CEB. The CPS identifies activities for FY05 and 06 and provides for identification of activities in subsequent years through Annual Business Plans (ABPs).

4. The Government has interest that the World Bank remain engaged in the three broad priority areas listed below, which are consistent with the criteria for engagement discussed in the preceding paragraph and support the key priorities of the NDS: (a) promote fiscal adjustment and reverse negative debt dynamics through restructuring of expenditures (*Fiscal Consolidation*); (c) Promote convergence through an improved investment climate and enhanced competitiveness (*Convergence/Competitiveness*); (d) Reduce poverty, encourage social inclusion and bring employment closer to the Lisbon targets (*Employment and Poverty*).

5. The Odra River Basin Flood Protection Project (ORFPP) fits well in the priority for promoting convergence through improved investment climate and enhanced competitiveness. The Government recognizes that Bank involvement in project preparation and implementation can transfer knowledge and skills in ways that pure analytic work cannot accomplish. Accordingly, the CPS and subsequent ABPs have three projects in road rehabilitation and maintenance, ORFPP, and support for legal and judicial reform under this priority.

6. **Support for Flood Protection Project.** The Project fits extremely well in the CPS, Government's development objectives as well as in priority areas in which the Government is interested to engage the World Bank. The Government envisages that this is one of the operations

through which Bank can transfer knowledge and skills, having being involved in the sector subsequent to the 1997 floods. The damages caused by floods in the Odra River Basin (ORB), particularly by large floods of the magnitude of the 1997 flood, impose a huge cost to the Polish economy, and result in substantial fiscal burden to the country. The ORFPP is important in improving the macroeconomic situation of the country and providing the necessary protection to eliminate the loss of life and minimize damages to property, thus providing a safe environment for continued economic growth. Further, World Bank support through this operation is essential for enhancing Poland's capacity in flood forecasting and management, and strengthening the managerial and financial capabilities of its institutions to plan and implement large and complex infrastructure projects efficiently. The latter is particularly important to build capacity so that Poland can effectively utilize financing from EU Structural and Cohesion Funds.

7. **Sector Background.** Large floods in the Odra River and its tributaries are frequent. In the 19th century, four major floods were recorded in the years 1813, 1829, 1854 and 1880, while in the 20th century twelve large floods were recorded, of which the July 1997 flood was by far the largest. The 1997 flood was caused by extremely heavy rain, with some meteorological stations recording as much as 400 mm over a four-day period. The total July 1997 rainfall was four times that of the long-term average. As a result, an area of 650 km² was inundated in the three voivodships of Slaski (Upper Silesia), Opolskie and Dolnoslaskie (Lower Silesia) damaging 37,000 buildings, 866 bridges and over 2,000 km of roads. An estimated 129 km of dikes were reported to be completely destroyed. The estimated damages in these three voivodships as a result of the 1997 flood were about PLN 8.5 billion (US\$ 2.3 billion). It caused the loss of 54 lives; flooding of some 700,000 households, while about 110,000 people were evacuated. The damages, comprising the costs of rescue, stress, loss of public and private property and production etc., were considerable.

8. The flood of July 1997 exposed the weakness of the present flood protection system in the ORB, which is about 100 years old and was developed after the 1903 floods. The protection system could not withstand the flood, and as a result major urban centers were flooded for extended periods. Similarly, the flood forecasting, monitoring, and warning systems performed poorly. The monitoring systems were damaged early, and the communication systems failed leaving uncoordinated operations of hydraulic structures.

9. The Government's response to flood recovery, however, was swift. The international community provided support, and the Bank led a major effort for providing assistance in flood damage recovery. The Emergency Flood Recovery Project (EFRP, US\$500 million) with a Bank loan of US\$200 million and co-financed by EIB and other donors focused on the rehabilitation of the damaged municipal and rural infrastructure. The Bank loan also provided funds for the upgrading of the flood forecasting, monitoring and warning system, which is now one of the most modern systems in the world, and for improving flood management at the local level. While Poland has an excellent flood forecasting system, the flood protection system is still weak and needs additional investments to bring it to the required standards in order to eliminate loss of life and damage to property due to recurrent floods.

10. Poland, together with Germany, the Czech Republic, and the EU, is a member of the Odra River Commission. After the 1997 flood, each member prepared a program of activities that it will implement in its own state. Poland prepared the *Oder 2006 Program* to complement the Odra 2005 that mainly focused on improving inland navigation. The main emphasis in the *Oder 2006 Program* is on flood protection and navigation, in addition to water quality protection, hydro-power production, land use planning, forestry and nature protection in the Odra River Basin. The *Oder 2006 Program* was approved by the Polish Parliament under the Act of July 6, 2001 establishing a long term program for modernization of the Odra River system. The program, estimated to cost about PLN 9.0 billion is to be implemented from 2002 to 2016; PLN 4.3 billion (about 47%) would be for flood protection. To help implement this program speedily, the act established a special office for coordination of program implementation and financing, namely the *Plenipotentiary for the Oder 2006 Program*. Much of the program is under implementation already. The

World Bank is supporting improvements in the flood warning and forecasting system through the on-going EFRP. Flood protection works for many cities in the basin have already been implemented. This Project would support two main components of the *Oder 2006 Program*, the construction of a dry polder at Raciborz and the modernization of the Wroclaw Floodway System (WFS).

2. Rationale for Bank involvement

11. As Poland joined the EU on May 1, 2004, it became clear that the World Bank's role, both in terms of lending and advisory services, needed to evolve to adapt to a new situation. It became also clear that other institutions, notably the EU (Cohesion and Structural Funds), CEB, EIB and EBRD --are likely to be longer-term partners for financing Poland's flood control systems. However, initially their ability to assist will be constrained by Poland's still weak institutional capacity to develop and implement a large program of high priority investments in flood control.

12. After the 1997 floods, the Bank's involvement in flood protection has been substantial. For the design and implementation of the EFRP, the Bank has provided leadership and technical expertise in flood damage recovery, modernization of flood forecasting and warning systems, as well as for preparation of the proposed Project. The Bank has made a substantial contribution in improving the design of the proposed Project by proposing to combine two major interventions in one project, namely the construction of the Raciborz dry polder and the upgrading and rehabilitation of the WFS. This optimizes the operation of all flood protection infrastructure in the basin, thus providing the best solution for flood protection in the ORB. The Government recognizes the Bank's continuous positive role in the flood protection sector and particularly in this project. Bank involvement is also crucial for donor coordination among development partners for mobilizing EU Cohesion funds, as well as ensuring proper implementation of the Project, which is central to the *Oder 2006 Program*.

13. Therefore, Government is seeking support from the World Bank for its knowledge, expertise and experience in the sector, in addition to its financing. More specifically, the Bank is expected to play a key role in providing support for: (i) continuation of the measures for institutional strengthening already underway under the EFRP, such as emergency preparedness, and improved flood forecasting and flood management; (ii) strengthening project management, including ensuring appropriate design and implementation of the project's environmental and social features; (iii) the preparation of a flood management and protection strategy also for the Vistula river basin; and (iv) stable funding for two principal components of the *Oder 2006 Program* as even the European institutions may be constrained in their financing, considering the high cost of this program.

14. **Borrower Ownership and Commitments.** As mentioned above, the two major components for the flood protection infrastructure proposed for implementation under the ORFPP are part of the *Oder 2006 Program*: the construction of the Raciborz dry polder and the modernization of the Wroclaw Floodway System, at costs of PLN 484.5 million and PLN 590.2 million, respectively. About PLN 673 million has already been disbursed for *Oder 2006 Program*, including the construction of the Bukow polder, which is in fact considered to be Phase I of the Raciborz dry polder complex (total cost PLN 172 million). The Project is included in the borrowing program of the Government of Poland (GOP) for obtaining a loan from the World Bank and funds have been allocated in the EU Cohesion Fund. The feasibility studies for ORFPP project preparation were financed under the EFRP and Government again expressed its strong interest in Bank financing during the March 2004 project preparation mission.

3. Higher Level Objectives to which the Project Contributes

15. The major pillars of the CPS are to promote convergence through an improved investment climate and enhanced competitiveness and to reduce poverty and bring employment closer to the Lisbon targets. Within that, further infrastructure development, including policies, institutions and investments to support

an appropriate modal mix, are both urgent and essential for improved competitiveness, economic growth and environmental sustainability. The proposed investments under the ORFPP would upgrade and modernize the infrastructure to protect a large part of the ORB against severe flooding and the corresponding loss of assets and production capacity, and it would yield high economic returns by reducing future losses due to floods. In addition to reducing damage to property, avoiding incidence of poverty, and supporting country wide economic growth, the ORFPP would help in saving lives during extreme flood events.

B. PROJECT DESCRIPTION

1. Lending Instrument

16. The proposed €505 million Project will be financed under a Specific Investment Loan (SIL) structured to support construction and management of the flood protection facilities in the ORB. The Project will be co-financed by the EU Cohesion Fund, CEB, the World Bank and the Government of Poland. About €130.0 million would be financed from the EU Cohesion and the Government of Poland would fund about €30 million. The remaining amount €345 million are to be financed from the loans from the World Bank (€140.1 million) and CEB (€204.9 million). The Bank loan would be Euro-denominated because Poland is increasing the Euro portion of its foreign debt portfolio as a result of its EU membership and its strong economic relations with the other member states. Also, the Borrower considers that borrowing in Euros would lessen the cost of loan servicing and debt repayment in the future.

2. Project Development Objective and Key Indicators

17. The main development objective of the Project is to protect the population in the ORB against loss of life and damage to property caused by severe flooding. This would be achieved by: (i) reducing the extreme flood peaks through storage in a dry polder on the Odra River just upstream of Raciborz town, enabling a reduction of the flood peak downstream of the reservoir and allowing better control of the operation of the river system; and (ii) by increasing the flood carrying capacity of the Odra River channels through and around Wroclaw. The Project would protect more than 2.5 million people against flooding in several towns such as Raciborz, Kedzierzyn, Kozle, Krapkowice, Opole, Brzeg, Olawa and Wroclaw, and settlements in the three voivodships of Slaskie, Opolskie and Dolnoslaskie.

18. **Project Monitoring Indicators.** As the principal objective of the Project is to avoid damages from floods, the main project monitoring indicators will be the record of actual floods (their size and frequency), the size of the inundated areas (if any), and the estimate of lives saved or the related damages avoided. The latter would be determined with the help of the baseline studies conducted during project preparation. The economic damages avoided for floods of specific frequencies should be updated from time to time (say once in ten years) to take into account any increases in population density and development activities (new assets, changes in land use etc) in the project area since the previous update.

3. Project components

19. The Project is designed to meet the above objectives; it would consist of the components described below:

20. **Component A: Construction of Raciborz Dry Polder (€218.3 million).** A dry polder would be created on the Odra River not far from the border with the Czech Republic near the town of Raciborz to store flood water. Total capacity of the reservoir would be about 185 Mm³. Main benefits from this reservoir will be: (i) a reduction in the Odra peak flows downstream of the reservoir so that the effectiveness of the existing flood defense system will be greatly improved; and (ii) a delay in the timing of the flood peaks at the confluence of the Odra with the Nysa Klodzka, so that the adverse combination of the

two floods that was so damaging in 1997 will become unlikely in the future. These two phenomena, in combination, will result in a considerable reduction in the frequency and severity of future floods.

21. The works comprise a 4.0 km embankment across the Odra valley with a maximum height of 10.5 m above the Odra river bed. Right and left bank dikes will be constructed from the main embankment along the valley upstream for lengths of 9.15 km and 9.5 km, respectively. The total polder area would be about 26.3 km². A spillway structure will be provided to handle probable maximum flood that will have six gates (12 m wide and 8.5 m high), and seven 4.4 m x 3.5 m bottom outlets with invert at the sill level (183.0 m) and a properly designed fish pass.

22. The construction of the polder would involve purchase of land, properties and resettlement of people living in the polder area (details are given in the Social section D.2 below). The resettlement related costs are estimated at about €64.9 million. These costs include the purchase of land, the replacement cost for buildings and other property, relocation of common property, relocation costs, infrastructure at a new village site, loss of business opportunities, and monitoring and evaluation of Resettlement Action Plan (RAP) implementation.

23. **Component B: Modernization of Wrocław Floodway System (Total Cost €253.9 Million).** Currently, Wrocław is subject to inundation with floods greater than 2,200 m³/s. The maximum flow during the 1997 flood was estimated at 3,640 m³/s at Trestno (upstream of Wrocław). The Raciborz dry polder would offer partial but not complete flood protection. The flood protection for Wrocław city is provided, in conjunction with the Raciborz polder, by modernizing and upgrading the flood protection system along the Odra channels passing through and around Wrocław city, as well as increasing their hydraulic capacity. The necessary works for the WFS comprise of three sub-components:

24. **B.1 Improvements to Odra dikes and embankments.** These improvements comprise: (a) works to reduce the risk of failure by piping; (b) raising embankments where necessary; and (c) works to increase the stability and height of existing retaining walls, particularly in downtown Wrocław.

25. **B.2 Improvements to the Odra Channels.** These improvements, which are designed to increase the hydraulic capacity of the Odra River, comprise widening and/or deepening of the channels and works for related hydraulic structures: (a) the Odra Flood Channel; (b) the Old Odra River channel along the City Canal, including works at the Rozanka weir and four bridges; (c) the City Canal; (d) the City Odra River channel, including the reconstruction of the weir at the Wrocław I power plant and improved flood protection for Popowice harbor; and (e) the Odra River channel from the Old Odra/City Odra junction to the Odra/Widawa confluence; and (f) works for Rędzin barrage.

26. **B.3 Flood relief through the Widawa Transfer.** The design capacity of the existing Odra-Widawa diversion will be increased to about 185 m³/s of flow in times of flood danger (320 m³/s under extreme conditions). This also requires an increase in the capacity of the Widawa River channel. These project works consist of: a new gated weir at the off-take of the Odra - Widawa diversion channel; widening the flood plain of this channel; and along the Widawa River the reconstruction of existing flood dikes, removal of some existing flood dikes, the construction of new flood dikes and the remodeling of one railway bridge and five road bridges. RAP or social costs mostly in the Widawa Transfer Component of WFS are estimated around €13.3 million.

27. **Component C: Improving Flood Management, Monitoring and Evaluation, and Supervision of the EMP& RAP (€27.0 million).** The Component would consist of the following sub-components: (i) improving emergency preparedness and flood management plans in the Odra River Basin with the participation of the local governments, concerned agencies and stakeholders; (ii) continued support to improve the flood forecasting system, to ensure that the system of hydro-meteorological forecasting, currently being installed would remain operational; (iii) continued improvements in the flood protection

and management plans and assistance in development of projects in the flood sector; (iv) monitoring and evaluation (M&E) of the Project's impact, including the implementation and monitoring of the environmental management plan (EMP), and the resettlement action plan (RAP); and (v) implementation of works identified under the EMP that are not included in other components (such as enhancement of ecological corridor in the Odra River) and cannot be funded from other projects under Odra 2006 Program.

28. **Component D: Project Management, Technical Assistance and Training (€5.8 million).** This component would support the Government in implementing the Project and prepare a follow-on project. It would include: (a) support for the operation of the Project Coordination Unit (PCU) and implementing agencies, and financing of overall project management, as well as technical assistance in such areas as detailed design, contract administration and construction supervision, procurement, financial management, as well as management of social and environmental issues; (b) a modest institutional strengthening program, including technical assistance and training. This would involve the financing of consulting services, and foreign visits, equipment and software for project management.

Table 1: Cost Estimates and Financing Plan (Million Euros)

| Project Component | Total Cost | GOP | World Bank | EU Cohesion Fund | CEB ^{a/} | Total Financing |
|--|-------------------|-------------|-------------------|-------------------------|--------------------------|------------------------|
| A. Raciborz Dry Polder | | | | | | |
| A1 Construction costs | 137.4 | | 27.4 | 80.0 | 30.0 | 137.4 |
| A2 Resettlement costs | 64.9 | 29.3 | 35.6 | | | 64.9 |
| A3. Design and construction supervision | 16.0 | | 7.0 | | 8.1 | 16.0 |
| Sub-Total A | 218.3 | 29.3 | 70.9 | 80.0 | 38.1 | 218.3 |
| B. Wroclaw Floodway System | | | | | | |
| B1 Rehabilitation of levees & channel Protection | 55.9 | | 8.4 | | 47.5 | 55.9 |
| B2 Retaining walls, channel widening, hydraulic Structures | 121.5 | | 18.5 | 50.0 | 53.0 | 121.5 |
| B3 Widawa channel improvements | 43.2 | | 6.5 | | 36.7 | 43.2 |
| B4 Design, construction supervision, admins. | 20.0 | | 3.0 | | 17.0 | 20.0 |
| B5 Resettlement Costs | 13.3 | 0.7 | 0.0 | | 12.6 | 13.3 |
| Subtotal B | 253.9 | 0.7 | 36.4 | | 166.8 | 253.9 |
| C. Improving Flood Management, Monitoring & Evaluation, and Supervision of EMP& RAP | | | | | | |
| C1. Emergency preparedness and improved flood management. | 4.9 | | 4.9 | | | 4.9 |
| C2. Flood forecasting (SMOK) | 9.5 | | 9.5 | | | 9.5 |
| C3 Flood management strategy and assistance On additional project preparation. | 5.0 | | 5.0 | | | 5.0 |
| C4 M&E of project impact and supervision of EMP and RAP | 3.0 | | 3.0 | | | 3.0 |
| C5 Environment Management Plan Works | 4.6 | | 4.6 | | | 4.6 |
| Subtotal C | 27.0 | | 27.0 | | | 27.0 |
| D. Project Management, Technical Assistance Training | | | | | | |
| D1. Project management | 4.0 | | 4.0 | | | 4.0 |
| D2 Technical assistance and training | 1.8 | | 1.8 | | | 1.8 |
| Subtotal D | 5.8 | | 5.8 | | | 5.8 |
| Total | 505.0 | 30.0 | 140.1 | 130.0 | 204.9 | 505.0 |

^{a/} Council of Europe Development Bank.

4. Lessons learned and reflected in the project design

29. Bank-wide experience has shown that reconstruction of damaged infrastructure is imperative but insufficient, and that measures are needed to reduce the risk of similar future disasters and to safeguard people at risk. Therefore, the underlying premise of the Project is to provide protection against floods to avoid damages, which calls for reconstruction and improvement of the existing flood protection facilities. Other lessons learned that are reflected in the project design are: (a) the need for thorough hydrological and hydraulic analyses. In-depth studies have been undertaken, while using the latest techniques, to determine the frequencies for the occurrence of floods of various magnitudes, undertake flood routing studies, and assess the impact of floods with various return periods. A basin wide view was taken in designing the project interventions for flood protection and their integration in the management and operation systems for the existing flood protection facilities; (b) the need to complete the detailed design of key works prior to negotiations; (c) to implement the project works through large civil works contracts following the best contract management models, and whereby consultants with proper qualifications and adequate resources would assist the Government in construction supervision; (d) to deal up front with any resettlement and land acquisition issues, RAP has been prepared prior to project appraisal. The RAP has been prepared considering alternatives to minimizing the resettlement requirements, providing fair compensation based on the replacement value of the property and options for compensations proposed under RAP and implementation plan has been discussed with the project affected people during consultation workshops. This, combined with financing the RAP costs from loan proceeds, would help to speed up implementation of the RAP, thus minimizing the need for applying the expropriation laws; (e) to keep project design simple, and make sure that the project objectives are clear and well understood; and (f) the lesson that co-financing and the Bank's role in coordinating other development partners is invaluable for delivering the best financing package and technical expertise to the Borrower.

5. Alternatives considered and reasons for rejection

30. Damages due to recurrent floods in the Odra River are very high. Therefore, regularly incurring expenditures for flood damage control during emergency situations and continuing investments for the rehabilitation of private and public infrastructure after the floods have subsided is not an option, especially considering the loss of life during floods. Therefore, a higher degree of protection against floods of major towns and population centers is necessary. The Proposed Project is the best solution for providing the necessary protection. For overall project design, three basic options were considered: (i) providing flood protection by only raising the dikes along the river; (ii) constructing reservoirs on the tributaries of the Odra; and (iii) raising dikes, where necessary, in combination with a "dry" polder at Raciborz. Option (i) is an extremely expensive solution. Regarding option (ii), a new reservoir on the Nysa Klodzke (Kamieniec Zabkowicki reservoir, with a flood storage of about 58 Mm³) is already being planned, but effectiveness of reservoirs on Odra tributaries for flood control on the Odra is low if the floodwaves on the tributary and the Odra would coincide, and the chance that this would happen is about 60 percent. Option (iii) is by far the superior solution as it reduces the peak flow of large floods by about 20-50 percent and the corresponding water levels by about 0.5-1.0 m for more than 500 km of dikes. It has also been considered to only implement the Raciborz dry polder and delay the proposed upgrading of the WFS. This option would continue to expose Wroclaw to the danger of severe floods, which is unacceptable to the Polish authorities including Wroclaw city.

31. For the design of the Raciborz dry polder, three alternatives were considered: (i) alternative A with a layout for the dikes around the polder that would require resettling the inhabitants of Nieboczowy village and Ligota Tworkowska village (about 161 households with population of 689); (ii) alternative B, whereby the dikes would circumvent Nieboczowy village, which would reduce the population to be resettled from 689 to 125 persons. Alternative B was found to increase the dike length by about 9 km, reduce the reservoir capacity by 19 percent and the benefits by 8.2 percent. In addition, Alternative B would increase groundwater levels in Nieboczowy when the reservoir would be inundated, as well as substantially increase

the risk to the population in case of emergency, because virtually no warning time would be available to warn and evacuate the population; and (iii) alternative C, under which the layout of the dikes would have been the same as in case of alternative A, but Nieboczowy village was to be reconstructed at or near its current location but above flood level, and provided with access to the polder dike. This alternative, though slightly cheaper, was found impractical.

32. The Psina River is a tributary of the Odra River which flows into the Odra through the designated polder area. By constructing the embankments for the Raciborz Polder, the Psina will be cut off from its outlet. Two design options were evaluated: (i) creating a new Psina outlet by connecting the Psina with the Old City Odra by constructing a new 2.5 km long canal outside the polder. This option would require the purchase of a considerable area of agricultural land west of the polder and would have significant negative environmental effect on the natural vegetation along the old Psina outlet, which would dry up completely; (ii) in the second variant the Psina River would flow through the polder in its present channel during normal discharges and only be diverted around the polder during operation of the reservoir. This requires the construction of a storm water flood channel of about 2.0 km length between the embankment of the polder and the existing railway. This option has been selected, since it minimizes resettlement and environmental impacts.

33. All WFS alternatives were considered with the Raciborz dry polder because only with Raciborz can they provide the required level of protection for Wroclaw city:

- Option 1: Adapting the Katowice polder (located just upstream of Wroclaw city), currently a “flow through” polder during floods, for use as a “dry” polder for storing flood water; raising and strengthening of dikes and retaining walls, and; removal of the Paniowice polder;
- Option 2: All elements of Option 1 plus remodeling of the Flood Channel, the Old Odra River channel along the City Canal, the City Odra River Channel, and the Odra River channel from its junction with the Old Odra channel to its confluence with the Widawa Channel.
- Option 3: All the elements of Option 2 plus the construction of the Odra - Widawa Transfer and increasing the capacity of the Widawa channel.
- Option 4: All elements of Option 3, except for the Katowice polder.

34. Options 1 and 2 provided inadequate protection. Option 3 and 4 would both protect Wroclaw satisfactorily. However, Option 4 proved to be more economic than Option 3 and was therefore selected for implementation.

C. IMPLEMENTATION

1. Partnership arrangements

35. Under the ongoing EFRP, the technical assistance provided by Bank staff and consultants in helping to shape the Government’s Odra 2006 Program, and preparation of the ORFPP, has been fully supported by the Government of Poland, and partners such as EIB, CEB and the EU, Germany and the Czech Republic. The latter two countries are, with Poland, members of the Odra River Commission. The Polish Government and the World Bank have maintained regular contact with representatives of the European agencies, to keep them informed and to consult them on program preparation. The Project would be co-financed by the EU Cohesion Fund, and CEB. It is expected that funds from all financiers would be merged to cofinance the various civil works contracts instead of parallel financing allowing the maximum use grant funds from the EU Cohesion Fund. Procurement and disbursement would follow a streamlined procedure agreed with all partners. The Bank’s role would be to coordinate and consolidate the assistance of the other partners for the Project.

2. Institutional and implementation arrangements

36. **Overall Project Management.** The proposed project implementation arrangements are shown in Chart-I. The Office of Natural Disasters Recovery (ONDR) under the Ministry of Interior and Administration would have overall responsibility for project management and coordination. ONDR would also supervise, through Voivod and Marszalek of Lower Silesia, parts of the Project implemented by the Lower Silesia Board of Amelioration and Water Structures (DZMiUW). The State Water Management Authority (KZGW) of the Ministry of Environment (MOE) would be responsible for project implementation through its Regional Authorities for Water Management (RZGWs) in Gliwice (RZGWGL) and Wroclaw (RZGWWL). A PCU is established in Wroclaw under KZGW for day-to-day coordination and management. The RZGWGL would be responsible for implementation of the Raciborz dry polder sub-project, while the RZGWWL would be responsible for works related to modernization of hydraulic structures on the Odra River in the WFS. DZMiUW would be responsible for modernization of dikes in the Wroclaw area, and the Widawa transfer. The RZGWGL would be responsible for implementation of the RAP and EMP related to Raciborz dry polder while RZGWWL and DZMiUW would deal with any resettlement related issues and EMP in WFS. The Institute of Meteorology and Water Management (IMGW) would be responsible for implementation of Component C2 related to improving flood forecasting system namely the SMOK. The Conservator of Nature of MOE would be responsible for overall coordination of Component C5 activities related to enhancement of the Odra River ecological corridor that would be implemented by the Regional State Forest Directorates (RDLP) at the Voivod level (under supervision of General Directorate of State Forests --GDLP) in coordination with Conservators of Nature of Slaskie, Oploskie and Dolnoslaskie regions, Marszalek offices, local NGOs and academic institutions.

37. Since the EU Cohesion Fund would also provide cofinancing for the Project, and the associated National Environmental Protection and Water Management Fund (NFOSiGW) is responsible for management of the EU Cohesion Fund, the MOE/KZGW and PCU would coordinate project implementation activities and financing with NFOSiGW.

38. **Project Steering Committee (PSC).** A national PSC would be established to provide guidance and coordinate project activities at the highest level of Government, including the inter-ministerial level. The PSC will also review the overall implementation of the project and resolve any implementation, and financing issues. The PSC would meet at least quarterly or as necessary, and review project implementation progress and other issues that need to be addressed.

39. **Project Coordination Unit (PCU).** The PCU established in Wroclaw under KZGW would have responsibility for overall coordination/management on a day-to-day basis. PCU would consist of a project director, a deputy director, a technical specialist with experience in implementation of large construction works, a technical specialist with experience in monitoring of EMP and RAP, a procurement specialist, a financial management specialist, public relations specialist, an accountant, and support staff. The PCU, jointly with related agencies, would take the lead in updating the flood management strategy and developing additional project for improving flood management. The consultants for M&E supervision of implementation of EMP/RAP would also report to the PCU.

3. Monitoring and evaluation of outcomes/results

40. The PCU will submit quarterly reports in an appropriate format to the MOE, PSC, ONDR and the Bank no later than 45 days after the end of each quarter. The quarterly report would cover the progress and expected completion date for civil works and equipment/goods contracts, progress on institutional components, training and studies, and activities of the PCU's engineering, M&E, procurement and financial consultants. The reports would cover financial and procurement information, including: (a) comparison of actual physical and financial outputs with forecasts, and updated six-months project forecasts; (b) project financial statements, including sources and application of funds, expenditures by category statement, and

special accounts reconciliation statement; and (c) a procurement management report, showing status and contract commitments.

41. The PCU will also prepare annual reports by no later than January 31 of each year of project implementation. The report will cover: (a) the progress of each component, implementation of key features of the environmental management plan, key performance indicators, operation of project facilities, and financial statements; and (b) the Annual Work Plan for implementation, annual funds required for implementation with breakdown by each cofinancier, an updated disbursement profile, planned actions for mitigating negative effects during construction, and target indicators for the coming year. A mid-term review of the Project would be undertaken by July 31, 2011. An Implementation Completion Report (ICR) would be submitted to the Bank no later than six months after the closing date.

42. A group of consultants would be recruited for M&E of the Project impact, including the implementation and monitoring of the EMP, and the RAP. The M&E studies would evaluate the success in project implementation in terms of meeting the project's objectives, and to assess its physical, hydrological, environmental, social, and economic impacts. The M&E activities would provide continuous feedback to the MOE, Ministry of Interior and Administration (MIA), ONDR and the PSC on the project's performance and its impact on the various components, so that corrective actions could be undertaken in a timely manner. Changes in the PAD or the Project, if any, would be reflected in the implementation review aide-memoires and/or communicated through exchange of letters between the Bank and the Government.

4. Sustainability

43. The infrastructure to be constructed or rehabilitated under the Project is of a "public good" nature, and its management would remain the state and provincial government's responsibility in the near future. Under the technical assistance component, technical assistance would be provided to create adequate institutional capacity for operation and maintenance of the project facilities. Adequate budgetary provisions would have to be made for their operations and maintenance (O&M) after the project facilities are completed. It is estimated that about Euro 2.0 million would be required annually for adequate O&M of the dry polders in Raciborz (for both the Bukow and Raciborz dry polders) and about Euro 3.0 million for the WFS. Proper O&M of the infrastructure constructed under the Project is not a major issue as most of the flood protection infrastructure is well maintained in Poland.

5. Critical risks and possible controversial aspects

44. **Critical Risks.** The main objective of the Project itself is to reduce the risk of damages resulting from major floods. The possible risks in achieving this objective consist of: (a) failure of Raciborz dry polder or other protection dikes of WFS in case of extreme floods; (b) uncoordinated and untimely operation of Raciborz and other available flood storage and management facilities in the basin thus causing floods instead of mitigating them; and (c) delays in the construction of the Raciborz dry polder due to delays in resettlement.

45. The Raciborz dry polder is designed to handle the Probable Maximum Flood (PMF) estimated based on the probable maximum precipitation for the Odra Basin. The design would be prepared by experienced international and national consultants, who would also supervise the construction. A Panel of Experts would review the design and provide overall guidance during implementation. Furthermore, Poland has a system of inspections of major hydraulic facilities like Raciborz that would ensure its safety. The risk that this structure will fail is very small. The flood protection works for WFS would be designed and constructed to provide protection against specific design floods and the crest level of the dikes would be set in accordance with established norms. Failure of dikes, if any, would cause only localized damages. In fact, one way to manage extreme floods would be to cause controlled breaching in areas where damages would be small instead of compromising the safety of the dikes near highly populated areas.

46. Uncoordinated operation or early deployment of the Raciborz polder before the occurrence of the flood peak could make the protection system ineffective and in an extreme situation increase the intensity of the flood downstream. To avoid such a situation and make effective use of the flood protection system, the flood forecasting and warning system is being implemented in Poland under the EFRP. Under Component C of the Project, a special application of the flood forecasting system for the Odra valley would be developed. Also, in Poland as well as in the Czech Republic, better communications would be established between various agencies and facilities for improving the operation of the flood protection system. In addition, improved emergency preparedness and flood management plans (Component C1) would be prepared in collaboration with responsible RZGWs and local authorities, clearly establishing the rules of operation of various structures, and priorities for areas to be protected against floods of various magnitudes. This would minimize the risks of incorrect operation of the flood protection system during a real time situation.

47. Extraordinary delays due to resettlement are unlikely because: (a) the resettlement would be carried out in parallel with project implementation. However, efforts would be made to complete a significant part of the land acquisition before starting construction; (b) it is expected that after the Project is approved and financing secured, the residents of the two villages would negotiate seriously with Government and agree to the sale of their property. This is likely to be the case if financial compensation is delivered promptly by Government after negotiations and signing of the property purchase agreements. Because the Raciborz project has been in the planning phase since the 1940s and Government has discussed the purchase of land and property on several occasions without any serious follow-up, the residents of the two villages are always skeptical of the Government's plans; (c) the RAP has been developed considering adequate and acceptable alternatives for resettlement for affected people with fair compensation for property based on the replacement value. Various options for compensation proposed under RAP have been discussed with residents and there is general acceptance of the RAP approach; (d) Polish laws for land acquisition, resettlement and expropriation have adequate provisions to deal with resettlement issues and property value assessments. These laws also provide recourse in case of disputes to ensure that people are treated fairly under the law. Such procedures are completed fairly quickly so it is unlikely that they will be the cause of long delays; and (e) the Government entity (RZGW-Gliwice) in charge of the Project is experienced in land acquisition and resettlement; it has already constructed the Bukow polder just upstream of the site for the Raciborz polder that also involved resettlement.

48. Given the above, the risk of resettlement issues causing significant delays in project construction is small. The RAP has been completed and it has been agreed with the Bank prior to loan negotiations thus the associated risks have been identified and they are minimal. The risks of mismanagement in funding and payments to the beneficiaries are minimized through robust financial management system (See Annex 7) with adequate internal controls and audit arrangements. Also the surveys and monitoring by independent M&E consultants would identify any irregularities in providing compensation under the RAP.

49. **Controversial aspects.** Resettlement could be a controversial aspect of the Project. Some residents of one village, Nieboczowy, have expressed an unwillingness to resettle. As explained in the risk and social assessment section, adequate and acceptable alternatives for resettlement, proper management of the resettlement process especially, and adequate and prompt delivery of compensation will help avoid unpopular expropriations.

50. Poland's capacity and improved governance environment under which the project is to be implemented provides confidence that project implementation issues related to management, procurement and financial management including those of resettlement would be addressed in an effective manner thus ensuring achievement of project's development objectives.

6. Loan/credit conditions and covenants

51. **Conditions for Board Presentation.** Re-activation of PCU. PCU was reactivated on January 9, 2007
52. **Effectiveness conditions.** CEB Loan Agreement has become effective.
53. **During Project Implementation:**
- (i) the Project Steering Committee, Project Coordination Unit, and project implementation staff in ONDR, RZGW-Gliwice, RZGW-Wroclaw and DZMiUW would be maintained with appropriate terms of reference, agreeable to the Bank, until project completion;
 - (ii) the PCU shall maintain a financial management system for the Project, comprising an updated financial manual and a computerized Project Accounting and Management Information System until project completion. The project financial statements (including statement of expenditures (SOEs) and Special Account) will be audited by independent auditors with the terms of reference acceptable to the Bank. The annual audit reports will be provided to the Bank within six months after the end of each fiscal year. The FMRs (Financial Monitoring Reports) will be submitted on a quarterly basis within 45 days after the end of the calendar quarter;
 - (iii) PCU and implementing agencies would monitor the physical and financial progress of the Project, implementation of the RAP and EMP, and the project impact studies, analyze the data on key performance indicators on a regular basis and prepare and submit quarterly and annual progress reports, and annual work plans for the following year;
 - (iv) the mid-term review of the Project would be undertaken by July 31, 2011;
 - (v) The Borrower would ensure proper implementation of the Environmental Management Plan including the enhancement of the ecological corridor in the Odra River Valley and other compensation measures for the natural habitats (potential Natural 2000 sites) located within the Project;
 - (vi) The Borrower would ensure proper implementation of Resettlement Action Plan and Resettlement Policy Framework (RPF) with due diligence and efficiency, provide adequate funds, monitor and evaluate and maintain the Bank suitably informed of the progress in implementation.
 - (vii) For the polder works and large hydraulic infrastructure to be constructed under the project, the Borrower shall: (a) appoint, not later than December 31, 2007, an independent panel of experts with qualifications and terms of reference satisfactory to the Bank to advise the Borrower on matters relative to safety of the polder and other large hydraulic infrastructure and critical aspects of design and operation; (b) convene panel meetings periodically to review the design and implementation of the infrastructure; (c) prepare and implement a detailed plan for: (i) construction supervision and quality assurance, not later than December 31, 2007; (ii) an instrumentation plan, and operation and maintenance plan, not later than December 2008; and (iii) an emergency preparedness plan, not later than September 30, 2009; (d) after startup of the operation of the polder and large hydraulic structures works, have period safety inspections.

D. APPRAISAL SUMMARY

1. Economic and financial analyses

54. The Economic Rate of Return (ERR) of the Project is 17.4 percent. The primary benefits of the Project are the reduction in damages due to recurrent floods. These benefits are measured in terms of a reduction in Annual Average Damages (AAD), which is the integration of a series of single event damages for a sequence of floods with progressively increasing return period. For estimating the area inundated, hydraulic simulation models were developed providing water levels for floods with various return periods. These levels were then overlaid on the topographic conditions (using digital terrain models) to estimate the area inundated "with Project" and "without Project". The actual damages of the 1997 flood, together with

the modeled areas of various land use categories that were inundated, were used to derive unit rates on a per hectare basis for each land use category. The ERR is robust and not very sensitive to costs and benefits. A 10 percent increase in project costs or a 10 percent decrease in benefits would change the ERR by less than one percentage point. The total project costs have to increase by 100 percent or benefits have to reduce by 50 percent to reduce the ERR to the opportunity cost of capital (taken as 10 percent). The ERR was also tested against major assumptions such as no economic growth in the project area in future, an estimation of return periods for various floods using a different method of estimation. The intangible benefits include reduced stress, alcoholism, suicide rates, fear of floods, loss of control over situation, loss of memorabilia, and health problems (details are in Annex 9).

2. Technical

55. The technical studies for the Project have been well prepared, and in particular the hydrological and flood simulation studies. The hydrological analysis for this type of project is a difficult task. Therefore, the latest state of the art techniques were used in carrying out the hydrological and hydrodynamic analyses. Return periods for various floods were estimated using the “conventional method” (using historic discharge data at a given point in the river, this method gives less weight to the extreme 1997 flood) and the “regional method” (analysis carried out at sub-basin level using several measuring stations that have the same characteristics, this method gives more weight to the 1997 flood). There is a considerable difference in the return periods of the floods estimated by the two methods, the return periods for the regional method are much shorter. For routing the flood wave through the river and the valley, the latest version of the Mike 11 model (developed by the Danish Hydraulic Institute) and which was calibrated by simulating several historic flood events such as the 1977, 1985 and 1997 floods. For estimating the areas inundated by floods of various return periods, historic as well as synthetic hydrographs for return periods ranging from 10 years to 5,000 years were used.

56. As mentioned earlier, the Raciborz dry polder is designed to handle the PMF. With respect to the design of the dikes and other flood protection works for the WFS, Polish standards require that the crest levels of the dikes be set at least to the level of a “control” flood (assumed with a return period of 1,000 years as determined by the conventional method)¹. In this case, to be on the safe side, the dike heights were set corresponding to the water levels provided by the model resulting from a “control” flood with Raciborz that was increased by 15 percent. This more conservative approach was taken for reasons that: (i) as pointed out above, uncertainties exist in determining the return periods of floods, especially in case of extreme events; (ii) Wroclaw is the greatest city in the Odra valley and had the largest damages resulting from the 1997 flood; and (iii) the simulated results, which are optimized based on a full knowledge of the flood hydrographs for the Odra River and its tributaries, will be difficult to achieve in a real time flood situation.

57. The designs for the Raciborz dry polder and for the dikes in WFS are not extraordinarily complex. Similar works have been constructed on the Odra River already. Renowned international and national consultants are currently preparing the designs. Qualified contractors, selected on the basis of international competitive bidding, would construct the works. The contractors would be supervised by qualified engineers.

3. Fiduciary

58. **Procurement Arrangements.** The Polish Public Procurement Law has been amended in line with the EU Directives for public procurement. The Polish Public Procurement Law and the World Bank

¹ The concepts of “design flood” and “control flood” are based on the regulations issued by the Polish government for the design of major structures and embankments, with the exception of major reservoirs. The “design flood” indicates the flow that should be passable under normal flood conditions and the “control flood” what should be passable under emergency conditions. The regulations require that for first class structures and embankments the “design flood” should have a return period of 200 years and that a freeboard of at least 1.3 meters should be provided. In addition, the crests of the embankments/dikes should at least reach the level of the “control flood” (assumed with a return period of 1,000 years).

Procurement Guidelines are now generally consistent. The nature of the Project and the civil works contracts demand that funds from all financiers be pooled together to fund large civil works contracts i.e., cofinancing of contracts instead of parallel financing of selected contracts by each financier. For that purpose, procurement arrangements acceptable to all cofinanciers will be used under the Project. In order to achieve this objective, simplified and special procurement procedures would be used to procure major contracts under the Project. The World Bank procurement procedures and guidelines and bidding documents would be acceptable to CEB for contracts cofinanced by the CEB and the World Bank. The EU Cohesion Fund requires that the procurement is carried out in accordance with the Polish Public Procurement Law. At this stage, only the World Bank has the Standard Bidding and Contract Documents, therefore these documents shall be used for procurement under the Project. Based on these parameters, a procurement program, methodology, and plan, was developed for this Project. The details are given in Annex 8.

59. **Financial Management Arrangements.** The financial management arrangements of the project were assessed and found acceptable to the World Bank's financial management requirements. The overall financial management risk for the project with mitigation measures is moderate. Details are provided in Annex 7. The main financial management functions will be performed by the PCU responsible for gathering and consolidation of entire project financial information, preparation of disbursement documentation (withdrawal application, SOE documentation), reporting (periodical and annual), financial monitoring, flow of funds. The remaining implementing entities DZMiUW, RZGWWL, RZGWGL, IMGW will carry out procurement and supervision of contracts, account for expenditures in their existing budgetary accounting systems, receive funds, make payments and provide PCU with documentations and information related to withdrawal of the loan proceeds, SOE documentation of the eligible expenditures, project reporting and monitoring.

60. The PCU has managed EFRP and is familiar with IBRD's financial management requirements. The PCU has handled the financial management system for EFRP that involved about 880 sub-projects in six voivodeships, and about 185 powiats/ gminas and 5 implementing agencies of MOE. The PCU has a Financial Management Specialist with expertise and experience in financial management of the EFRP. The PCU will install a computerized financial management system for ORFPP, and will maintain books and accounts for the Project, adequate to reflect the operations, resources and expenditures related to the Project. The system would have capacity to prepare disbursement applications for submission to the World Bank, EU, other co-financiers as well as to produce expenditure statements in accordance with the Polish chart of accounts/regulations and for submission to the auditors. If possible, the whole or part of the system may also be installed in project implementing agencies such as RZGWGL, RZGWWL and DZMiUW.

61. **Disbursements.** Bank loan funds would flow from the loan account to the Special Account in the National Bank of Poland managed by the Ministry of Finance (MOF). Funds would be transferred from MOF to MOE/KZGW's implementing agencies RZGWGL, RZGWWL, IMGW and State Forest Departments, and the Marshal of Dolnoslaskie (Lower Silesia and then to DZMiUW) through the normal budgetary transfers. The PCU would coordinate the flow of funds to various implementing agencies and it would be responsible for preparation of disbursement applications that would be submitted to the World Bank through the MOF.

62. **Special Account (SA).** The SA would be managed by the MOF. The authorized allocation of the SA would be €20.0 million and the initial deposit into the SA would be €10 million, until the total disbursements under the Project reach €20 million. The applications for the replenishment of SA would be submitted by the PCU on a monthly basis. The SA and project accounts would be audited by an audit firm in accordance with international auditing standards and the audit certificate would be furnished within six months of the end of the fiscal year.

63. **Retroactive Financing.** To meet the urgent project preparation and start up needs, and procurement of priority works, the Bank could finance retroactively expenditures incurred for the period between January 1, 2007 and Loan signing, up to a limit of €10 million, provided the procurement procedures acceptable to the Bank are followed. Expenditures for equipment, consultancy services, incremental staff salaries and operating expenditures, training, civil works, RAP costs and other preparatory expenditures would be eligible for such retroactive financing. However, such amount would have to be advanced by the MOF, MOE or ONDR and would be paid retroactively from the loan after it becomes effective.

4. Social

64. **Social Impacts—Downstream Benefits and Mitigation of Upstream Impacts due to Land Acquisition (Annex 10.2).** The project will have two principal impacts: first, it will decrease the threat of loss of lives and property from floods for approximately 2.5 million people who live downstream of the proposed Racibórz Polder; second, it will result in the displacement of approximately 161 households (689 people and 260 family units) who live within the proposed boundaries of the polder and the loss of land located within the boundaries by owners (about 850 owners) who reside outside. The downstream population will benefit from physical works that will increase control over flood waters, as well as improved coordination in flood management control due to better flood management and early warning systems. Even though the polder would only be flooded during extreme floods (with return periods of more than 10 years), Polish regulations require the land/property within the polder to be acquired by the State and allocated to the RZGWGL responsible for operation of the polder for flood management.

65. The detailed design of the proposed Widawa Transfer (in the Wrocław Floodway System around the city of Wrocław) will be undertaken during project implementation. Widawa Transfer is expected to affect leased garden plots (with small sheds, trees and some other assets) and possibly require some land acquisition and/or revised lease agreements. A resettlement policy framework has been prepared for WFS (Component B5) and agreed (provided in Annex 10.2). As part of the detailed design of the Widawa Transfer component of the WFS a comprehensive RAP will be prepared and agreed for this component based on the principles and parameters of agreed resettlement policy framework and the RAP for the Raciborz component. Construction of the Widawa Transfer component would start only after DZMiUW prepares a RAP addressing resettlement and social issues, acceptable to the Bank. The estimated cost for handling RAP issues and social costs in WFS have been incorporated in the project.

Resettlement Action Plan.

66. **Project Site, Land use and Ownership.** The total area required for the Racibórz Dry Polder is 2,626 ha distributed in four gminas, Lubmia (41 percent), Racibórz (23 percent) Kornowac (1 percent), and Krzyzanowice (35 percent). Out of this, the land required for construction of the dry polder i.e. structures, dikes, and borrow areas, is about 960 ha or 37 percent of the total area needed for the polder. This area must be acquired by the RZGWGL with high priority. About 1,853 ha out of the total area for the reservoir are agricultural land, in water bodies about 185 ha, forest 148 ha, waste land 292 ha and residential area is 40 ha, of which 29 ha constitutes the built-up area. (see Annex 10.2 for details). The area of plots with buildings in the two villages located within the reservoir is 185.6 ha. Inhabitants are not allowed to stay within the reservoir and all buildings and other structures have to be removed. The use of other land within the reservoir (approximately 1,480 ha) can continue according to the existing uses, such as farming, for gravel extraction, forest, ponds and water bodies during construction and in future. This area can be acquired towards the end of the construction period and possibly be leased back to previous owners with terms which recognize the recurrence and severity of floods.

67. Private owners possess about 30 percent of the area (50 percent of the plots) and the remaining area belongs to institutions and organizations, mainly state-owned. Less than 6 percent of the area belongs to

private firms. Much of the land is divided into small plots. The majority of plots, more than 88 percent, are very small with an area not exceeding 1.0 ha, covering 32 percent of the total area. More than 46 percent of the land in the polder area is owned by the State Treasury and administered by different institutions, inter alia: Agricultural Real Property Agency (ARPA), State Forests-Forest Inspectorate Rybnik, Polish State Railways, Light and Mineral Aggregates Production Enterprise in Katowice, RZGW in Gliwice.

68. Approximately, 11 percent of the residents in the polder area are engaged in agriculture, but few households depend on agriculture as the principal source of income. People are employed in coal mines, gravel pits, industries, commerce, processing and local government service, among other things. Many households have two or more income-earners, some of whom live and work in Germany. The population of the two villages is aging rapidly as members of younger generations move away for education and employment -- more than 22% of people are over 60 years of age.

69. **Project Affected People and Categories of Impact.** People directly affected are: (i) people who live in the dry polder area, primarily about 700 people, about 260 families, in two villages Nieboczowy and Ligota Tworkowska; (ii) people who own land in the reservoir area and live outside; and (iii) people who own or are employed by businesses located within the dry polder area --mainly residents in the two villages.

70. Twenty businesses are located within the polder area, most of which will be relocated or closed. Twenty-two community assets will also be closed or relocated elsewhere. These are 1 church, 1 chapel, 7 crosses, 5 wayside shrines, a cemetery, 2 fire brigade buildings, a kindergarten, school, bread house, a recreation room, and a sports club. Resident private owners of the land within the polder area are clustered in the two villages, Nieboczowy and Ligota Tworkowska, and their number is about 500. Private land owners living outside the area number about 850.

71. Land leasing is common in the area. ARPA lands, in particular, are leased under various terms for farming purposes. The ARPA land leases are of two categories: (a) short term lease contracts many of which expiring during 2005 or soon after; (b) long term leases, most of which will expire around 2011 or 2012 as these leases were for a 20 years period and most were signed just after 1991. Virtually all of the long term leases will expire by the time the polder becomes operational. The RZGW intends to lease back the land that lies within the polder area but with terms that recognize the increase in probability and severity of flooding and RZGW would not be responsible for crop losses. If the polder is used before the existing long term leases expire, then the RZGW would pay for the crop losses of the lease holders.

72. **Legal Framework, Entitlements and Compensation.** Polish Law governing land tenure, resettlement and land and asset evaluation are covered by the Act of Management of Real Properties (MoRPA). Polish law enables administrative units to purchase land and property for public use through negotiations. If that fails, and the site in question has been identified in the local land use master plan and designated as needed for public purposes, the land and assets can be expropriated. In practice, expropriation is only exercised as a last resort. Details on the legal framework, procedures for property acquisition, compensations and entitlements are given in the Annex 10.2.

73. As mentioned above (Section B5) various alternatives were considered to minimize the resettlement and land acquisition and the proposed alternative was selected as the best solution. According to Polish laws, a location permit was issued for the Raciborz Dy Polder that allows RZGWGL to proceed with land acquisition through negotiations and/or through expropriation, if necessary. RZGWGL negotiates compensation and departure/evacuation arrangements with owners, and plans to use expropriation only as a last resort. Currently, owners are offered compensation for land and property at market value, which is established by professional assessors. The compensation agreed to date is acceptable to sellers and meets the Bank standard of full replacement cost; the alternative valuation method (used in the past in Poland), called 'replacement cost,' is subject to depreciation and thus would not meet Bank requirements. The purchases completed to date have been voluntary, with owners coming forward to negotiate.

74. The overall impact of resettlement for residents of Nieboczowy and Ligota Tworkowska, land owners and other affected persons will be mitigated by a number of factors that affect individual households to varying degrees:

- No residences are located within the footprint of the embankments, thus resettlement of the population is not required immediately and can proceed until the end of 2010;
- Non-agricultural income sources are primarily outside of the polder area, in nearby towns and Germany, and some people expect to move closer to employment sites;
- Few households depend primarily on agricultural income; the land-for-land option will enable farmers to continue farming and cash compensation will enable others to capitalize their assets for other uses. Also the land under agricultural use or for gravel extraction would be acquired and leased back to the original owners, however, the lease terms would recognize the increase in probability and severity of flooding;
- Some families have already built or purchased homes outside of the polder area in anticipation of resettlement;
- RZGWGL is flexible in the timing of relocation, giving residents as long as two years to purchase or build new housing and prepare for a smooth transition;
- Residents who want to maintain community ties will have the option of moving to one of the resettlement sites;
- Vulnerable people will be given special assistance in finding alternative residential sites and moving.

75. **RAP Implementation.** The cost estimate of implementation of the RAP for the Raciborz Dry Polder is €64.9 million and included in the project. For implementation of the RAP for the WFS component €13.3 million have been allocated in the project. The cost is based on replacement value of property, houses, barns, garages, standing crops and productive trees; relocation of common property such as the church, chapel, cemetery school, sports club etc.; construction of one or more resettlement villages at new sites (if necessary); relocation cost as well as the cost of administration monitoring the implementation of RAP. The RAP has been developed based on the principle that all losses should be assessed and adequately compensated and that no individual, family or community should end up worse off than they were before their assets were acquired.

76. The area required for construction of polder infrastructure (about 960 ha) must be acquired by RZGW with high priority. Based on the available information and survey it is estimated that about 200 ha of land may be required as replacement land for land acquired for construction of infrastructure. Several parcels of land have been identified for this replacement land, all of which are owned by Agricultural Real Property Agency (ARPA) and leased to various lease holders. For example, Agromax Ltd is a leaseholder of 3,000 ha from ARPA. Similarly there are several other leases by ARPA in the area surrounding the dry polder. ARPA land is preferred by those interested in land exchange and the sites identified are acceptable to owners who have expressed an interest in swapping. The ARPA lease agreements have provision that the Agency can reduce the leased area by 20 percent, if such area is required for public investment such as the Raciborz dry polder. There are no legal or administrative constraints in acquiring these lands for allocation to people who prefer replacement land.

77. About 180 ha of land needed for construction of infrastructure in the early phase of the project is owned by ARPA that has been leased out. This land had four short term leases (2 years long contract) which expired in September 2005 covering an area of 100 ha. The remaining 80 ha are under a long term contract with Agromax Ltd which will be acquired through provision of the lease contract that allows a reduction of 20 percent of the leased area. The leasing of 214 ha of ARPA land in the polder area is similar, 50 percent in short term lease and 50 percent in long term.

78. The acquisition of land within the polder area, houses and properties in the two villages would continue in parallel to the construction of the infrastructure. By the end of 2004, RZGWGL had purchased about 36 properties, including 31 residential houses. Negotiations are ongoing with another 15 owners, which will consume the remaining budget allocated to RZGWGL for land acquisition. To date the process has taken about three months from initial discussion to the signing of an Agreement. Due to its limited budget, RZGWGL has negotiated with owners who came forward, rather than seeking out owners for purchases. Once project funds are available, the pace of acquisition will speed up markedly. Most of the land acquired would be available to be leased back, however, and the houses will be demolished after they are vacated.

79. RZGWGL has identified three sites for resettlement of residents, if they choose to do so. Two of the sites are located adjacent to urban areas at Lubomia, where residents would be able to build their own homes or swap their residences for new units constructed by RZGWGL. A third site would be suitable to re-establish a rural community, for which residents would be able to swap agricultural and residential land to re-establish agricultural units. Residents would have choice to select a replacement house at the alternative village site or at other site in the Gmina suitable to them. According to Polish Laws, replacement house, land or property is provided as part of the administrative or expropriation proceedings (when a cash settlement is not acceptable to the owner). If demand is adequate, the sites will be fully developed, with urban infrastructure, prior to settlement. Prospective residents will be encouraged to participate in the process of designing the site plans and residences in a process to be established once the scale of demand is determined.

80. RZGWGL will be responsible for implementation of the RAP for compensating and resettling the inhabitants of the Raciborz dry polder area. RAP issues in the WFS, if any, will be addressed by the RZGWGL and DZMiUW. The PCU will remain responsible for coordinating all RAP activities at the higher level of the Government and the Bank. The use of the Loan proceeds for land acquisition will be a major factor in ensuring timely and smooth implementation of the RAP.

81. **Stakeholder Participation.** The Raciborz polder has been the subject of discussion and planning for a few decades, but the information flow to residents has been erratic and signals often contradictory, fostering mistrust and opposition. This culminated in the creation in 2002 of the Committee for the Defense of Nieboczowy, the larger of two settlements in the polder area. To prepare for evacuation of the polder, RZGWGL commissioned a detailed inventory of population and property in 1998, followed by another survey in 2002 and a series of consultation meetings. The Defense Committee now seems to accept the inevitability of construction of the polder.

82. Since January 2002, a series of public meetings were held to discuss various aspects of the Project with the affected population, also to seek ideas and advice to minimize the negative social affects of the project and to develop a pragmatic resettlement action plan. A list of these meetings is provided in the RAP, Annex 10. Public meetings have been contentious, with expressions of concern about both polder construction and compensation levels. RZGWGL's recent consultations seem to have had an impact, as over the last year or so the opposition to the Project has declined. This is also because the location permit was issued for the dry polder, a decision which cannot be overturned, and because of the relatively good compensation package being offered to affected people by RZGWGL. With successful negotiations of more than 36 properties in the two villages and reduced public opposition, an increasing number of people are coming forward to sell their properties.

83. **Disclosure.** After thorough consultations for preparation of RAP given above and sharing various drafts, the disclosure process for the final RAP report was as follows:

- **Announcements.** Advertisements were placed in local newspapers, which described the disclosure process, listed locations where the summary and full RAP were available, gave the address of the

web site where they were posted and invited public discussions; and gave the address to submit written comments and to go for live discussions.

- **Mailings.** A copy of the announcement and the RAP Summary (in Polish) were sent to all households on the list of affected persons prepared for the location permit.
- **Posting.** The full RAP and Summary (in Polish and English) were placed on the RZGW web site and the full RAP and Summary (in Polish) were placed for public review in Gmina and City Council offices around the polder area, RZGW offices in Raciborz and Gliwice and the parish office in Nieboczowy.

84. The disclosure period lasted from the middle of June to July 11, 2004, which coincided with the conclusion of the EA report disclosure period. By the end of the disclosure period, RZGWGL received three letters: from residents Bieńkowice, the Regional Board of Roads Management, and the Defense Committee for Nieboczowy. In addition, a delegation consisting of members of the Defense Committee and other residents of Nieboczowy met with RZGWGL officials at its Inspectorate office in Raciborz.

85. The Roads Office asked for clarification of the future status of roads within the polder area. The residents of Bieńkowice declared their willingness to negotiate with RZGWGL for land sales and swaps, based on a concrete and reasonable offer from RZGWGL. The letter from the Defense Committee asked for justification for rejecting the Committee's alternative design; expressed a willingness to cooperate with RZGWGL for consultations and participate in decision-making; questioned the need for a resettlement village and criticized the proposed sites; asked about the location of replacement land; and requested RZGWGL to develop a specific program to assist the vulnerable. RZGWGL responded to specific points by letter, and was overall pleased by the constructive nature of the letters.

86. **Social Monitoring.** The socio-economic survey undertaken in 1998 and 2002 generated considerable data regarding the population and their assets. The consultants consolidated the various data sources into a comprehensive land and population database for land acquisition and resettlement, which will be updated during the land acquisition process. The baseline will be updated through a brief survey administered to each household at the point of sale that covers consumption levels, income sources, property holdings and post-resettlement plans. This baseline will be incorporated into the larger database and used for follow up monitoring to assess resettlement impacts and, if appropriate, to identify problems that need mitigation. RZGWGL will manage the database and an independent firm will carry out periodic monitoring and impact assessments.

87. Downstream social development impacts of the project, manifest as flood losses avoided, do not require special monitoring, as they will be captured through standard monitoring of the project impact and disaster monitoring and assessment procedures. Upstream impacts resulting from land acquisition and resettlement will be monitored separately with focus on measuring the well-being of the project affected people. An independent team of M&E consultants will review implementation of the agreed RAP and provide reports to the implementing agencies, PSC and the Bank. The cost estimates and procedure for monitoring and reporting resettlement activities have been prepared as part of the RAP and included in the project budget. The PCU will issue quarterly monitoring reports including RAP implementation, which will be reviewed during Bank supervision missions, followed up by field visits. In addition, two surveys will be undertaken by the M&E consultants: one at the completion of the land acquisition and resettlement process; and another two years later or at the end of the project period. Using the baseline established in the SA and RAP, the surveys will assess the impact of land acquisition and resettlement on households and, if appropriate, recommend actions to be taken to achieve the objectives of the RAP and to mitigate negative impacts that were not foreseen in the RAP.

5. Environment

88. With accession to EU, Poland has harmonized its key environment laws (including environmental assessment (EA) with the relevant EU directives. These transposed Polish laws require preparation of a

detailed Environmental Impact Assessment (EIA) for issuing a construction permit for the major components of the Project. These EIAs are prepared together with the detailed designs and the bidding documents. Thus specific EIAs would be prepared for contracts covering Raciborz, dikes, and hydraulic structures (Component A), various dikes proposed to be strengthened or constructed in the WFS individually (Component B) during project implementation in accordance with the Polish regulations. Therefore, EA procedure for development, operation and monitoring of this Project are perhaps much more comprehensive, than the World Bank safeguard requirements. However, in line with the Bank's safeguard policies (which require EA prior to appraisal) EA of the Project was carried out as part of the Project feasibility study (in 2003 and several consultation sessions were held) and that was reviewed by a team of international and national EA consultants. Based on this review an overall summary EA and EMP were prepared in March 2005 which also included ecological enhancement works under Component C of the Project. First round of consultations and disclosure this EA/EMP was held with stakeholders in March and April, 2005. The second round of EA/EMP consultations and disclosure took place in Wroclaw on June 30, 2005 and in Raciborz town on July 1, 2005. The EA/EMP documents were placed in the RZGWs and DZMiUW for a period of four weeks. Advertisements in local newspapers in Wroclaw and Raciborz were published with invitation to participate in the two public meetings, invitations were sent to major NGOs in the country and copies of the relevant documents were distributed widely in Polish and in English. Further details on consultations and disclosure are provided in Annex 10 and 10.1.

89. Based on World Bank guidelines, the Project is rated as an EA Category "A" Project because of the potential significant impacts on environment, and the extent of planned involuntary resettlement. The EA concluded that the Project would have significant positive impact by increasing protection level against extreme floods for large population, property, and industrial areas and thus implementation of the Project is strongly recommended despite some negative impact which can largely be mitigated and/or compensated. The EA evaluated the impact of the major components of the Project, that is construction of Raciborz dry polder upstream, and improvements in the Odra channels near Wroclaw (WFS) including increasing the capacity of a bypass channel namely the Widawa Transfer. EA also evaluated the impact related to project design, construction and operation. Based on this evaluation, an EMP is proposed for the Project, designed to mitigate, minimize, and compensate any negative effects and in fact to enhance the ecological benefits of the Project. A summary of EA and EMP (extracted from the Executive Summary of the EA report) is provided in Annex 10.1.

90. Since the social impact of the Project is discussed separately, these are not repeated here. The main reason that the Project would have insignificant impact on the environment during the operation is that floods with frequent return periods (less than 10 years) would be passed undisturbed and only extreme floods would be mitigated and their peaks reduced using the Raciborz dry polder. The ecological conditions in the river channel are determined by recurrent floods and therefore they would generally remain undisturbed. In determining the operation regime of the Raciborz it is important to maximize the protection against floods as well as ecological benefits and to minimize any negative ecological affects. In fact, the Raciborz polder can be operated to enhance the intensity of "ecologically beneficial" floods by holding water for a short period and then releasing with the desired peak flow. These aspects would be studied further during project implementation. The only considerable project effect could be on a possible Natura 2000 site in Raciborz dry polder and possibly in the Odra corridor. The Natura 2000 sites are equivalent to the World Bank's "critical natural habitats." However, Poland's submission to EU does not include any Natura 2000 sites in the project area though some NGOs feel there are some potential sites. The potential negative effects would be mitigated by the ecological enhancements/compensation under the Component C, by the provision of passages for fish migration, and by good operational procedures during project implementation. The Bank will work closely with Polish officials to ensure the protection of designated Natura 2000, provisory designated sites and landscapes, and/or other critical natural habitat. Given the schedule for the entire Odra 2006 process, these matters may not be fully concluded before implementation.

91. Key features of the EMP to mitigate the above are: (a) to improve the emergency preparedness, flood management plans and operational regime of Raciborz and all other hydraulic infrastructure on the

Odra River, required investments and technical assistance and consulting services would be covered under Component C1 of the Project. As indicated above these plans would be developed with the involvement of the local authorities, concerned agencies, and stakeholders; (b) cost of proposed mitigating measures are included in the relevant investment components of the Project and they would be incorporated into the main construction contracts for construction of such facilities. However, investments to enhance environmental benefits by developing a bio-corridor proposed under EMP are included in Component C5 of the Project. This component would also cover any other mitigating measure required that are not included in the Odra 2006 program or other components of the Project; (c) properly designed fish ladders would be provided in the hydraulic structures to minimize the discontinuity in the river regime and impact on the movement of fish; (d) designs of the embankments and other structures passing through environmentally sensitive areas have been modified (such as bed width is reduced) to minimize the damages to the environmentally important areas and tree cutting and disturbance to land surfaces and environment would be minimized during construction. These requirements would be incorporated in the bidding documents for the construction contracts. Similarly, procedures to minimize the disturbance during construction in the Raciborz as well as in WFS would be incorporated in the detailed designs and bidding documents for the construction contracts; (e) procedures are also proposed to deal with any sites with a potential to be included in Natura 2000 (and other critical natural habitat); and (f) to monitor the implementation of the EMP and independent M&E consultants would be recruited to ensure that all procedures are followed and actions taken as proposed in EMP, including any “chance find” of archeological effects during construction (Component C4).

6. Safeguard policies

| Safeguard Policies Triggered by the Project | Yes | No |
|--|------|-----|
| <u>Environmental Assessment (OP/BP/GP 4.01)</u> | [X] | [] |
| <u>Natural Habitats (OP/BP 4.04)</u> | [X] | [] |
| <u>Pest Management (OP 4.09)</u> | [] | [X] |
| <u>Cultural Property (OPN 11.03, being revised as OP 4.11)</u> | [X] | [] |
| <u>Involuntary Resettlement (OP/BP 4.12)</u> | [X] | [] |
| <u>Indigenous Peoples (OD 4.20, being revised as OP 4.10)</u> | [] | [X] |
| <u>Forests (OP/BP 4.36)</u> | [] | [X] |
| <u>Safety of Dams (OP/BP 4.37)</u> | [X] | [] |
| <u>Projects in Disputed Areas (OP/BP/GP 7.60)</u> | [] | [X] |
| <u>Projects on International Waterways (OP/BP/GP 7.50)</u> | [X] | [] |

92. Details regarding Environmental, social, involuntary resettlement, international water ways as well as explanation for application of other safeguard policies is given Annex 10.

7. Policy Exceptions and Readiness

- No policy exception is needed for the Project.
- Preparation of detailed designs and bidding documents for four contracts for WFS (two for Component B1 and two for Component B2) with a cost estimate of €38 million are ready.

Annex 1: Country and Sector or Program Background

POLAND: Odra River Basin Flood Protection Project

A. Flood Protection in the Odra and Vistula River Basins

1. **Introduction.** Most of the territory of Poland (99.7%) lies within the catchment of the Baltic Sea, mainly in the basins of the Vistula and Odra Rivers; the remainder belongs to the catchments of the Black and North Seas. About 90% of the Vistula and Odra river basins lie within the territory of Poland. The flood of July 1997 was the worst flood on record and Poland's flood defense system turned out to be grossly inadequate. Areas of seven voivodships in the upper and middle Odra river basin and upper Vistula river basin were flooded over 25% of their territory. The floods damaged private residences and apartment buildings, public buildings (e.g. municipal buildings, schools, hospitals, etc.) roads and bridges, railroads, hydro-technical structures (dikes and water control structures), water treatment works, natural gas distribution lines, telecommunication systems, energy transmission systems and other facilities. The floods also destroyed crops and created financial losses to agricultural and non-agricultural enterprises. The total 1997 flood damages in the Odra and Vistula basins have been estimated at about 18 billion PLN (approximately US\$5 billion), of which approximately 65% in the Odra basin and 35% in the Vistula basin. The response in the region and the voivodships and gminas proved the capacity of local authorities for leadership and imaginative crisis management, despite the breakdown of communication and information systems. But the great stress which this extreme event placed on the flood management system also exposed the gaps and weaknesses in flood management and the hydraulic infrastructure.

2. **The Odra River Basin.** Occurrences of large floods in the Odra River and its tributaries are frequent. In the 19th century, four major floods were recorded in the years 1813, 1829, 1854 and 1880, while in the 20th century twelve large floods were recorded, of which the July 1997 flood was by far the largest. The 1997 flood was caused by extremely heavy rain, with some meteorological stations recording as much as 400 mm over a four-day period. The total July 1997 rainfall was four times that of the long-term average. As result, an area of 650 km² was inundated in the three voivodships of Slaski (Upper Silesia), Opolskie and Dolnoslaskie (Lower Silesia) damaging 37,000 buildings, 866 bridges and over 2,000 km of roads. An estimated 129 km of dikes were reported to be completely destroyed. The estimated damages in these three voivodships as a result of the 1997 flood were about PLN 8.5 billion. It caused the loss of 54 lives; flooding of some 700,000 households, and about 110,000 people were evacuated. The damages, comprising the costs of rescue, stress, loss of public and private property and production etc., were considerable.

3. The flood of July 1997 was especially a major test for the current flood protection system in the Odra river basin, which had virtually remained unchanged for almost 100 years. It was developed after the 1903 flood as a system consisting of flood protection levees, storage reservoirs, flood relief channels, polders and dry water retention basins. The problems of efficiently operating the available flood defenses during the flood to maximize flood benefits, exposed the most serious weaknesses of the flood management system. The response to the flood was chaotic. The monitoring system was vulnerable to damage early in the flood, there was no forecasting and warning system, and even before communications failed, the information systems could provide little to support decision making during the flood. Without a clear set of operating principles, and information and analytical capability to consider alternatives, operations were left with rigid, overly simplified and inflexible rules. The administrative system and the fragmented and diffuse responsibilities for flood management exposed the consequences of not reconciling the conflict between a basin or systematic approach to flood operations on the one hand, and local demands for flood protection on the other hand.

4. **The Vistula Basin.** Because the 1997 storm was farther west, the damage sustained in the upper Vistula was only about half of that in the Odra. While more dikes are reported to have been damaged, about

215 km, the area affected was less, and with fewer catastrophic breaches the damage was much less severe. However, in August 2001 there was another severe flood on the Vistula, which resulted in the death of 10 people and forced the evacuation of 1,300 people, while Warsaw just narrowly escaped flood damage.

5. **The National Reconstruction and Modernization Program (NRMP).** In response to the 1997 flood disaster the Government prepared and adopted the NRMP. This program comprised an immediate program of *ad hoc* actions to be completed by September 1997; a program of medium-term actions to be completed by March 31, 1998; and a program of long-term actions that would be carried out thereafter.

B. Accomplishments under the Emergency Flood Recovery Project (EFRP)

6. Following the 1997 flood, Government also requested the Bank to extend financial assistance. The Bank responded by approving a US\$200 million loan for the Emergency Flood Recovery Project (EFRP) (Ln 4264-POL) in December 1997, which mainly covered the medium-term actions of the NRMP. The main object of this Project was to restore the basic infrastructure in communities and rural areas affected by the 1997 floods, by making urgent repairs to the flood management system, while concentrating on the most heavily affected region of Poland. The Project also aimed at improving the policy framework and institutional capacity for better flood management and mitigation. The loan for the EFRP became effective in March 1998 and closed on December 15, 2006. The EFRP consisted of three main components:

7. Component A aimed to restore municipal and rural infrastructure in about 185 of the most damaged gminas (repairs to water intakes, water treatment plants, pumping stations; replacement of water pipes and control structures; repairs to roads and bridges; repairs to heating and gas systems; and repairs to communal housing and public buildings; and consulting services for engineering and construction supervision. All activities related to Component A were completed in August 2002 (the amount disbursed was US\$111.7 million).

8. Component B (US\$82.5 million) was designed to assist GOP to strengthen sustainable long-term flood hazard reduction and management as well as to support investments in the rehabilitation and expansion of flood protection infrastructure. The broad objective of this Component is to strengthen the existing flood management system to reduce direct and indirect flood damages, reduce flood hazard and vulnerability, and reduce the economic costs to central and local budgets from floods that range from frequent to rare catastrophic floods. Specific sub-components were: (a) updating and modernizing basin water management strategies and plans (b) the preparation of digital terrain maps; (c) the preparation of hydraulic simulation models and information systems; (d) establishment of monitoring, forecasting and flood warning systems; (e) investments in flood protection infrastructure; (f) flood risk reduction and prevention, including the preparation of detailed flood preparedness plans, first on a pilot basis and then its expansion to additional communities. The ORFPP was prepared using the loan funds from the Project.

9. Component C (US\$10.1 million) aimed mainly to establish a Project Coordination Unit (PCU) to act on behalf of the ONDR and provide overall project administration, coordination, monitoring and progress reporting and help procurement and disbursement activities associated with the Project.

C. Program for the Odra River - 2006

10. The scale of the 1997 flood and the magnitude of the losses demonstrated to GOP the need to create a comprehensive strategy for the modernization of the Odra flood protection system in Poland. Such a strategy was prepared in the form of a pre-feasibility study for the Odra 2006 Program. Following wide social consultations during the 1996 – 2001 period, the strategy for the Odra was endorsed by the Act on the Establishment of the Multi-Annual “Program for the Odra River - 2006” (Odra 2006 Program), which was adopted by the Sejm (Polish Parliament) on 6 July 2001. Odra 2006 Program would implement tasks related to:

- Construction of passive and active flood management systems
- Protection of the natural environment and water quality
- Flood recovery
- Preventive land use planning and ecosystems restoration
- Increase of wooded areas
- Maintenance and development of inland navigation
- Utilization of rivers for power generation

11. The Act imposed upon the Council of Ministers an obligation to appoint the Government Plenipotentiary for the Odra 2006 Program. Under the Council of Ministers Decree of 12 March, 2002, the Governor of Dolnoslaskie Voivodship was appointed to Government Plenipotentiary. The Government Plenipotentiary is empowered to take action on a wide range of tasks including but not limited to coordination for implementation, taking actions related to the International Odra Commission, program funding, budgeting, progress control, related regulatory and economic aspects etc. The Act provides for a budget of about PLN 9.0 Billion for the Odra 2006 Program, broken down in Table 1 below.

Table 1: Estimated Budget allocation for Odra 2006 Program

| Components | Total Costs (million PLN) | Percentage of total (%) |
|--|--------------------------------------|------------------------------------|
| 1. Forests | 298.5 | 3.30 |
| 2. Sewage treatment plants | 3,565.6 | 39.40 |
| 3. River regulation structures | 1,042.9 | 11.53 |
| 4. Flood management structures | 3,098.5 | 34.24 |
| 5. Land use planning | 35.5 | 0.39 |
| 6. Environmental planning | 241.7 | 2.67 |
| 7. Flood management monitoring | 401.8 | 4.44 |
| 8. Reconstruction and modernization of dikes | 364.5 | 4.03 |
| TOTAL | 9,049.0 | 100 |

12. It was anticipated that this program would be implemented over the 15-year period 2002 - 2016, and would be financed from the state budget (10.7%); gminas (17.38%); Polish environmental protection funds, such as the National Fund for Environmental Protection (NFOSiGW), the Voivodship Funds for Water Management, and the National Fund for Environmental Protection and Water Management (WFOSiGW) (21.16%), and; the European Union (30.22%) and other international financial institutions, such as the CEB, EIB and the World Bank (20.58%).

13. The estimated expenditures on specific investment projects for flood control included in the above PLN 9,049 million amounted to PLN 4,263.66 million or 47%. It includes the two main components included in the ORFPP, the construction of the Raciborz dry polder and the rehabilitation and modernization of the flood control defenses for Wroclaw, at estimated costs of PLN 484.5 million and PLN 590.2 million, respectively.

14. The largest flood management projects included in the Odra 2006 Program and implemented by 2002, at a total cost of PLN 672.5 million, include:

- the Bukow polder which, under the program, is considered as the Phase I of the Raciborz dry polder complex (cost PLN 172 million)
- the Kozielno and Topola reservoir projects, which are important components of the Nysa Klodzka cascade (PLN 326 million)
- the Opole diversion channel (PLN 100 million)

- the reconstruction of the Szczytnicki barrage (PLN 35 million) and the Bartoszowicki barrage (PLN 26 million) in Wrocław
- construction works at the Malczyce fall (PLN 13.5 million)

15. So far only the EU Cohesion Fund has tentatively allocated Euro 700 million for Odra 2006 for the period 2004 – 2006, out of which Euro 514 million would be available for tasks related to improvement of surface water quality and improvement of drinking water quality and distribution, and Euro 186 million for the construction of water reservoirs and flood protection needs.

D. Summary of Hydrological and Flood Simulation Studies for the Odra River Basin

16. **General.** The Odra flows out of the Odreskie mountains at 634 m above sea level. Its source is in the Silesian-Moravian part of the Sudety mountains at 400- 700 m elevation on clayish shales. The Czech Odra basin is 4,665 km² in area. The main Czech tributaries are the Opawa, Ostrawica, and the much smaller Olza. In Czech territory there are 8 retention reservoirs with a total capacity of 386 Mm³, including a flood reserve of 70 Mm³.

17. The main tributaries of the Odra in Poland are the Ruda, Klodnica; Mala Panew and Strobawa on the right bank and the Osobloga and Nysa Klodzka on the left bank. The right bank tributaries do not have the character of mountain rivers and their floods are much lower than the those of the left bank tributaries. In Poland there are 5 significant flood control reservoirs on the Odra tributaries with a total capacity of 401 Mm³ and a flood reserve of 209 Mm³. The Kamieniec reservoir on the upper Nysa is under design. There are also 12 dry flood reservoirs in Polish territory within the Upper Odra basin with a total capacity of 28.6 Mm³.

18. **Probability of Peak Flows.** Standard hydrological data (rating curves, flood wave hydrographs, peak flows of various frequencies and comparisons of co-occurrence of floods on the Odra and its tributaries were drawn from Hydrographical Yearbooks (1951 – 83 and 1997). There are 15 gauging stations on the main river and its tributaries. Polish standards have been used to calculate peak flows with defined probability using Kaczmarek’s Methodology. The peak flows of the 1997 event were well over double the maximum previously recorded flows at a large number of stations in the upper Odra Basin. Unfortunately, there is inevitable uncertainty in attempting to determine the frequency of extreme floods. On the one hand, using conventional methods based on the historical evidence and giving little weight to the exceptional 1997 flood, one could assign the 1997 event an estimated return period of the order of 1,000 years (0.1% probability). On the other hand, one could also assume that the 50-year period of record is a random sample, and fit a distribution which gives reasonable weight to the 1997 event as the highest in 50 years. The latter has been undertaken using the “regional analysis method”, using software of the Center for Ecology and Hydrology (Wallingford, UK). This method has been found to give consistent estimates of the relation between flood magnitude and return period, or frequency of occurrence, when applied to areas of reasonable homogeneity. The analysis resulted in dimensionless frequency curves for five regions of the upper Odra, providing relationships between the maximum flood and the mean annual flood (Q/MAF) and various return periods. Because the individual records all contain the 1997 flood, this approach does not avoid the problem of the rare 1997 event. It is noteworthy that the regional curve is similar to that derived in 1995 for the upper Vistula basin. The correlation between the return periods predicted by the two methods is presented in Table 2.

Table 2: Correlation of return periods for peak flows at Raciborz

| Peak Raciborz reservoir inflow (m ³ /s) | Return period (years) | |
|--|-----------------------|-----------------|
| | Conventional method | Regional method |
| 1,000 | 10 | 11 |
| 1,510 | 50 | 31 |
| 1,735 | 100 | 45 |
| 2,129 | 333 | 79 |
| 2,260 | 500 | 94 |
| 2,485 | 1,000 | 123 |
| 3,008 | 5,000 | 211 |
| 3,231 | 10,000 | 260 |

19. Synthetic hydrographs were developed for a wide range of probabilities of occurrence (return periods varying from 10 to 10,000 years) for cross sections at 9 gauging stations and 8 sites on the Odra and its tributaries. One subject that was particularly addressed during the studies was the development of synthetic flood coincidence scenarios for the main Odra River and its major tributaries. This was undertaken by establishing a relationship between the peak water stage at an Odra gauging station and the gauging station of its nearest tributary, and then by assigning, for a flow with a specific probability in the Odra, a probability to the corresponding flow in the tributary. This analysis showed that in only 60% of the floods in the Odra one could also expect dangerous floods in its tributaries. Reservoir flood routing studies for the Tuwara, Otmuchov, Nysa and Raciborz reservoirs were also done for a wide variety of synthetic floods.

20. **Probable Maximum Flood (PMF).** The rainfall recorded at Czech stations in the 120 hours from 4th –9th July 1997 reached 585 mm at Lysa Hora and similar amounts at other stations. A regional study of maximized real precipitation was carried out in Germany using standard moisture maximization records. Close to the Czech mountain range the maximized point value of rainfall was estimated to be 550 mm – 600 mm over 72 hours, while the actual 72 hour rainfall at Lysa Hora was 509 mm. For an area of 1,000 km² for the same period, the maximized point value was 500 – 550 mm, while the average rainfall at 11 stations in the Opava and Ostravica basins in the Czech Republic over the highest 3 day rainfall was 420 mm. Thus, in both cases the actual rainfall was about 80 – 90% of the Probable Maximum Precipitation (PMP). On this basis, and with an actual peak flow at the Miedona gauging station (close to Raciborz) of 3,120 m³/s, the PMF for the Raciborz reservoir was estimated at approximately 3,700 to 4000 m³/s. German experts also recently undertook an in-depth analysis of the frequency of floods on the Elbe and Odra Rivers and concluded that there is no upward trend in the occurrence of extreme floods in Central Europe².

21. **Flood Simulation Studies with the Hydrodynamic Model.** The principal objective of the flood modeling component of the feasibility study has been to evaluate the net benefit of the proposed Raciborz reservoir in terms of the predicted future reduction in flood damage in the Odra valley. This flood damage reduction assessment has been carried out as a systematic procedure comprising the following sequence of tasks:

- Construction of a hydrodynamic model for the Upper Odra basin;
- Calibration of the flood wave model using the historic flood events of 1997 and 1977;
- Evaluation of alternative flood scenarios for a range of return periods, with and without Raciborz reservoir;
- Development of a digital elevation model of the Upper Odra valley;
- Preparation of flood inundation mapping for each flood scenario by overlaying the flood envelopes, produced by the flood wave model, over the digital elevation model of the Odra valley;

² M. Mudelsee et al; No upward trends in the occurrence of extreme floods in Central Europe; Nature, vol. 425, 11 September 2003

- Analysis of the inundation mapping to assess the predicted inundation cost for each of the alternative scenarios, at the range of return periods, with and without Raciborz reservoir;
- Determination of the incremental flood damage reduction benefit of the Raciborz reservoir, for each of the flood return periods, to be carried forward to the economic financial analyses.

22. The hydrodynamic model was constructed using the Mike 11 software package developed by the Danish Hydraulic Institute (DHI). The model covers approximately 204 km of the main river channel (between Olza near the Czech border and Trestno, just upstream of Wroclaw) and includes the two main tributaries, the Nysa and the Mala Panew. The river channel cross sections used in the model number 195 for the Odra, 54 for the Nysa and 20 for the Mala Panew. The Odra is maintained as a navigable river. Existing weir complexes and polders have been incorporated in the model. Once the model was completed it was calibrated progressively from upstream to downstream using the 1997 (out of bank) and the 1977 (in-bank) event. In addition, a wide range of flood scenarios has been carried out, including historic hydrograph simulations for alternative flood defenses (for existing defenses only, and for the planned reservoirs at the Raciborz and on the Nysa), and synthetic hydrograph simulations for alternative return periods (from 10 to 5,000 years, with and without Raciborz). Table 3 is an example of water level reductions on account of Raciborz reservoir for a flood with a return period of 1,000 years (conventional method) for the Odra and a flood with a return period of 333 years on the Nysa.

Table 3: Synthetic hydrograph simulation

Inflow into Raciborz 2,485 m³/s (p=0.1%) (Nysa p=0.3%); maximum release 1,300 m³/s

| Gauging station | Water levels (m) | | |
|---------------------|-------------------|----------------|-----------------------|
| | Without reservoir | With reservoir | Water level reduction |
| Raciborz Dry Polder | | 194.64 | |
| Miedonia | 186.37 | 185.14 | 1.23 |
| Kozle | 171.83 | 170.64 | 1.19 |
| Krapkowice | 165.56 | 164.49 | 1.07 |
| Opole | 154.50 | 153.56 | 0.84 |
| Skorogoszcs | 145.17 | 145.17 | 0.00 |
| Brzeg Most | 136.06 | 135.76 | 0.30 |
| Olawa | 129.34 | 128.73 | 0.61 |
| Trestno | 121.23 | 120.85 | 0.38 |

23. **Flood Inundation Envelopes.** Flood envelopes portraying the extent of predicted inundation for the range of flood simulations for selected return periods (each with and without Raciborz) have been produced using MikeGIS in conjunction with ArcView. The flood envelopes were produced by overlaying the flood levels computed by the Mike11 hydrodynamic model over a digital elevation model (DEM) based on 1:25,000 scale mapping and river cross-section data. The inundated areas and inundation depth for each flooding scenario, and for each gmina, were extracted from the inundation map grids using Spatial Analyst (an extension of ArcView). The total inundated area for each flood return period is summarized in Table 4.

Table 4: Total inundated areas for each flood return period.

| Flood Return Period (years) | Flood Peak (m ³ /s) | Inundated area with Raciborz (km ²) | Inundated area Without Raciborz (km ²) | Inundated Area Reduction (km ²) |
|-----------------------------|--------------------------------|---|--|---|
| 1 in 10 years | 1,070 | 153 | 259 | 106 |
| 1 in 50 years | 1,620 | 210 | 376 | 165 |
| 1 in 100 years | 1,846 | 313 | 429 | 117 |
| 1 in 333 years | 2,267 | 445 | 616 | 172 |
| 1 in 500 years | 2,407 | 466 | 632 | 166 |
| 1 in 1000 years | 2,646 | 473 | 667 | 194 |
| 1 in 5000 years | 3,204 | 622 | 761 | 140 |

24. These above results were based on optimized reservoir operation rules, assuming that flood forecasting procedures are utilized to predict the size of an impending flood event and hence maximize the attenuation of the predicted flood peak.

25. **Sedimentation Studies.** The sediment studies have been carried out as part of the feasibility studies. The Odra River has very little sediment, annual sediment load is estimated at about 130,000 cubic meters per year. As long as the Raciborz reservoir is used as a dry polder and only for seasonal flood control, the small amount of sediment that would come into the reservoir would be flushed out by the normal operations of the reservoir. Consequently, the morphology and hydraulics of the river downstream would not be affected.

26. **Hydraulic Modeling for the Wroclaw Floodway System.** The scheme of the modeled section is shown in IBRD 33310. To evaluate the flood situation in and around Wroclaw, three separate hydraulic models were used for the Brzeg Most to Brzeg Dolny Odra section: (i) the Odra river model from Brzeg Most to the Janowice barrage (upstream); (ii) the WFS model from the Janowice barrage (downstream) to the Redzin barrage (upstream); and (iii) the Odra river model from Redzin (downstream) to Brzeg Dolny. The models are based on the St. Venant equations. The output hydrographs generated by the Mike 11 model were used as an input at Brzeg Most. The WFS model was developed in the Agricultural University in 1994 but was modified for the new simulation scenarios. It had already been calibrated for the 1977 and 1985 floods. It was checked for the 1997 flood wave and the results were satisfying. Brzeg Most was selected as the interface between the Mike 11 model and the WFS model. Polish standards require that the crest levels of the dikes be set - as a minimum- at the level of a "control" flood with a return period of 1,000 years (as determined by the conventional method). However, the "control flood" for the design of the WFS was taken at 3,100 m³/s at Brzeg Most (derived from 2,700 m³/s - that is the 1997 event - multiplied by a factor of 1.15 to account for less than optimal operation during the real flood). The 3,100 m³/s control flow actually equals the flow at Brzeg Most (with Raciborz) for a return period of 5,000 years, as calculated with the Mike 11 model (the flow is 3,917 m³/s without Raciborz; the estimated flow in 1997 was 3,829 m³/s). Obviously, the use of this more conservative "control flood" provides a higher degree of protection and is fully justified for reasons that: (i) as pointed out above, unavoidable uncertainties exist in determining the return periods of floods, especially in case of extreme events; and (ii) Wroclaw is the greatest city in the Odra Valley and, of all cities, had the largest damages resulting from the 1997 flood.

27. **Development Options.** Four development options were modeled (all in conjunction with the Raciborz reservoir):

Option 1:

- Adapting the Katowice polder for use as a “dry” polder (mostly rehabilitation and raising of embankments);
- Construction and upgrading of embankments within the city of Wroclaw;
- Improvements to retaining walls in the downtown water system, including replacement of a permanent sill at the power plant with a movable structure;
- Construction of a retaining wall along the City Canal; and
- Removal of polder Paniowice embankments.

Option 2:

- All elements of Option 1;
- Increasing the hydraulic capacity of channels by dredging/excavation, and structures remodeling downstream of the city center: Rozanka barrage; Redzin barrage; spillway structure to Odra-Widawa channel; City Odra (South and Old Odra); Flood Channel; increasing the discharge capacity under the bridges.

Option 3:

- All the elements of Option 2
- Construction of the Widawa Transfer(spillway structure in Option 2); embankments along the Widawa channel; construction and upgrading of Widawa valley embankments; river channel excavation; increasing of capacity under the existing bridges and as well their reconstruction.

Option 4:

- All elements of option 3, except for the Katowice polder.

28. Option 1 (PLN 408 million) did not reduce the water levels in Wroclaw for the design flow (having a return period of 200 years; $p=0.5\%$), while flood damages in Olawa city would even be higher. Option 2 (PLN 662 million) was better but still did not protect Wroclaw city enough. It was found that Option 3 (PLN 750 million) would fully protect Wroclaw against flooding during the 1997 flood event. It was found that Option 4 (596 million) would also fully protect Wroclaw against flood damages during the 1997 flood event and would be the least costly alternative. Option 4 was therefore selected for implementation. Under Option 4, reductions in water level during the design flood are expected to occur of: 0.35 m – 1.10 m along the City Odra; 0.40 –1.10 m along the Flood Channel and Old Odra; 0.58 m –0.70m along the Old Odra from Szczytniki to Psie Pole barrage; and 0.70 m along the Odra downstream to Redzin.

29. With the help of the digital maps the inundated areas under the various options were found to be the following:

Table 5: Inundated areas under Options 1-4 (with and without Raciborz reservoir)

| Description | (Option 0: existing condition) | | Option 1 | | Option 2 | | Option 3 / 4 | |
|--------------------------|--------------------------------------|-------------|------------|-------------|------------|-------------|--------------|-------------|
| | W/o Res. | With Res | W/o Res | With Res | W/o Res | With Res | W/o Res | With Res |
| Residential | 3,561 | 1,157 | 3,487 | 702 | 3,192 | 450 | 1475 | 137 |
| Municipal | 71 | 12 | 67 | 4 | 58 | 3 | 31 | 1 |
| Large industries | 58 | 24 | 56 | 18 | 52 | 16 | 12 | 1 |
| Medium commercial | 6 | 4 | 6 | 2 | 6 | 0 | 5 | 0 |
| Small commercial | 63 | 14 | 58 | 7 | 50 | 3 | 20 | 0 |
| Very small commercial | 21 | 4 | 19 | 3 | 14 | 2 | 14 | 0 |
| Arable land | 1,069 | 486 | 1,067 | 363 | 1,016 | 220 | 423 | 107 |
| Grass land | 7,922 | 4,253 | 7,859 | 3,784 | 7,707 | 3,504 | 4886 | 3,225 |
| Forest | 4,191 | 2,630 | 4,170 | 2,264 | 4,097 | 2,051 | 3340 | 1,995 |
| Others | 5,082 | 2,889 | 5,067 | 2,494 | 4,960 | 2,402 | 2,632 | 1,838 |
| Total | 22,044 | 11,473 | 21,856 | 9,641 | 21,152 | 8,651 | 12,838 | 7,304 |

30. The simulation scenarios show that an integrated project consisting of the Raciborz Dry Polder and WFS is the best solution for the desired protection for the population against flooding. The Raciborz Polder alone protects several cities and settlements above Wroclaw but only partially reduces the impact of extreme floods on Wroclaw such as that of 1997 Flood. The WFS works are designed to protect against the “control flood” developed based on the 1997 Flood.

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies

POLAND: Odra River Flood Protection Project

| | Project | Latest Supervision (PSR) Ratings | |
|---|---|----------------------------------|----------------------------|
| | | Implementation Progress (IP) | Development Objective (DO) |
| Bank-financed | | | |
| Flood Emergency Recovery, rehabilitation of municipal and rural infrastructure damaged due to 1997 floods. | Emergency Flood Recovery Project | S | S |
| Implementation of improved flood forecasting, warning and management systems. Development of local flood management plans | Emergency Flood Recovery Project | S | S |
| Other development agencies | | | |
| Council of Europe Development Bank | | | |
| Flood Protection Systems | Construction of Kozielno and Topola flood reservoirs on Nysa Klodzka Flood Diversion Channel in Opole Reconstruction of Szczytnicki and Bartoszowicki barrages in Wroclaw and construction at Malczyce fall | | |
| European Investment Bank with addition of local funding: 1998 - 2002 central budget 33.6% local budget 2.1% Nat'l Fund for Env't'l Protection 3.4%, Provincial Fund for Env't'l Protection in Katowice 1.1% 0.01% - legal entities | Bukow Polder | | |

Annex 3: Results Framework and Monitoring

POLAND: ODRA RIVER BASIN FLOOD PROTECTION PROJECT

Results Framework

| PDO | Outcome Indicators | Use of Outcome Information |
|--|---|--|
| Increased protection for the population of Odra river basin against loss of life and damage to property caused by severe flooding. | The area inundated, damages avoided and lives saved under floods of various magnitudes or with return periods such as 10, 20, 50, 100, 200, 300, 1000 or 5,000 years. | Verify that project is yielding results and take corrective actions if expected area is not protected. Improve land use and development plans. |
| Intermediate Results One per Component | Results Indicators for Each Component | Use of Results Monitoring |
| <p>Component A: Overall. Full protection against flooding between the Raciborz dry polder and Wroclaw city.</p> <p>Intermediate. Construction completion</p> | <p>Component A: Reduction in area inundated, damages avoided and lives saved with floods of various magnitudes in the project impact area. Expenditure and disbursements</p> | <p>Component A. Improved land use plans, flood warning systems etc.</p> <p>To review the implementation status.</p> |
| <p>Component B: Full protection of Wroclaw city against flooding.</p> <p>Intermediate: Construction completion.</p> | <p>Component B: Reduced flood emergencies in Wroclaw city. Expenditure and disbursements.</p> | <p>Component B: Improved land use plans and flood warning system.</p> <p>To review the implementation status.</p> |
| <p>Component C: Improved flood forecasting and better linkage of forecasts with real time flood management.</p> | <p>Component C: Improved lead time in forecasts, and better communication between agencies responsible for flood management and operation of flood control infrastructure, including the facilities constructed under the Project.</p> | <p>Component C: Improved operation of the flood protection facilities and synchronized operation in case of extreme floods.</p> |
| <p>Component D: Smooth implementation of the Project, land acquisition and resettlement, design of facilities, and completion of construction on time and without cost over runs.</p> | <p>Component D: Project affected people in particular in Raciborz area negotiate and settle for sale of land and property to the Government, limited number of expropriations, construction completion on time.</p> | <p>Component D: Corrective action to resolve RAP issues and changes in approach, design of the Project and mechanisms to speed up construction.</p> |

Arrangements for results monitoring

| Outcome Indicators | Baseline | Target Values | | | | | Data Collection and Reporting | | |
|---|--|---|--|-----|---|--|-----------------------------------|--|--|
| | | YR1/2 | YR3 | YR4 | YR5 | YR6 | Frequency and Reports | Data Collection Instruments | Responsibility for Data Collection |
| Reduction in area flooded, damages avoided and lives saved due to floods of various magnitudes and return periods. | Area flooded during 1997 floods. | | | | | Full protection against floods of the against 1997 magnitude. | Annual, after major floods. | Satellite images, actual survey of flooded areas. | MoE/KZGW, PCU, Project implementing agencies: RZGWGL, RZGWWL, DZMiUW and M&E consultants. |
| Results Indicators for Each Component | | | | | | | | | |
| Component A: Reduction in area flooded, damages avoided and lives saved in cities and settlements between Raciborz and Wroclaw city. Construction completion and expenditures. | Area flooded during 1997. | 10% | 20% | 30% | 30% | Full protection against floods of the 1997 magnitude. 10% | Annual, after major floods. | Satellite images, actual survey of flooded areas. | KZGW, PCU, Project implementing agencies, RZGWGL, and M&E consultants. |
| Component B: Full protection to Wroclaw city against flooding. Construction completion and expenditures. | Area flooded during 1997 floods. | 10% | 20% | 30% | 30% | Full protection against floods of the 1997 magnitude. 10% | Annual, after major floods. | Satellite images, actual survey of flooded areas. | KZGW, PCU Project implementing agencies, RZGWWL, DZMiUW, and M&E consultants. |
| Component C: Improved flood forecasting and better linkage of forecaster and communication with flood management. | Status of forecast and communication during 1997 floods. | Step of information system in RZGW Gliwice and Wroclaw. At least 40 percent of the land acquired, residents settled. | | | Plan for operation of various structures during floods. | Established institutional and communication setup for operation of various structures in the system. Complete construction of all project facilities. | Annual. | Information from the RZGWS, local authorities, operators of structures, and impact on avoiding area flooded. | KZGW, PCU, Project implementing agencies RZGWWL and RZGWGL, IMGW, PCU, DLP, and M&E consultants. |
| Component D: Implementation of RAP, design of infrastructure and construction completion on time. | | | RAP completed construction contracts Raciborz and WFS. | | | | Quarterly, and Annual Work Plans. | Contractors reports, supervision reports by the engineers and Bank supervision missions. | MoE/KZGW, PCU, Project implementing agencies RZGWGL, RZGWWL, DZMiUW and M&E consultants, and Local authorities |

Annex 4: Detailed Project Description
Poland: Odra River Basin Flood Protection Project

Project Components

Existing System.

1. The project area is the flood plain of the Odra River between the Czech border at Chalupki Gauging station (km 20.7) and Brzeg Dolny barrage (km 282). Along this about 260 km stretch of the river the cities and towns of Raciborz, Kedzierzyn-Kozle, Krapkowice, Opole, Breg Most, Olawa and Wroclaw (from upstream to downstream) are situated, together with innumerable villages. The Odra originates in the mountains of the Czech Republic. Its total length is 854 km. It flows for 112 km in the Czech Republic, for 555 km through Poland, becomes the border between Poland and Germany for 187 km and finally discharges in the Baltic sea. The average outflow in the Baltic is 17.5 billion m³ (B m³) per year, during extremely dry years 9.0 Bm³ per year and during extremely wet years 23 Bm³ per year. At Raciborz, the Odra discharge varies from a safe flow of about 500 m³/s to flows of more than 3000 m³/s during severe floods. The most serious flood occurred in 1997, when most of the project area was inundated, including the historic city of Wroclaw. The main objective of the Project is to reduce the frequency and severity of the flooding in the project area. The first concept of a flood storage reservoir at Raciborz had already been developed during the Prussian reign immediately after the flood disaster of 1880. Further hydrological information on the Odra is given in Annex 1.

2. Downstream of Kozle the Odra is canalized for navigation up to Dabie Lake at Szczsin at the Baltic, that is over a length of 643 km. At Kozle the navigation waterway also connects with the harbor in Gliwice by the Gliwice navigation canal. The Odra River divides above Opole into a diversion channel. Diversion channels are also located at Olawa and Brzeg Most. There are a large number of hydraulic structures on the Odra between Raciborz and Wroclaw, including flow control structures on the main river with locks to permit navigation, flood protection dikes on both banks of the main river; flood retention polders; and flood retentions reservoirs on the Odra tributaries.

3. **The Existing Wroclaw Floodway System.** The main features of the flood control system in Wroclaw were designed after the flood of 1903 and built between 1905 –1920 to insure a safe passage of 2,400 m³/s through the city. The current safe capacity of the city system is not more than 2,200 m³/s. Upstream of Wroclaw there are a number of polders that are used for temporary flood storage and they reduce the flood peaks through the city: the Rybna, Brezina, Lipki-Olawa, and Olawka polders. In addition to the extensive system of flood protection dikes, the current hydraulic infrastructure consists mainly of: (i) the barrages of Bartoszowice and Opatowice, which split a portion of the Odra flood between the Flood Channel (703 m³/s) and the Old Odra (584 m³/s); (ii) a weir (destroyed by the 1977 flood) at the head of the spillway channel to the Widawa River, which diverted a small portion of the flood waters around the city (140 m³/s); (iii) the Szczytnik weir to control the flow from the Old Odra into the Flood Channel (519 m³/s); (iv) the City Odra, which carries the remaining Odra water, including overflows from the Olawka polder (708 m³/s); (v) the Rozanka and Redzin barrages for flow and water level control; and (vi) two small power stations on the North and South City Odra¹. The navigation canal runs parallel to the flood channel.

4. **Project Strategy.** Key elements of the project strategy include: (a) development of a dry polder along the upper Odra, near Racibórz, not far from where the Odra river enters Poland, with a flood storage capacity of 185 million cubic meters (Mm³); (b) improvement of existing flood protection

¹ The above carrying capacities are for the one in 200 year “design flood” (without Raciborz).

structures in and near the city of Wroclaw, including the reconstruction of overflow polders, and improvements for the Widawa Transfer, consisting of improvements to the Odra -Widawa diversion channel, and works to increase the carrying capacity of the Widawa River and associated structures, to enable the diversion of a larger portion of the flood waters around Wroclaw city; (c) reinforcement and increase in the height of key levies and embankments in Wroclaw city and an increase in the Odra channel capacity up to the Odra –Widawa confluence; and (d) support to selected agencies in the management of Odra river flows and floods, and for the development and management of flood warning systems. The Project would consist of the components described below:

Component A: Construction of Raciborz Dry Polder (€ 218.3 million)

5. A dry polder would be created on the Odra River not far from the border with the Czech Republic near the town of Raciborz to store flood water. Total capacity of the reservoir would be about 185 Mm³. Main benefits from this reservoir will be: (i) a reduction in the Odra peak flows downstream of the reservoir so that the effectiveness of the existing flood defense system will be greatly improved; and (ii) a delay in the timing of the flood peaks at the confluence of the Odra with the Nysa Klodzka so that the adverse combination of the two floods that was so damaging in 1997 will become unlikely in the future. These two phenomena, in combination, will result in a considerable reduction in the frequency and severity of future floods.

6. The works comprise a 4.0 km embankment across the Odra valley with a maximum height of 10.5 m above the Odra river bed. This embankment will be constructed of local cohesive soils with a toe drain at the downstream slope. An outlet structure will be provided that will have six 12 m wide bays equipped with 8.5 m high vertical lift gates, and seven 4.4 m x 3.5 m bottom outlets with invert at the sill level (183.0 m). During preparation of detailed designs provision of bulkhead gates for bottom outlets would be considered. A properly designed fish pass would also be provided. A bridge will pass over the structure. A stilling basin will be constructed on the downstream side of the structure to dissipate the excess hydraulic energy. Seepage control will be provided by a vertical diaphragm wall under the main structure. A 600 kVA standby generator will be installed to provide electric power to operate the gates in case power supply from the transmission network fails. Right and left bank dikes will be constructed from the main embankment along the valley upstream for lengths of 9.15 km and 9.5 km, respectively. The total reservoir area is about 26.3 km².

7. The polder would function as a “dry” reservoir as during normal flows the outlet gates will remain open and the reservoir will be dry. During times of flood, the gates will be used to limit outflow to the minimum possible, subject to the constraint that the water level in the reservoir will not exceed 195.2 m, the maximum storage level. The outlet structure will be designed to safely pass the Probable Maximum Flood (PMF), which has been estimated at 3,700 m³/s. In accordance with Polish regulations, a freeboard of 2.3 m will be provided which sets the crest level of the embankment at 197.5 m. The polder area is underlain by gravel, which is being extracted by contractors. The gravel extraction in the polder area, that is likely to last another 30 years, would increase the polder’s flood storage capacity by another 110 Mm³. There are proposals to convert the reservoir into a regular multi-purpose reservoir after gravel extraction is completed. If this is done, the amount of storage for flood protection would still remain about the same (185 Mm³) as the additional storage made available by gravel extraction would become available for other purposes.

Component B: Modernization of Wroclaw Floodway System (WFS, Total Cost € 253.9 Million).

8. Currently, Wroclaw is subject to inundation with floods greater than 2,200 m³/s. The maximum flow during the 1997 flood was estimated at 3,640 m³/s at Trestno (upstream of Wroclaw). The Raciborz dry polder would offer partial but not complete flood protection. Polish regulations require first class

structures to be designed with the crest level of embankments at least rising to the water level of floods with a return period of one in 1,000 years and in the case of second class structures with a return period of one in 333 years. Adequate protection of Wrocław's first class structures would in fact mean protection against a flood similar to the one in 1997 flood. Allowing for a reduction in the peak flow on account of the Raciborz reservoir, the design flow at Brzeg Most (upstream of Wrocław city) was taken at 3,100 m³/s. The flood protection for Wrocław city is then provided, in conjunction with the Raciborz polder, by modernizing and upgrading the protection system along the Odra channels passing through Wrocław city. The necessary works for WFS comprise of three sub-components: (i) improvements to the Odra dikes and embankments; (ii) improvements to the Odra channels; and (iii) the Widawa Transfer. The cost for detailed designs, construction supervision, administration and contract management are estimated around €20.0 million and resettlement costs are estimated at about €13.3 million.

9. **Improvements to Odra dikes and embankments (€55.9 million).** These improvements comprise: (a) works to reduce the risk of failure by piping; (b) raising embankments where necessary; and (c) works to increase the stability and height of existing retaining walls. These works will be carried out at the following locations:

- a) Left side flood levees of Oławka Polder;
- b) Flood levees of Blizanowice-Trestno Polder;
- c) Ring-type flood levees of Opatowice and Nowy Dom;
- d) Left side flood levees of Odra River along sections Kotowice – Siedlce, Popowice Kozanów, Maślice, Pracze Odrzańskie, Janówek with Water Treatment Plant;
- e) Right side flood levees along sections Janowice, Jeszkowice, Kamieniec Wr., Łany, Wojnów, Zalesie - Zacisze, Osobowice, Rozanka and Rędzin;
- f) Constructions of down-town Odra junction retaining walls; and
- g) Removal of Paniowice polder, reconstruction of the Rędzin embankment, reconstruction of Lesica embankment, and removal of the embankment at Rędzin barrage for a total length of 8.95 km; completion of Siechnice –Groblice embankment.

10. **Improvements to the Odra Channels (€121.5 million).** These improvements, which are designed to increase the hydraulic capacity of the Odra, comprise the following:

- (i) Remodeling of the Flood channel: widening and deepening;
- (ii) Remodeling works of City Odra river channel, including widening, deepening, construction of protected slopes and retaining walls, modernization of flood gate, modernization of city navigation lock
- (iii) Remodeling of Old Odra river channel along the Municipal Canal: widening of the river channel, reduction of guiding embankment at Różanka navigation lock; rebuilding of the Różanka weir; increasing capacity under Warsaw, Trzebnicki and Poznań bridges; Popowice river harbour: additional protection;
- (iv) **Remodeling of South Odra river channel (city section) - reconstruction of the weir at Wrocław I power plant;**
- (v) Remodeling of Odra river channel from junction with the Old Odra channel to the Widawa confluence - widening, dredging and construction of side slope revetments; and
- (vi) Remodeling of Rędzin barrage.

11. **The Widawa Transfer (€43.2 million).** The Odra - Widawa diversion channel would be enlarged to convey about 320 m³/s of flow from the Odra to the Widawa River in times of a flood similar to the one in 1997. The capacity of the Widawa River would be increased to about 350 m³/s. The project components are as follows:

- a) Odra-Widawa diversion channel improvements:

- (i) A new gated weir at the offtake of the Odra- Widawa Canal with embankment spillway. This weir will be constructed simultaneously with the right side flood levees of the Odra river channel;
 - (ii) Reconstruction of the existing railway bridge on Miłoszyce – Osobowice route;
 - (iii) Reconstruction of the existing road bridge at Swojczycka street;
 - (iv) Construction of new flood levees;
 - (v) Reconstruction of existing flood levees;
 - (vi) Removal of existing flood embankments;
- b) Increasing the discharge capacity of the Widawa river valley:
- (i) Reconstruction of existing road bridge over Stara Widawa at Główna Street;
 - (ii) Reconstruction of existing bridges along Widawa river at Krzywousty Street, Sułowska Street bridge and Pęgowski bridge;
 - (iii) Construction of new flood levees;
 - (iv) Modernization of existing flood levees; and
 - (v) Removal of existing flood levees.

Component C: Improving Flood Management, Monitoring and Evaluation, and Supervision of the EMP& RAP (€27.0 million).

12. The Component would consist of three sub-components: (C1) improving emergency preparedness and flood management in the Odra river basin with participation of local governments, concerned agencies, and stakeholders. This would include establishing a modern Odra River Flood Management Center (OFMC) for the upper and middle Odra river basin and a working group consisting of representatives of relevant Regional Water Management Authorities (RZGWs), Provincial Boards for Amelioration and Hydraulic Structures (RZMiUWs), the civil administrations of concerned voivodships (provinces), powiats (counties), and gminas (municipalities), including Raciborz, Opole, Wrocław and other major cities in the basin, as well as the Institute of Hydro-Meteorology and Water Management (IMGW), and other stakeholders involved in flood forecasting, planning and management. The existing plans for flood management and emergency preparedness, and crisis management during and after floods, would be reviewed and upgraded. The development of the Flood Information Centers (OKI) would be advanced, flood simulation models would be improved and put into operation, and operational plans would be prepared for operation and management of major flood storage reservoirs and other hydraulic infrastructure in the Odra river basin. This would result in more effective use of the existing flood protection infrastructure and the infrastructure proposed under the Project, and would minimize the damages caused by extreme floods; (C2) continued support to improve the flood forecasting system, to ensure that the system of hydro-meteorological forecasting (SMOK), currently being installed would remain operational. SMOK would be improved with a better linkage to the Office of Natural Disasters and Recovery (ONDR); (C3) the preparation of a flood management and protection strategy, including identification of priority projects and their ranking, pre-feasibility level studies for at least three high priority projects, and a feasibility study for the highest priority project; (C4) monitoring and evaluation (M&E) of the project impact, including the implementation and monitoring of the environmental management plan (EMP), and the resettlement action plan (RAP). The objective of the M&E Component is to evaluate the success in project implementation in terms of meeting the project's objectives, and to assess its physical, hydrological, environmental, social, and economic impacts. The M&E activities would provide continuous feedback to the Ministry of Environment (MOE) and the Steering Committee on the project's performance and its impact on the various components, so that corrective actions could be undertaken in a timely manner. Particularly, the implementation of the EMP and the RAP should be monitored carefully; and (C5) implementation of EMP related works, that are not included in other components of the Project or cannot be covered under the Odra 2006 or other ongoing programs in the country.

Component D: Project Management, Technical Assistance & Training (€5.8 million).

13. This Component would support the Government in implementing the Project and prepare a follow-on project. It would include: (a) support for the operation of the PCU and implementing agencies (RZGWGL, RZGWWL), RZMiUW, and financing of overall project management, as well as technical assistance in such areas as detailed design, contract administration and construction supervision, procurement, and financial management; (b) a modest institutional strengthening program, including technical assistance and training, would be included in the Project. This would involve the financing of consulting services, and foreign visits, equipment and software for project management.

Annex 5: Project Costs

Odra River Basin Flood Protection Project

1. The total project cost is estimated at about €505 million (See Table 1). The estimates for construction costs are based on actual cost of construction of similar works of proper quality and implemented on time. The costs include physical contingencies of 10%. The cost estimate for the RAP includes all costs related to property compensation, relocation, implementation and monitoring such as purchase of land, buildings, infrastructure decommissioning, compensation for relocation, implementation of RAP, and monitoring of RAP and EMP. The costs were estimated in 2003 Polish Zloty that were converted to EURO using the average exchange rate during 2003, except for RAP costs that were in 2004 prices. These costs were then converted to 2004 costs by using an annual price escalation of 2.5%. With the expected expenditure pattern during project implementation and 2.5% annual escalation, the price contingencies during the construction period are estimated to be about 10% of the 2004 base cost. A VAT of 22% is added in all cost items. The total VAT under the Project is estimated at €111 million. The RAP costs are about €78.2 million of which €64.9 million are for Raciborz and €13.3 million for WFS. The total project cost would be US\$663.4 million equivalent or PLN 1,858 million equivalent using rate of US\$1.3137 per Euro and PLN 3.68 per Euro, respectively.

**Cost Estimates and Financing Plan
(Million Euros)**

| Project Component | Cost Net of VAT | VAT | Total Cost | GOP | World Bank | EU-Coh. | CEB | Total | WB % |
|---|-----------------|--------------|--------------|-------------|--------------|--------------|--------------|--------------|------------|
| A. Raciborz Reservoir | | | | | | | | | |
| A1 Construction Costs | 107.2 | 30.2 | 137.4 | | 27.4 | 80.0 | 30.0 | 137.4 | 20 |
| A2 Resettlement Costs | 50.6 | 14.3 | 64.9 | 29.3 | 35.6 | | | 64.9 | 55 |
| A3. Construction Supervision | 12.5 | 3.5 | 16.0 | | 7.9 | | 8.1 | 16.0 | 49 |
| Sub-Total A | 170.3 | 48.0 | 218.3 | 29.3 | 70.9 | 80.0 | 38.1 | 218.3 | 32 |
| B. Wroclaw Floodway System (WFS) | | | | | | | | | |
| B1 Rehabilitation and modernization of Levees and Channel Protection Works | 43.6 | 12.3 | 55.9 | | 8.4 | | 47.5 | 55.9 | 15 |
| B2 Retaining walls (Boulevards),channel Widening and Hydraulic structures | 94.8 | 26.7 | 121.5 | | 18.5 | 50.0 | 53.0 | 121.5 | 15 |
| B3 Widawa Channel Improvements | 33.7 | 9.5 | 43.2 | | 6.5 | | 36.7 | 43.2 | 15 |
| B4 Design, Construction supervision and Administration | 15.6 | 4.4 | 20.0 | | 3.0 | | 17.0 | 20.0 | 15 |
| B5 Resettlement Costs | 10.3 | 3.0 | 13.3 | 0.7 | 0.0 | | 12.6 | 13.3 | 0 |
| Subtotal B | 198.0 | 55.9 | 253.8 | 0.7 | 36.4 | 50.0 | 166.8 | 253.9 | 14 |
| Subtotal A+ B | 368.3 | 103.9 | 472.2 | 30.0 | 107.3 | 130.0 | 204.9 | 472.2 | 23 |
| C. Improving Flood Management, Monitoring & Evaluation, and supervision of EMP and RAP | | | | | | | | | |
| C1. Emergency preparedness and Improved flood management | 3.8 | 1.1 | 4.9 | | 4.9 | | | 4.9 | 100 |
| C2. Flood Forecasting System (SMOK) | 7.4 | 2.1 | 9.5 | | 9.5 | | | 9.5 | 100 |
| C3 Flood management strategy and assistance in additional project preparation | 3.9 | 1.1 | 5.0 | | 5.0 | | | 5.0 | 100 |
| C4 M&E of project impact and supervision of EMP and RAP | 2.3 | 0.7 | 3.0 | | 3.0 | | | 3.0 | 100 |
| C5 Works for EMP | 3.6 | 1.0 | 4.6 | | 4.6 | | | 4.6 | 100 |
| Subtotal C | 21.0 | 5.9 | 27.0 | 0.0 | 27.0 | 0.0 | | 27.0 | 100 |
| D. Project Management, Technical Assistance and Training | | | | | | | | | |
| D1. Project Management | 3.1 | 0.9 | 4.0 | | 4.0 | | | 4.0 | 100 |
| D2 Technical Assistance and Training | 1.4 | 0.4 | 1.8 | | 1.8 | | | 1.8 | 100 |
| Subtotal D | 4.5 | 1.3 | 5.8 | 0 | 5.8 | | | 5.8 | 100 |
| Total | 393.8 | 111.2 | 505.0 | 30.0 | 140.1 | 130.0 | 204.9 | 505.0 | 28 |

Note: EU-Coh -- EU Cohesion Fund, CEB -- Council of Europe Development Bank,
 GOP -- Government of Poland, WB -- World Bank

Annex 6: Implementation Arrangements

POLAND: Odra River Basin Flood Protection Project

- Overall Project Management.** The proposed project implementation arrangements are shown in Chart-I. The Office of Natural Disasters Recovery (ONDR) under the Ministry of Interior and Administration would have overall responsibility for project management and coordination. ONDR would also supervise, through Voivod and Marszalek of Lower Silesia, parts of the Project implemented by the Lower Silesia Board of Amelioration and Water Structures (DZMiUW). The State Water Management Authority (KZGW) of MOE would be responsible for project implementation through its Regional Authorities for Water Management in Gliwice (RZGWGL) and Wroclaw (RZGWWL), Institute of Meteorology and Water Management (IMGW) and Regional State Forest Directorates (RDLP) under the supervision of General Directorate of State Forests (GDLP). The Lower Silesia Board of Amelioration and Water Structures (DZGMiUW) would be responsible for modernization of dikes in the Wroclaw area, and the Widawa Transfer. The Project Coordination Unit (PCU) established in Wroclaw under KZGW would be responsible for day-to-day coordination and management.
- Since the EU Cohesion Fund also provides co-financing for the Project, and the associated National Environmental Protection and Water Management Fund (NFOSiGW) is responsible for management of the EU Cohesion Fund, the MOE and PCU would coordinate project implementation activities and financing with NFOSiGW.
- Project Steering Committee (PSC).** A national Project Steering Committee would be established to provide guidance and to coordinate project activities at the highest level of Government, including the inter-ministerial level. The PSC will also review the overall implementation of the Project and resolve any implementation, and financing issues. The PSC would be chaired by the Minister of Interior and would have as its members representatives of the Ministries of Finance and Environment, the National Environmental and Water Management Fund, as well as the voivodes (governors) of Slaskie, Silesia and Dolonaskie (Lower Silesia), the Odra 2006 plenipotentiary, the Marshals of Slaskie and Dolonaskie, the mayors of Wroclaw and Raciborz, the director of IMGW, and the director of PCU. The director of the Office of Natural Disasters Recovery (ONDR) would be the secretary of the PSC. The PSC would meet at least quarterly or as necessary, and review project implementation progress and other issues that need to be addressed.
- Project Coordination Unit (PCU).** The PCU established under KZGW in Wroclaw would have responsibility for overall coordination/management on a day-to-day basis. PCU would consist of a project director, a deputy director, a technical specialist with experience in construction of large construction works, a technical specialist in implementation of EMP and RAP, a procurement specialist, a financial management specialist, public relations specialist, accountant, and support staff. PCU, jointly with MOE and concerned agencies, would take a lead in preparation or revised flood management strategy and development of additional projects for improving flood management. The consultants for M&E supervision of implementation of EMP/RAP would also report to PCU.
- Implementing Agencies.** RZGWGL would be responsible for implementation of the Raciborz sub-project (Component A and implementation of its RAP and EMP). The RZGWWL would be responsible for implementation of the Odra River and hydraulic structure works in the WFS (Component B2) and the Lower Silesia Board for Amelioration and Hydraulic Structures (DZMiUW) would be responsible for construction of dikes in WFS and the Widawa Transfer (B1 and B3) and its RAP/EMP. The required staff would be assigned in these agencies to work on project implementation on a full time basis. RZGWWL would take a lead in preparation of improved emergency preparedness and flood

management plan (Component C1) in which the RZGWGL would play a crucial role. Implementation of this Component would be carried out with the involvement of voivodships, gminas, cities such as Raciborz, Opole, Wroclaw, IMGW, and other concerned stakeholders in the Odra basin. Improvements in flood forecasting system for ORB (Component C2) would be carried out by the IMGW. As mentioned above PCU, jointly with KZGW/MOE, would be the implementing agency for Components C3 and C4. The EMP works (Component C5) would be implemented by the concerned implementing agencies for the subcomponent and to the extent possible they would be included in the construction contracts for main works related to the subcomponent. In some cases they would be contracted separately by the concerned implementing agency. The development of ecological corridor in Odra river valley as proposed under the EMP would be implemented by the RDLP at Voivod level under supervision of GDLP in coordination with Conservators of Nature of Slaskie, Oploskie and Dolnoslaskie regions, Marszalek offices, local NGOs and academic institutions. The Conservator of Nature of MOE would be responsible for overall coordination. Slaskie (CNS) would be the main coordinator.

6. **Panel of Experts.** The ORFPP is a complex project and also includes the large dry polder of Raciborz, with embankments as high as 10.5 meters at some places, and a storage capacity of 185 Mm³. To review the project designs and to advise the Government on technical issues an independent Panel of Experts would be appointed. The panel would be mainly selected from the IMGW's Dams Monitoring Center (OTKZ). The panel should consist of at least four experts, a dams engineer (also acting as chairman of the Panel), a geotechnical engineer (international expert), a mechanical/electrical expert, and a hydrologist with expertise in operational plans of dams and river systems and flood mitigation. The panel expertise may be supplemented when necessary by other national and international staff in consultation with the implementing agencies and the World Bank.

7. **Implementation Period.** The Project would be implemented over a period of six years starting from project effectiveness expected in by July 1, 2007. Thus the target would be to complete all project works by May 31, 2014 and the Loan Closing date would be November 30, 2014.

8. **Monitoring and evaluation of outcomes/results.** PCU will submit quarterly reports in an appropriate format to the MOE, PSC, ONDR and the Bank no later than 45 days after the end of each quarter. The quarterly report would cover the progress and expected completion date for civil works and equipment/goods contracts, progress on institutional components, training and studies, and activities of the PCU's engineering, M&E, procurement and financial consultants. The reports would cover financial and procurement information, including: (a) comparison of actual physical and financial outputs with forecasts, and updated six-months project forecasts; (b) project financial statements, including sources and application of funds, expenditures by category statement, and special accounts reconciliation statement; and (c) a procurement management report, showing status and contract commitments.

9. PCU will also prepare annual reports by no later than January 31 of each year of project implementation. The report will cover: (a) the progress of each component, implementation of key features of the environmental management plan, key performance indicators, operation of project facilities, and financial statements; and (b) the Annual Work Plan for implementation, annual funds required for implementation with breakdown by each cofinancier, an updated disbursement profile, planned actions for mitigating negative effects during construction, and target indicators for the coming year. A mid-term review of the Project would be undertaken by July 31, 2011. An Implementation Completion Report (ICR) would be submitted to the Bank no later than six months after the closing date.

10. A group of consultants would be recruited for monitoring and evaluation (M&E) of the project impact, including the implementation and monitoring of the environmental management plan (EMP), and the resettlement action plan (RAP). The M&E studies would evaluate the success in project implementation in terms of meeting the project's objectives, and to assess its physical, hydrological,

environmental, social, and economic impacts. The M&E activities would provide continuous feedback to the MOE, MIA, ONDR and the PSC on the project's performance and its impact on the various components, so that corrective actions could be undertaken in a timely manner.

11. Changes in the PAD or the Project, if any, would be reflected in the supervision aide-memoires and/or communicated through exchange of letters between the Bank and the Government.

Annex 7: Financial Management and Disbursement Arrangements

POLAND: Odra River Basin Flood Protection Project

1. **Summary of Financial Management Assessment.** The objective of the financial management assessment is to determine whether the entities implementing the project components have acceptable financial management arrangements including procedures for making payments, accounting treatment of transactions, financial reporting, auditing of financial statements, and internal control procedures for avoiding misuse or misappropriation of funds / assets. The assessment concludes that there are substantial inherent and control risks, from the financial management perspective, which can be reduced adequately provided the mitigation measures are taken in time. Therefore, the financial management arrangements for the project - as documented in this annex - are acceptable to the Bank. Details are provided below.

2. **Country Issues.** The 2005 CFAA for Poland provided updated information on public financial management (PFM). Poland has upgraded its legislative framework, introduced internal auditing, and prepared for EU accreditations process of fund managing agencies. Nevertheless, Poland has yet to address essential recommendations made by international partners, such as the EU and the International Financial Institutions (IFIs). The main recommendation was to integrate the major Extra-Budgetary Funds (EBFs) into the state budget process and to consolidate these accounts with those of Public Budget Organization (PBOs) into a Treasury Single Account (TSA) system. Such a step is essential for fiscal transparency and to mitigate fiduciary risks; it is also critical to an economic, efficient and effective functioning of the PFM system as a whole. The 2005 CFAA also indicates that the current administrative capacity is stretched and that the absorption capacity required for administering a great number of new EU funded activities will not be sufficient and needs strengthening.

3. These issues will be addressed as part of the plans for improving the financial management capacity of the PCU, Ministry of Environment and the implementing agencies, i.e. RZGW-Gliwice, RZGW-Wroclaw and DZGMiUW, particularly by introducing a new financial management system for the Project.

4. According to Transparency International, the corruption perception index (CPI) has improved in 2006 compared to last year (2006 CPI is 3.7 compared to 3.4 last year). According to the recent The EBRD-World Bank **Business Environment and Enterprise Performance Survey (BEEPS)**, the corruption in Poland has decreased compared with 2002. The main reasons identified which can lead to corruption practices are:

- Exceeded level of power in hand of one official – due to insufficient segregation of duties in decision making
- “Freedom” in decision making – due to lack of clear and transparent criteria or required procedures
- Undermining the need for documentation and reporting which results in lack of formal documentation justifying the decisions
- Weak internal audit units as a result of poor organization (in most cases only ad hoc activities are performed) and insufficient personnel
- Unequal access to information on available optional discretionary benefits or access to scarce control goods/resources (access to such information is obtained by the entities which have own methods for gathering needed information)
- Lack of precisely defined personal responsibility of officials for realization of tasks which results in washing out of individual responsibilities for decisions/results.

- Lack of effective anticorruption solutions in particular weakness of the anticorruption law, which in current form lacks effective enforcement mechanisms.

5. With regard to the project, adequate mitigation measures are incorporated in the project to improve transparency and accountability, use of funds for intended purposes and to guard against inappropriate use of project funds. These mitigation actions can be summarized as follows: (a) the project will establish a tight internal control framework, including appropriate internal procedures over the resettlement cost (included also in Resettlement Action Plan); (b) the size of procurement packages and the frequency of the Bank's prior review will be determined in a way that it allows an appropriate level of control while attempting to avoid unnecessary reviews which could cause delays; (c) performance audit by independent auditors preferably NIK on terms acceptable to the Bank including a random sample of resettlement cases; (d) enhanced disclosure and transparency of project-related information, including through a project and local government website and local press; (e) social consultations related to resettlement will continue (number of consultation have already taken place); (f) appropriate complaints handling mechanism, with all complaints from resettled individuals, bidders, observers, or other parties should be promptly forwarded to Government and borrower for consideration and follow-up action, (g) there will be intensive Bank's supervision, which will visit a selected number of participating villages annually, including site visits to inspect the construction in progress and meetings with resettled group of individuals.

6. **Risk Analysis.** The overall financial management risk for the project is substantial before mitigation measures, and with adequate mitigation measures agreed, the financial management residual risk is rated moderate. Table below summarizes the financial management assessment and risk ratings of this project:

| <i>Risk</i> | <i>Risk Rating</i> | <i>Risk Mitigation Measures</i> | <i>Risk Measure after Mitigation Measures</i> |
|---|--------------------|---|---|
| INHERENT RISK | | | |
| <i>Country level.</i> Corruption is taking downward trend however the CPI of 3.7 is still highest amongst new and existing EU member. | S | Appropriate mitigation measures on corruption risk are incorporated in section Country Issues. | S |
| <i>Entity level.</i> This project has complex implementation arrangements involving a number of governmental and local level entities. | S | Existing governmental and local institutions have experience in implementation of large projects. However, PCU would provide proper coordination and monitoring of all entities involved. This would improve accounting and financial management under the project with proper report prepared and delivered to Ministries and Financiers of the Project. | M |
| <i>Project level.</i> The main complexity is the implementation of resettlement and land acquisition and procurement of large investment contracts. | S | Resettlement will be implemented according to Resettlement Action Plan agreed with the Bank and based on the existing legal regulation in Poland. RAP implementation would be monitored closely and also by an independent team of consultants responsible for M&E of the project. The procurement of large investment contracts will be carried out as ICB requiring Bank No objection. | M |

| | | | |
|--|-----|--|----------|
| Overall Inherent Risk | S | | M |
| CONTROL RISK | | | |
| 1. <i>Budget</i> | M | | M |
| 2. <i>Staffing</i> | M | In addition to financial specialist already working the PCU will hire an accountant. | M |
| 3. <i>Information Systems</i> – lack of advanced information system consolidating information from all implementing entities. | S | Advanced computerized system will be implemented if project would like to move into report based disbursement | M |
| 4. <i>Accounting Policies and Procedures.</i> | M | | M |
| 5. Internal Control and Internal Audit. Controls over the flow and management of funds by various implementing agencies may not be adequate. | S | PCU will monitor the flow of funds and documents within the project. | M |
| 6. <i>Financial reporting</i> – lack of advanced computer reporting tool to consolidate information. | S | Advanced computerized system will be implemented if project would like to move into report based disbursement during the first year of implementation | M |
| 7. <i>External Audit.</i> | M | It is strongly recommended that the audit of the project should be done by NIK who apart from financial audit is also experience in conducting performance/operational audit. | M |
| 8. Fund flow and disbursement-Complex and slow fund flow arrangements as funds are to be transferred to several implementing agencies | S | Although the flow of funds is done in line with the budgetary procedures the Ministries should streamline the process of transferring the funds. The details will be included in the financing agreements with each implementing entities. | M |
| Overall Control Risk | M/S | | M |
| Overall FM Risk | S | | M |

7. **Strengths.** The strengths that provide a basis of reliance on the project financial management system include the experience of ONDR, PCU and the Ministry of Environment staff in implementing the Emergency Flood Recovery Project (EFRPP) and several other projects financed by other donors including EU. PCU has managed the EFRP and familiar with IBRD's financial management requirements. PCU has handled the financial management system for EFRP that involved about 880 sub-projects in six voivodships, and about 185 powiats/gminas and five implementing agencies of MOE. All implementing agencies, RZGWGL, RZGWWL, DZMiUW, IMGW have considerable experience in managing large projects involving payments for large and small contracts, financial management and reporting.

8. **Weaknesses and Action Plan.** The weakness identified during the assessment relates to lack of implemented computerized Management Information System. It has been agreed that a computerized Management Information System (MIS) would be developed during the first year of the project. This MIS would also be moved to each implementing agency if the disbursements are made based on the report based system.

9. **Implementing Entities.** The Office of Natural Disasters Recovery (ONDR) under the Ministry of Interior and Administration would have overall responsibility for project management and coordination. ONDR would also supervise, through Voivod and Marszalek of Lower Silesia, parts of the Project implemented by the Lower Silesia Board of Amelioration and Water Structures (DZMiUW). The State Water Management Authority (KZGW) of the Ministry of Environment (MOE) would be responsible for project implementation through its Regional Authorities for Water Management (RZGWs) in Gliwice (RZGWGL) and Wroclaw (RZGWWL). A PCU is established in Wroclaw under KZGW for day-to-day coordination and management. The RZGWGL would be responsible for implementation of the Raciborz dry polder sub-project, while the RZGWWL would be responsible for works related to modernization of hydraulic structures on the Odra River in the WFS. DZMiUW would be responsible for modernization of dikes in the Wroclaw area, and the Widawa transfer. See Chart-I and Annex 6 for details.

10. The main financial management functions will be performed by PCU responsible for gathering and consolidation of entire project financial information, preparation of disbursement documentation (withdrawal application, SOE documentation), reporting (periodical and annual), financial monitoring, flow of funds. The implementing entities DZMiUW, RZGWWL, RZGWGL, IMGW will carry out procurement and supervision of contracts, account for expenditures in their existing budgetary accounting systems, receive funds, make payments and provide PCU with documentations and information related to withdrawal of the loan proceeds, SOE documentation of the eligible expenditures, project reporting and monitoring. The financial management arrangements are partially based on the completed EFRPP however the new project is less complex with only few large construction ICB contracts.

11. **Staffing.** The project will utilize the existing staff in implementing entities. PCU financial staff will be responsible for collection and consolidation of reports from other implementing entities. The financial staff of the implementing entities has proven experience in the accounting and reporting of budgetary expenditures including large investment projects. During the first year of implementation PCU will hire an accountant for additional support of financial function in PCU. The risk associated with staffing is moderate.

12. **Budgeting and Planning.** The budget for the project including loan funds and counterpart funding is prepared within the state budget prepared and approved by the Parliament on annual basis. Budget is prepared in accordance with Law on Public Finance and budget classification. The overall annual limit for the project expenditures is set in local currency PLN. MOF will allocate resources to implementing entities during the year through the line Ministries within the overall annual budget allocations. The risk associated with planning and budgeting is assessed as moderate.

13. **Information Systems.** Each of the implementing entities uses various not integrated computerized financial accounting systems. Existing budgetary system is based on bottom up aggregation of information in paper form up to the level of in line Ministry and then to Ministry of Finance. The reports are sent on a monthly basis in a format prescribed by budgetary regulations. Basic financial information on the use of budgetary funds in aggregate form is gathered using paper budgetary reports.

14. For the project purpose the PCU developed basic computer system, including books and accounts for the Project, adequate to reflect the operations, resources and expenditures related to the Project. The system will be basis for preparations of disbursement applications for submission to the World Bank, CEB and the EU, as well as to produce expenditures statements in accordance with the Polish chart of accounts/ regulations for submission to the auditors. The system would be used for preparations of quarterly Financial Monitoring Reports (FMRs). The system will support PCU in management of the project and monitoring of the contracts. In the later stage the implementation of the more advanced Financial Management System with capacity to automatically generate the required reports and its

installation in all implementing entities would be required in order to move into the report based disbursement. The risk associated with information systems is substantial due to lack of the advanced computerized system consolidating information from all implementing entities.

15. **Accounting Policies and Procedures.** The accounting books and records of the implementing entities are maintained on modified cash basis (i.e. liabilities are recorded at the date of invoice acceptance). Each implementing entity will record transactions in their accounting books and records in accordance with normal accounting procedures according to Polish Accounting Regulations applicable for budgetary units.

16. The PCU documented the project's financial management arrangements in the Operational Manual for the project. These describe project-specific procedures, the roles and the responsibilities of the various financial management staff in all implementing entities, eligibility of expenditures, flow of funds, applicable budgetary procedures for application for funds, payment procedures, internal control, accounting procedures and auditing arrangements as well as guide for data entry and operation of the computerized system, sample formats of the financing agreements between Central and Local Governments, formats of the reports required from implementing entities, the agreed formats of the consolidated project's FMRs with the deadline for their preparation, and the project' auditing arrangements including terms of reference for audit. The risk associated with accounting policies and procedures is moderate.

17. **Internal Controls and Internal Audit.** All fund and expenditures will have to follow public finance law requirements including efficient and economic use of the funds. The contracts to be financed from the project sources will be included in the procurement plan to be approved by the World Bank. Most of contracts are large construction contracts which require prior review and no objection from the World Bank. The funds for this project are included in the State Budget in so called special reserve which is used for all external loans. Implementing entities will apply for the project funds including loan and counterpart funding from the Ministry in line with the budgetary procedures but with additional acceptance of PCU. All project expenditures will be originally recorded in accounting books of the implementing entity finally responsible for given expenditure. PCU would monitor and coordinate the flow of funds including monitoring of complex flow of funds from Ministry of Finance to implementing entities, managing the cash flow liquidity of the project by consolidation of the cash forecast, consolidation of the information about the use of the funds and preparation of the reports and records for documentation of the expenditures to the World Bank. Although as described above PCU defined project-specific procedures in the Operational Manual PCU will need to monitor flow of funds and documents within the project. Internal audit departments in the implementing entities are relatively new and were created in 2002 as required by the Law on Public Finance. The work of the internal auditors in 2002 and 2003 related mainly to training, preparation of their organizational structures, formulation of audit procedures, and the preparation of audit plans. In case the internal auditors include the project in their audit plans, this will provide additional assurance. However, the audit plans are established individually in each implementing entity and therefore the World Bank is not able to solely rely on such audits for its fiduciary purposes. The risk associated with the internal control and internal audit is substantial.

18. **Reporting and Monitoring.** The PCU developed a basic computer tool for ORFPP, including books and accounts for the Project, adequate to reflect the operations, resources and expenditures related to the Project. In the later stage the implementation of the more advanced Financial Management System with capacity to automatically generate the required reports and its installation in all implementing entities would be required in order to move into the report based disbursement.

19. FMRs will include the following: (a) Financial Reports; (b) quarterly Project Progress Reports; and (c) Procurement Management Reports. Formats of the FMRs agreed during the negotiations would be

incorporated in the Financial Manual. FMRs should be prepared on quarterly basis and submitted to the Bank within 45 days after the end of the quarter. The risk associated with the reporting and monitoring is substantial due to the lack of advanced computerized system and possibility of human error during the consolidation of information from the project implementing entities.

20. **External Audit.** In its role as the Polish Supreme Audit Institution, the Najwyższa Izba Kontroli (NIK) performs an annual audit of the state budget including the funds used by the implementing entities. As the project's funds will flow through the budgetary mechanisms, the project can effectively be audited by NIK as part of its annual audit of the state budget. NIK would be an auditor acceptable to the World Bank. During the negotiations it was agreed that, subject to NIK's consent, NIK should perform the financial and performance audit of the project.

21. The Audit of the project financial statement will be performed annually both by an auditor and in accordance with TORs acceptable to the World Bank. The audit shall be carried out in accordance with International Organization of Supreme Audit Institutions (INTOSAI) Auditing Standards or International Standards on Auditing and the project financial statements together with the auditor's report will be submitted to the Bank within six months of the end of the each fiscal year. The TORs acceptable to the World Bank were attached to the minutes of negotiation. In case the project will be audited by the private sector auditors the short list of auditors will be submitted to the World Bank prior to the end of each fiscal year, and only those accepted by the World Bank shall be included in the short list. The risk associated with external audit is assessed moderate.

| <i>Audit Report</i> | <i>Due Date</i> |
|---|--|
| Project Financial Statements (PFS) including SOE withdrawal schedule, Special Account. Audit will include operational review (performance audit) for the entire project expenditures encompassing all sources of funding and implementing entities. | Within six months after the end of each fiscal year and also at the closing of the project. Combined audit reports for period up to 18 months can be agreed with the Bank at the beginning and closing of the project. |

22. **Flow of Funds and Disbursement Arrangements.** Bank loan funds would flow from the loan account to the Special Account in the National Bank of Poland (or a commercial bank) managed by the Ministry of Finance (MOF). Budgetary allocations would be made as part of the reserves for flood management. Funds would be transferred from MOF to the MOE/KZGW (and then to RZGWGL, RZGWWL, IMGW, State Forest Directorates) and the Marshal of Dolnoslaskie (Lower Silesia) (and then to DZMiUW), through the normal budgetary transfers.

23. PCU would coordinate the flow of funds to various implementing agencies and it would be responsible for the preparation of disbursement applications that would be submitted to the World Bank through the MOF. Upon request for funds by the implementing agencies (such as RZGWGL, RZGWWL IMGW, DZMiUW), the PCU would prepare and submit a request to MOF to withdraw funds from Special Account after obtaining the necessary approvals from MOE and ONDR. Based on this request, the MOF would transfer funds to the implementing agencies through budgetary allocations in accordance with current practices. The implementing agencies would submit expenditure statements to PCU based on which the PCU would prepare the disbursement applications and submit these to the Bank through the MOF for replenishment of the Special Account. The risk associated with the flow of funds and disbursement is assessed substantial.

24. *Special Account (SA).* There would be one Special Account for the project opened by MOF in National Bank of Poland or a commercial bank acceptable to the World Bank. Loan funds would flow

from the World Bank to the Special Account and then converted into PLN and channeled to the central budget account. The funds would then be made available to implementing entities as budget earmarked transfers in line with existing budgetary procedures. Therefore it would be possible to trace the loan funds and prepare a SOE claims.

25. The authorized allocation of the SA would be €20 million. The applications for the replenishment of the SA would be submitted by the PCU on a monthly basis. Replenishment of the SA would be done based on replenishment application requests supported by documentation, or on Statement of Expenditures (SOEs) for eligible expenses.

26. *Retroactive Financing.* To meet the urgent project preparation and start-up needs, and procurement of priority works, the Bank could retroactively finance expenditures incurred for the period between January 1, 2007 and Loan signing, up to €10 million, provided the procurement procedures acceptable to the Bank are followed. Expenditures for equipment, consultancy services, incremental staff salaries and operating expenditures, training, civil works, RAP costs and other preparatory expenditures would be eligible for such retroactive financing. However, such amount would have to be advanced by the MOF, ONDR, or KZGW and would be paid retroactively from the loan after it becomes effective.

27. *Use of statement of expenditures* is applicable for expenditures below the prior review thresholds: (i) less than €150,000 per contract for goods, (ii) less than €5,000,000 per contract for works, (iii) less than €50,000 per contract for individual consultant, (iv) less than €150,000 per contract for consulting firms, (v) and for all Incremental Operating Costs.

28. *Allocation of Loan Proceeds.* The allocation of the loan proceeds is given in Table 1, which gives the Bank financing by expenditure category. The remaining part of the expenditure would be financed by other project co-financiers and the Government of Poland. Activities under the Project are expected to be completed by May 31, 2014 and the expected closing date for the loan is November 30, 2014.

Table 1 : Allocation of Loan Proceeds (Million Euros) and Financing Percentage

| Expenditure Category | Total Cost | IBRD € million | Financing Percentage |
|--|------------|-------------------|----------------------|
| 1. Works | | | |
| (a) Raciborz Dry Polder Works (Part A1) | 137.4 | 25.0 | 20% |
| (b) Wroclaw Floodway Works | 220.6 | 33.0 | 15% |
| (c) Environment Management Plan Works | 4.6 | 4.0 | 100% |
| 2. Resettlement Costs | | | |
| Raciborz dry Polder (Part A2) | 64.2 | 30.0 | 55% |
| WFS (Part B5) a/ | 13.3 | 0.0 | 0% |
| 3. Goods | 13.0 | 10.0 | 100% |
| 4. Consulting services | | | |
| (a) Consulting services for Raciborz (Part A3) | 16.0 | 5.0 | 49% |
| (b) Consulting services WSF (Part B4) | 20.0 | 3.0 | 15% |
| (d) Consulting services for Part C and D | 13.0 | 10.0 | 100% |
| 5. Incremental operating costs | 2.2 | 2.0 | 100% |
| 6. Unallocated | - | 18.1 | |
| Total | 505.0 | 140.1 | |

a/ Resettlement costs for Wroclaw Floodway Systems would be financed by CEB, no World Bank financing would be used.

29. **Supervision Plan.** During project implementation, the World Bank will review the project's financial management arrangements in two main ways: (i) review of the project's financial management reports, and annual audit report; and (ii) during the World Bank's supervision missions, review of the project's financial management and disbursement arrangements to ensure compliance with the World Bank's requirements. As required, a Bank-accredited Financial Management Specialist will assist in the supervision process.

Annex 8: Procurement Arrangements

POLAND - Odra River Basin Flood Protection Project

1. The Project primarily consists of large civil works contracts and consulting services for design and construction supervision. The total project cost is estimated at €505 million and it is proposed to be financed by the Government of Poland (GOP), EU Cohesion Fund, the Council of Europe Development Bank (CEB) and the World Bank. The nature of the Project and the civil works contracts demands that funds from all financiers be pooled together to fund large civil works contracts i.e. cofinancing of contracts instead of parallel financing of selected contracts by each financier. For that purpose, it is necessary that procurement arrangements acceptable to all cofinanciers are used under the Project. In order to achieve this objective, simplified procurement procedures would be used to procure major contracts under the Project. CEB agreed to the use of World Bank procurement Procedures and Guidelines and standard bidding documents for contracts cofinanced by the CEB and the World Bank. The EU Cohesion requires that the procurement is carried out in accordance with the Polish Procurement Law.

2. For large works the GOP normally uses FIDIC bidding documents which are also the basis for the World Bank bidding documents with mandatory modifications. Therefore, the World Bank's SBCDs shall be used for all procurements under the Project. All prior reviews by the World Bank as described below will follow World Bank Procurement Guidelines and standards.

3. The latest World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, and the provisions stipulated in the Legal Agreement would be applicable for the carrying out procurement under the Project. The various items under different expenditure categories are described in general below. For each contract to be financed by the Loan, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and time frame are agreed between the Borrower and the Bank in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity. Overall procurement arrangement with tentative amounts is given in Table 1. Based on these parameters, the proposed procurement methods are to be followed under the Project:

Procurement of Works:

4. **Contracts up to €5.278 million (POPT-NCB):** The civil works contracts estimated to cost up to €5.278 million would be procured using Polish Procurement Laws open tendering procedures (POPT). The POTP-NCB procedure meets the requirements of the World Bank National Competitive Bidding (NCB) procedure except that under POPT-NCB: (a) no domestic preference shall be used; (b) the term "best offer" (the most advantageous offer) shall be understood as the lowest evaluated bid selected following evaluation with the use of quantifiable monetary factors; and (c) no merit points system shall be used to evaluate bids.

5. The invitation to bid would be advertised on the: (i) internet Website of the implementing agency; (ii) Europe Journal of procurement; (iii) Polish Bulletin of Procurement; and (iv) nationally circulated newspaper.

6. Prior review of such contracts by Public Procurement Office (PPO) is not mandatory. The World Bank would only carry out prior review of contracts costing more than €5 million. The contracts procured under this procedure would be eligible for financing from all financiers of the Project.

7. **Contracts above €5.278 million (ICB):** The contracts costing more than €5.278 million which would be financed by CEB and the World Bank would be procured using International Competitive Bidding (ICB) procedure under the World Bank Procurement Guidelines. Invitation to bid for these contracts would also be published in the United Nations Development Business (UNDB) in addition to the four bulletins/newspapers mentioned above. These contracts would be subject to prior review of the PPO which may be carried out in parallel or sequentially to the review of the World Bank.

8. **Contracts above €5.278 million (POPT):** The contracts costing more than €5.278 million that are expected to be financed by EU Cohesion Fund and the World Bank or CEB would be procured using open tendering procedures of the Polish Procurement Law which meets the requirement of the NCB except: (a) all such contracts would be subject to prior review of the PPO and the World Bank; (b) invitation to bid for these contracts would also be published on the United Nations Development Business (UNDB) in addition to the four bulletins/newspapers mentioned above; and (c) World Bank Standard Bidding Documents will be used.

9. **Contracts below €75,000:** Smaller works estimated to cost up to €75,000 equivalent would be procured using Shopping procedure on the basis of “request-for-quotations method” of the Polish Procurement Law.

10. **Pre-qualification:** Prequalification would be carried for contracts estimated to cost more than €10.0 million.

Recruitment of Consultants.

11. The consulting services for design and construction supervision, monitoring and evaluation and other services consisting of large contracts would be recruited through the Quality and Cost Based Selection (QCBS) procedure under the World Bank Guidelines.

12. Under the Polish Procurement Law the same procedures are used for recruitment of consultants and procurement of works. The QCBS procedure is similar to the provision of “restricted tendering” under the Polish Procurement Law.

13. **Other Selection Methods:** In addition, when necessary and suitable, in consultation with the Bank, the following methods can be used for selection of consulting services:

“Fixed Budget”: Under this procedure of the Bank, firm with the highest ranked technical proposal within a predetermined budget can be selected. This procedure is akin to the Restricted Procedure which is practiced in Service Contracts of the EC and it is consistent with the EU Directives.

“Least Cost Selection”: Under this procedure, the firm with lowest cost can be selected. This procedure would be used for selection of the auditor for carrying out the project auditor;

“Consultants’ Qualifications”: This selection procedure for hiring of consulting firms is applicable for contracts up to €150,000. The Client requests Expression of Interest (EOI) and based on consultant’s experience and competence relevant to the assignment, a short list is prepared. The Client selects the firm with the most appropriate qualifications and references. The selected firm is asked to submit a combined technical-financial offer and the firm is awarded the contract if the offer is acceptable;

“Hiring of Individuals”: The individual consultants can be selected following the World Bank Guidelines or according to EC Directive.

**Table 1: Project Costs by Procurement Arrangements
(Euro million equivalent)**

| Expenditure Category | Procurement Method ¹ | | | Total Cost |
|---|---------------------------------|-----------------------|-------------------------|--------------------------|
| | ICB a/ | POTP-NCB | Other | |
| 1. Works | | | | |
| (a) Raciborz Dry Polder | 137.4 (27.4) | | | 137.4 (27.4) |
| (b) Wroclaw Flood System | 213.4 (32.3) | 7.2 (1.1) | | 220.6 (33.4) |
| (c) Environmental Management Works | | 3.6 (3.6) | 1.0 (1.0) | 4.6 (4.6) |
| 2. Resettlement Costs (Raciborz) | | | 64.9 (35.6) | 64.9 (35.6) |
| WFS (to be financed by CEB not world Bank) b/ | | | 13.3 (0.0) | 13.3 (0.0) |
| 3. Goods | 7.0 (7.0) | 4.0 (4.0) | 2.0 (2.0) | 13.0 (13.0) |
| 4. Services | | | 49.0 (23.9) | 49.0 (23.9) |
| 5. Incremental Operating Expenditures | | | 2.2 (2.2) | 2.2 (2.2) |
| Total | 357.8 (66.7) | 14.8 (8.7) | 132.4 (64.7) | 505.0 (140.1) |

¹ Figures in parentheses are the amounts to be financed by the Loan funds. All costs include contingencies.

a/ contracts cofinanced with EU Cohesion Fund would be procured using POTP procedure described above. The Remaining contracts would be procured using ICB.

b/ Resettlement costs for WFS are financed by CEB and GOP.

Procurement of Goods.

14. The procurement of goods would be very limited under the Project. Goods estimated to cost up to €75,000 equivalent would be procured using “request-for-quotations method” of the Polish Procurement Law. Goods estimated to cost more than €75,000 and less than €500,000 would be procured through POPT-NCB and above €500,000 using POPT-Open Tendering using Bank’s Standard Bidding Documents and prior reviews by PPO and the World Bank as per Bank’s Procurement Guidelines and standards.

Direct Contracting.

15. Works, Goods, and services (other than consulting services) for repairs and rehabilitation of dikes and structures under emergency conditions: (i) estimated to cost less than €6,000 equivalent per contract may be procured on the basis of provisions of the Polish Law on Public Procurement; and (ii) estimated to cost less than €600,000 equivalent per contract, which the Bank agrees meet the requirements for Direct Contracting may be procured in accordance with provisions of said procurement method.

Resettlement Action Plan (RAP) Costs.

16. The RAP related costs i.e. contracts for purchase of land and property and for other social costs would be based on the procedures agreed in the RAP and negotiated by the implementing agencies following Polish law and guidelines for land/property acquisition and providing compensation to the project-affected people.

Operating Costs.

17. The operating costs for covering rent, office supplies, utilities, operating and maintenance expenditures of office equipment and vehicle, etc. would be disbursed on the basis of annual budgets to be prepared by implementing agencies and agreed with the World Bank.

18. The Bank's Guidelines, Standard Bidding Documents to be used for each procurement method, as well as Consultant Selection documents are provided to the Borrower at the pre-appraisal mission and the updated documents are available in the Bank's external web-site.

Capacity of Implementing Agencies.

19. Procurement for each component would be carried out by the relevant implementing agency. All implementing agencies are experienced in procurement as they have been implementing large flood and water management works for a number of years. RZGWWL and RZGWGL were also involved in the Bank-financed EFRP. The IMGW and PCU have also a lot of experience in procurement under EFRP as they were involved in implementation of various contracts valuing about US\$60 million and US\$10 million respectively. All implementing agencies have procurement staff as part of the staffing plan approved by the Government. The PCU will be staffed by qualified experts on planning, monitoring and evaluation, procurement, financial management and technical coordination. When necessary PCU procurement specialist would review the procurement activities of the implementing agencies and assist in addressing any multifaceted procurement issues that may arise during project implementation.

20. At the country level, a comprehensive analysis of the public procurement system in Poland was carried out during the Country Procurement Assessment Review (CPAR) in July 2000. The new Polish Public Procurement Law was adopted on January 29, 2004. The Law entered into force on March 2, 2004 (amended in May 2006) and replaced the former Act on public procurement of June 10, 1994. Even though this new law responds many of the concerns raised in the 2000 CPAR, it still contains number of weaknesses that reduce transparency of public procurement and inhibit economy and efficiency. In view of these findings, Poland is ranked as a medium-risk country in respect of its public procurement system. The overall project risk for procurement is also rated as medium.

21. To address these concerns: (a) as mentioned above, PCU would have a highly qualified procurement staff to review the procurement activities of the implementing agency before sending for the Government and Bank decisions; (b) a comprehensive procurement database and filing system would be maintained by the implementing agencies and the PCU; (c) the Project Launch Workshop will have a specific session on procurement training for the PCU and implementing agency's procurement staff; (d) the project procurement staff would be provided additional training under Component D and may attend procurement training course offered by ILO in Turin and/or by the Bank. Staff will be provided training in project management including management of supplies and deliveries; (e) procurement staff would be maintained by the implementing agencies throughout the project implementation period and they would interact with the Bank supervision missions.

C. Procurement Plan

22. The Borrower developed a procurement plan for project implementation which provides the basis for the procurement methods. This plan has been agreed between borrower and the task team during appraisal. The procurement plan will be available in the project's database and in the Bank's external website. The Procurement Plan will be updated in agreement with the task team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

D. Frequency of Procurement Supervision

23. In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of the Implementing Agency has recommended supervision missions to visit the field to carry out post review of procurement actions every six months.

E. Prior Review.

24. The prior review thresholds are: (i) civil work contracts costing more than €5 million; (ii) consultancy contracts costing more than €150,000 for firms and €50,000 for individual consultants. However, the plan for recruitment of consultants and terms of reference would be subject to prior review; (iii) goods contracts costing more than €150,000; and (iv) all contracts awarded on single source of direct contracting basis.

F. Details of the Procurement Arrangements

A. Civil works.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--|--|-------------------------------|---------------------|-----------------------|------------------------------|----------------------------------|---------------------------|
| Ref. No. | Contract Description | Estimated Cost (million Euro) | Number of Contracts | Procurement Method a/ | Domestic Preference (yes/no) | Review by Bank (Prior / Post) b/ | Expected Bid-Opening Date |
| OFRPP-A-1 Construction of Raciborz Dry Polder and ancillary works | | | | | | | |
| OFRPP-A1-1 | Construction of Raciborz dry polder | 137.4 | 1 c/ | POTP | No | Prior | July 2008 |
| OFRPP-B1 Construction of levees upstream of Wroclaw under WFS | | | | | | | |
| OFRPP-B1-1 | Modernization of Embankment in Blisanowice and Trestno | 2.1 | 1 | POTP-NCB | No | Post | June 2008 |
| OFRPP-B1-2 | Modernization of Embankment in Kotowice and Siedlce | 12.1 | 1 | ICB | No | Prior | July 2008 |
| OFRPP-B1-3 | Construction of other levees upstream of Wroclaw | 23.7 | 1 | ICB | No | Prior | April 2008 |

| OFRPP-B1 Construction of levees downstream of Wroclaw under WFS | | | | | | | |
|--|---|-------|---|----------|----|--------------|--------------|
| OFRPP-B1-11 | Construction of levees downstream of Wroclaw under WFS | 18.0 | 1 | ICB | No | Prior | May 2008 |
| Total B1 | | 55.9 | 4 | | | | |
| OFRPP-B2 Construction of Boulevards/Retaining walls in WFS | | | | | | | |
| OFRPP-B2-21 | Modernization of Boulevards of the Srodmiejska Odra River | 18.2 | 1 | ICB | No | Prior | June 2008 |
| OFRPP-B2-22 | Other Boulevards | 16.8 | 1 | ICB | No | Prior | May 2009 |
| OFRPP-B2 Expansion and Excavation of channels in WFS | | | | | | | |
| OFRPP-B2-31 and B2-32 | Excavation and expansion of channels in WFS | 70.0 | 3 | POTP-ICB | No | Prior | January 2009 |
| OFRPP-B2 Hydraulic Structures | | | | | | | |
| OFRPP-B2-41 | Modernization of locks at Redzin barrage in WFS | 5.1 | 1 | POTP-NCB | No | Prior | June 2008 |
| OFRPP-B2-42 | Other Hydraulic structures in WFS | 11.4 | 1 | ICB | No | Prior | July 2009 |
| Total B2 | | 121.5 | 6 | | | | |
| B3 Widawa Channel Improvements | | | | | | | |
| OFRP-B3-1, B3-2 | Flood relief through Widawa Transfer | 43.2 | 2 | ICB | No | Prior | June 2009 |

a/ POTP-NCB - Polish procurement procedure of open tendering (POPT) according to Chapter 3, Section 1 of Polish Procurement Law or National Competitive Bidding (NCB) for contracts up to Euro 5.278 million.

ICB- International Competitive Bidding (ICB) using usual World Bank procedures for contracts more than Euro5.278 million.

POTP for contracts more than Euro 5.278 million that are to be cofinanced by EU Cohesion Fund.

b/ All contracts estimated to cost above Euro 5 million per contract and all direct contracting will be subject to prior review by the World Bank.

c/ Construction of the Raciborz Dry Polder is likely to be under one contract covering all major works required for construction of the polder. However, additional contracts maybe considered for ancillary works or for removal of infrastructure within the polder area towards completion of the polder and for other smaller works. The final decision regarding additional procurement packages would be made after detailed design and bidding documents are finalized and before the project implementation start-up.

Note: Addition contracts can be considered for WFS (component B) when justified.

B. Consulting Services

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------|--|-------------------------------|---------------------|--------------------------------|---|------------------------------------|
| Ref. No. | Description of Assignment | Estimated Cost (Euro) million | Number of Contracts | Selection Method ^{a/} | Review by Bank (Prior / Post) ^{b/} | Expected Proposals Submission Date |
| 1 | A3- Construction Supervision for Raciborz Dry Polder for Component A1 | 16.0 | 1 | QCBS | Prior | Sep 2007 |
| 2 | B4. Design and Construction Supervision for Wroclaw Floodway System components B1 and B3 | 10 | 1 | QCBS | Prior | October 2007 |
| 3. | B4. Design and Construction Supervision for Wroclaw Floodway System component B2 | 10 | 1 | QCBS | Prior | October 2007 |
| 4 | Monitoring and evaluation of project impact Supervision of EMP and RAP | 3.0 | 1 | QCBS | Prior | March 2008 |
| 5 | Preparation of flood management strategy and additional projects. | 5.0 | 2 | QCBS | Prior | January 2009 |

^{a/} The consulting services would be procured using the QCBS procedure of the World Bank. This procedure is equivalent to Restricted Tendering under the Polish Procurement Law (Chapter 3 Section 2) for preparing shortlists of consulting firms and Negotiated Procedure for giving proper weight to the technical proposal in addition to the financial proposals. Shortlists composed entirely of national consultants: Shortlists of consultants for services estimated to cost less than Euro 150,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

(b) Consultancy services estimated to cost above Euro 150,000 per contract and all single source selection of consultants (firms) will be subject to prior review by the Bank.

Annex 9: Economic and Financial Analysis
POLAND: Odra RIVER BASIN FLOOD PROTECTION

Introduction

1. The project area comprises the flood plains of the Odra River between the Czech Republic border to Brzeg Dolny downstream of Wroclaw city. The length of the river within these limits is about 260 km. The population, businesses and enterprises in this area would be the prime beneficiaries of the Project. Also, the Odra river basin (ORB) downstream of Wroclaw and the valleys of its tributaries would derive some benefits from the reduced water levels in the river due to the Project. The Project activities are concentrated along the Odra River, located in southwestern Poland and covering the three voivodships of Slaskie (Silesia), Opolskie and Dolnoslaskie (Lower Silesia) with a total population of about 4 million people. The Project intends to protect against flooding the more than 2.5 million people in the Odra River valley that were affected during the 1997 flood. They live in several cities and towns such as Raciborz, Kedzieryn-Kozle, Krapkowice, Opole, Brzeg, Olawa and Wroclaw, as well as a large number of villages.

2. The main development objective of the Project is to protect the population in the Odra river basin against loss of life and damage to property caused by severe flooding. The Project would play a primary role in reducing the frequency and severity of flooding in the project area. The Project comprises of two main flood protection components: construction of the Raciborz dry polder and the modernization of the floodway system for the city of Wroclaw, the major urban center in the Odra valley that suffered high damages during 1997 Flood. The Raciborz dry polder would reduce the flow downstream, thus improving the effectiveness of the existing flood protection system. The modernization of the Wroclaw Floodway System (WFS) would improve the security of the Odra dikes and the capacity of the Odra flood channels through and around the city of Wroclaw and thus provide a higher degree of protection against the dangers of flooding.

3. The protection against floods in the Odra river valley has a long history. Plans for building the Raciborz reservoir were already initiated in the 1940s. In recent years more detailed feasibility studies were prepared and a number of possible interventions were evaluated using the results of hydrological analyses and hydraulic simulation models calibrated for the Odra river basin and using latest data from the 1997 flood event. The evaluation of the various scenarios indicated that an integrated project consisting of the Raciborz dry polder and the WFS would provide the optimal solution for flood protection. The Raciborz reservoir alone protects several cities and settlements above the city of Wroclaw, but for Wroclaw only partially reduces the impact of extreme floods such as the one in 1997. Together with the Raciborz reservoir, the modernization works for the WFS would protect the city against floods of the magnitude of the 1997 flood. The economic evaluation has been carried out for the least cost alternative, out of four alternatives considered, to meet the project's objectives, selected out of four options considered for implementation. The selected alternative is Option 4 described in Annex 1. This alternative consists of the construction of the Raciborz dry polder with a storage capacity of 185 Mm³ and, in the Wroclaw area, channel improvement works, construction/strengthening of dikes, improvement of the hydraulic structures and improving the diversion of floods around Wroclaw through the Widawa river channel.

Project Costs.

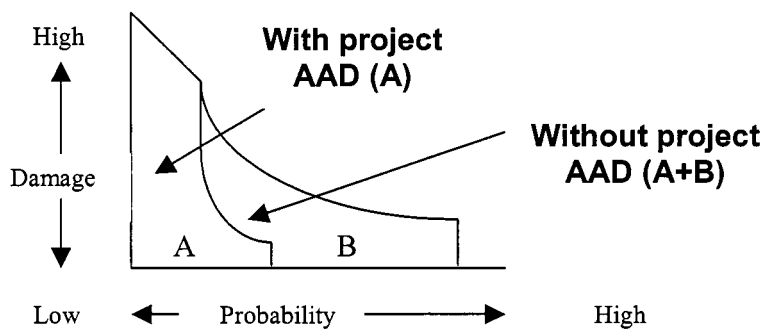
4. **Investment costs.** The project cost is PLN 1,352 million, exclusive of taxes and duties, expressed in 2002 Polish Zloty. The costs include construction costs, resettlement costs, administration, construction supervision, taxes, contingencies and price escalation. The estimates for construction costs are based on actual cost of construction of similar works of proper quality that will be performed on time.

The resettlement costs include the purchase of land, the replacement cost for buildings and other property, relocation of common property, relocation costs, infrastructure at a new village site, loss of business opportunities, and monitoring and evaluation of RAP implementation. The economic costs are estimated by subtracting price contingencies, taxes and duties and a standard conversion of 0.9 was applied to translate financial prices to economic prices.

5. **Operational and Maintenance Costs.** The annual operation and maintenance costs for the Raciborz reservoir are estimated as PLN 1.375 million per year. The additional O&M costs for a modernized WFS are mostly associated with the upgrading of the Widawa flood transfer and are estimated at PLN 0.5 million per year.

Methodology.

6. A fundamental element of the economic appraisal is the estimation of the Annual Average Damages (AAD) which can be determined by the integration of a series of single event damages for a sequence of floods with progressively infrequent return periods. The flood damages can of course only be avoided up to the designed degree of flood protection. The total flood protection benefits from the Project can then be found by deducting the area under the loss probability curve for the ‘with project’ scenario from the area under the loss probability curve for the ‘without project’ scenario.



7. For the project, the annual average damages avoided are represented by the difference in area between the two curves i.e. B.

Project Benefits.

8. Project benefits are categorized as primary, secondary and intangibles. Primary benefits are defined as the reduction in the flood damage resulting from the construction of the Project. Secondary benefits of the Project are associated with the exploitation of existing gravel within the reservoir area. Intangible, benefits are the immeasurable but nevertheless real benefits that arise from the reduction in frequency and severity of flooding.

9. The reduction in flood damage is estimated as the difference between the flood damage that would occur “without project” and that would occur “with project”. The actual damages of the 1997 flood, together with land use categories that were inundated, have been used to derive unit rates in PLN per ha of flood damage for each land use category (Table A below). Flood damages from the 1997 flood have been estimated by various sources, and these damages were used as the core information to establish annual average damages for a range of modeled flood events. The following principal data sources were compared and analyzed:

- Monograph of the 1997 flood by the Institute of Meteorology and Water Management, 1999;
- Inspectorate data for 1997 flood damages from the provincial administrations' Emergency Management Departments;
- Odra Water System Modernization Strategy;
- Contents data for residential and municipal property; and
- Inundation statistics for 16 land use types.

10. Estimation of flood damages requires prediction of the areas that will be inundated due to floods of various return periods. Hydrologic analyses used historic floods as well as synthetic hydrographs for return period ranging from 10 years to 5,000 years. To estimate inundated areas, hydrodynamic simulation models were developed to provide water levels for floods with various return periods. Then, these levels were overlaid on the topography, derived from digital terrain models, to estimate inundated areas in "with" and "without project" scenarios. Return periods for various floods were estimated using the "conventional probability method" (using historic data at given points) and the "regional probability method" (using the same data but also considering homogeneous parts of the basin and giving more weight to the extreme flood). In the base case scenario of economic analysis, the return periods based on the "regional method" were used.

Table A. Estimation of Damages

| Land use description | unit | quantity | Rate (PLN* 10 ³) | | | amount (PLN*10 ³) |
|--|------|----------|------------------------------|--------------|--------------|-------------------------------|
| | | | Slaskie | Opolskie | D'slaskie | |
| Residential curtilage (including contents) | ha | 5,847 | 287 | 386 | 378 | 2,162 |
| Large industrial/factory units | no | 350 | 8200 | 8200 | 8200 | 2,870 |
| Medium commercial | no | 112 | 2000 | 2000 | 2000 | 224 |
| Small commercial | no | 810 | 542 | 542 | 542 | 439 |
| Very small commercial | no | 328 | 250 | 250 | 250 | 82 |
| Municipal Buildings | ha | 96 | 6351.6 | 17,322 | 17,322 | 1,470 |
| Arable | ha | 15,068 | 1.8 | 2.5 | 2.8 | 38 |
| Grass land | ha | 21,177 | 0.9 | 0.7 | 1.1 | 19 |
| Forest | ha | | 2% total | | | 170 |
| Roads national | km | 538 | 89 | 89 | 89 | 48 |
| Roads regional | km | 513 | 47 | 47 | 47 | 24 |
| Roads local | km | 3,661 | 38 | 38 | 38 | 138 |
| Railways | km | | 3.5% of total | | | 297 |
| Bridges/hydraulic structures/embankments | | | | | | 218 |
| Water and waste water treatment | ha | 5,847 | 3 | 26 | 63 | 276 |
| Sports facilities | no | 7 | 829 | 829 | 829 | 6 |
| Total amount | | | 734 | 1,918 | 5,827 | 8,480 |

Primary Benefits.

11. The estimates of primary flood damage for the ‘with project’ and ‘without project’ cases for a range of flood probabilities are summarized as follows:

| Probability | Primary Flood Damage PLN(Million) | | |
|-------------|-----------------------------------|--------------|------------------|
| | Without Project | With Project | Damage Reduction |
| 0.2 | 0 | 0 | 0 |
| 0.1 | 559 | 228 | 331 |
| 0.033 | 904 | 369 | 535 |
| 0.022 | 1124 | 641 | 484 |
| 0.013 | 5605 | 1064 | 4541 |
| 0.011 | 6049 | 1126 | 4923 |
| 0.008 | 6612 | 1215 | 5397 |
| 0.005 | 8273 | 2166 | 6107 |
| 0.001 | 10595 | 3496 | 7099 |

12. **Property and Contents Flood Damage.** These damages make an extremely high contribution to the AAD. Data were used from the most recent flood, the 1997 flood, which was the most extreme and also very well documented. Damage data collected did not include damage to contents and practically no data on damage to contents are available in Poland. It was therefore decided to use the data gathered and elaborated in the UK by using for the Project the same proportional relationship between damage to contents and damage to the building that was established in the UK.

13. **Damage to Public Infrastructure and Facilities.** These public losses include losses to municipal infrastructure, public buildings and facilities, and loss of land. These damages make the second largest contribution to the AAD. Data on damages from the local public authorities and utilities are the main source for estimation of the damages to publicly-owned structures like highways, bridges, irrigation schemes, embankments, infrastructure, and gas, water, and electric utilities (including indirect losses through loss of facilities).

14. **Agricultural production losses.** Agricultural losses make a low contribution to the AAD. The agricultural damages/losses were determined through an analysis of net financial losses directly caused by historic flood events. This analysis requires the collection, or estimation, of the net overall financial effect of the water inundation on crop type, crop yield, agricultural season and associated agricultural activities. These flood effects are extended to estimate the effects on annual production. Variable crop production expenditure is included in the assessment when assessing net yield losses on failed crops. Alternatively, the ratio of flood damaged crop yield to normal crop yield is used for total and variable production losses when the crop continues to maturity. These losses are farm gate (i.e. financial losses) and were adjusted to world prices to reflect the true economic loss as a result of flooding. The world price (at farm gate was) considered and an economic loss per hectare was calculated. In addition for the Odra River, it was assume that 80% of the floods will occur in July, with the remaining 20% in March and April.

15. **Damages to trees.** Damages to trees also have a low contribution to the AAD. The number of fruit and fruitless (commercial) trees damaged by the 1997 flood were estimated and their values calculated from individual tree capitalisation. The trees are assumed to be at half of their economic life span in the calculations.

16. **Damage to the Environment, Land and livestock.** Damages to these three elements have a very low contribution to the AAD.

Secondary Benefits.

17. In addition to primary benefits of flood protection, the Project is expected to generate secondary benefits for the national economy. Secondary benefits will accrue from the exploitation of gravel in the Raciborz reservoir area. It is estimated that around a 100 Mm³ of gravel would be potentially available for extraction from the Raciborz reservoir area. This benefit is estimated to be about PLN 20 million/year for a 20-year period of gravel extraction.

Intangible benefits.

18. Flooding causes impacts not only to tangible goods such as residential and industrial property, roads and other infrastructure, but it can also have very profound effects on people's lives through increasing stress, fear of further floods, loss of control over the situation, loss of memorabilia and health problems. These impacts can be overlooked in assessments of the economic costs of floods and benefits of flood protection. However, it has been found by many (Simonovic 1999; Morris-Oswald & Simonovic 1997; Czapinski 1997 and Green et al 1994 after Green et al 2000) that they can represent a significant amount of the overall costs or benefits.

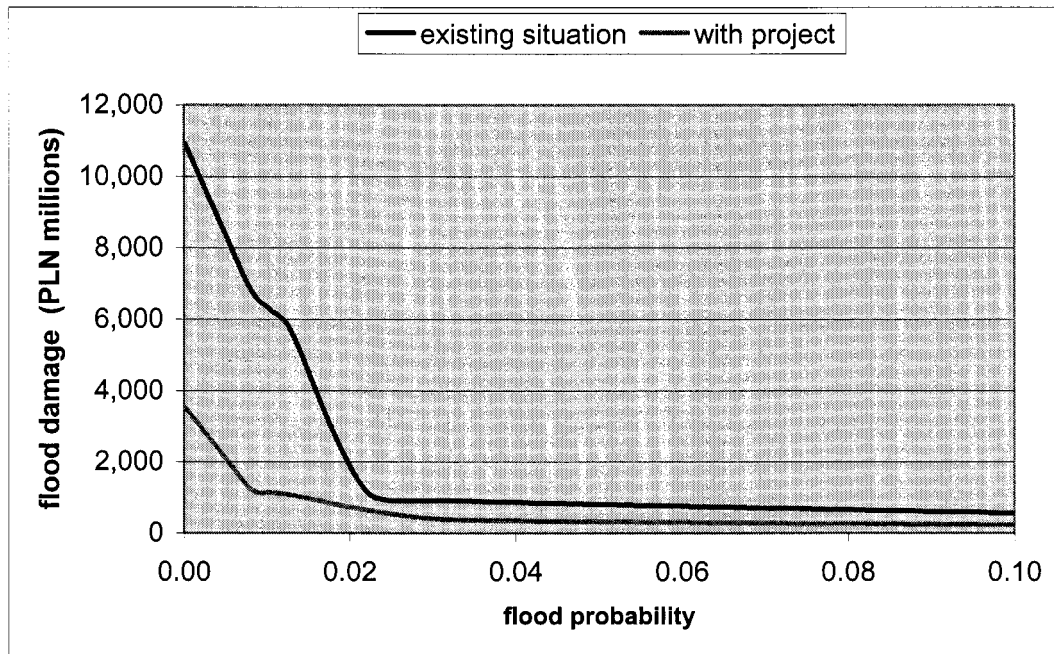
19. The study by Czapinski (1997) found that the direct effects of the 1997 flood event were: an increase in alcohol consumption, an increase in suicide rates up 49% within all flooded areas and up 76% in the most affected areas; and an increase in social conflict and aggression. The paper also suggests that symptoms of traumatic stress were discovered amongst some 15-20% of the people. Approximately 0.75 million people can potentially be affected by Odra floods. In addition, based on evidence presented in this study, potential flood victims would be willing to pay an annual amount of PLN330 per household to avoid the stresses they endured during and after the 1997 flood. Over the entire population at risk, this would be equivalent to 5% of tangible losses.

20. In addition to stress and health related costs, intangible losses also include the cost of emergency services, traffic disruption, and interruption to commercial and economic activities. In the absence of Polish data on the contribution of other intangible damages, their percentage contribution has been taken from the report "Autumn 2000 Floods in England and Wales: Assessment of National Economic and Financial Losses". In this report the total intangible damages are assumed to be 20% of tangible damage, made up of 5% for stress related costs and 15% for other damages, including: (a) emergency service 1.5%; (b) traffic disruption 5.0%; and (c) interruption to commercial activities 4.5%

21. In addition, Zaleski and Winter, in the Odra Water System Modernization Strategy, estimated the losses due to flood damage for the Odra valley as a whole at PLN 14 billion and tangible damages of PLN at 12.035 billion – the difference of PLN 1.965 billion representing intangibles which amount to 16% of the tangibles.

22. **Economic Growth.** It is considered reasonable to increase the project benefits in line with the anticipated growth in economic activity that is predicted to follow from Poland's accession into the European Union. It is expected that this growth will generate increased development in the project area in the form of new housing development and improved civic infrastructure. An annual growth rate of 1.3% has been used to quantify this effect.

The plot of damages/benefits vs probability for the “with” and “without project” cases is shown in the figure below.



Economic Analysis

23. The fundamental aim of the economic evaluation is to establish whether the proposed project’s contribution to future improvements in social and economic welfare of the communities in the project area protected from flooding is of greater value than the resource costs incurred by the national economy. The economic analyses have been carried out on the basis of a comparison between the incremental capital and operating costs of the Project scenarios with the incremental economic benefits resulting from their implementation. The parameters for the economic evaluation include a 30-year period of operation and a 90% economic conversion factor.

24. The economic viability of the Project has been tested through estimation of an economic rate of return (ERR) based on the above described assumptions. The estimated ERR for the Project is 17.4%, meaning that the Polish economy would realize a 17.4% rate of return from implementing the Project, which is well in excess of the opportunity cost of capital (OCC), taken at the rate of 10%.

25. For the selection of various technical solutions for the Project as a whole and the selection of various options for the major two individual components, an economic analysis has been carried out and it has been a deciding factor in the selection of an optimal solution for the Project. The economic evaluation has been used to select the optimal option for the WFS from four evaluated options, likewise it has been a factor in rejecting an alternative alignment for the Raciborz polder. One of the villages in the polder area, Nieboczowy proposed an alternative alignment involving the construction of an embankment around the village. With the alternative alignment the storage volume of Raciborz Polder reduces by 35 Mm³, and project benefits by 8.2%.

26. **Sensitivity Analysis.** The project ERR is robust and not very sensitive to variations in project costs or benefits. A 10% increase in project cost or 10% decrease in benefits would reduce the ERR by

about one percentage point. Sensitivity based on various risks that the Project may face, indicates that it is very unlikely that unfavorable developments would reduce the ERR below the OCC. The total cost of the Project would have to increase by 200% and benefits decrease by 50% to reduce ERR to the OCC.

27. The ERR was also tested against changes in major assumptions such as no economic growth, reduction in benefits appropriate to conventional flood probabilities, 10% increase in construction costs, primary benefit only i.e. excluding secondary and intangible benefits, and reduced Raciborz resettlement costs.

| Indicators | | ERR |
|---|-------|--------------|
| Base Case | | 17.4% |
| Switching Value | | |
| Capitol Costs increase | +200% | 10% |
| Total Benefit | -50% | 10% |
| Sensitivity Analysis | | |
| No Real Economic Growth | | 15.6% |
| Reduction in benefits in accordance with conventional flood probabilities | | 11.4% |
| 10% increase in construction costs | | 16.5% |
| 10% decrease in benefits | | 16.1% |
| Primary benefits only | | 16.4% |
| Reduced Raciborz Resettlement Costs | | 18.4% |

Annex 10: Safeguard Policy and Issues
POLAND: Odra River Basin Flood Protection

1. Polish laws now overlap considerably with the Bank's environmental and other safeguard policies since they have been harmonized with the European Environmental Protection Directives¹. The Polish process requires a permit for the planning stage to assure adherence to zoning requirements, as well as a construction permit prior to actual construction. Also EIA is to be individually prepared for each major sub-component, structure or civil works contract as part of the detailed design. Polish law requires a decentralized approach whereby the gminas (municipalities) and powiats (regional governments) are the main decision making bodies, whereas the central government and their provincial representatives (voivodes), as well as the NGOs and other affected parties play an advisory role. These laws require a consultation process for reviewing the design and the environmental assessment of a project. Therefore, the Project would be subjected to very comprehensive safeguard policies during the design, implementation and operation.

2. The Project triggers six safeguard policies, including environment assessment, natural habitats, cultural property, involuntary resettlement, safety of dams, project on international waterways all of which will be addressed under the Project, EMP and RAP.

(a) Environmental Assessment (EA). Details are provided in Annex 10.1. The Project is rated as category A. An environmental assessment was carried out as part of the project feasibility study and a draft Environmental Management Plan (EMP) was prepared. The EA was reviewed by an independent team of international and national consultants based on which a final EMP was developed. The EA concluded that the Project would have significant positive impact by increasing protection level against extreme floods for large population, property, and industrial areas and thus implementation of the Project is strongly recommended despite some negative impact which can largely be mitigated and/or compensated. The EA evaluated the impact of the major components of the Project, that is construction of Raciborz dry polder upstream, and improvements in the Odra channels near Wroclaw (WFS) including increasing the capacity of a bypass channel namely the Widawa Transfer. EA also evaluated the impact related to project design, construction and operation. Based on this evaluation an EMP is proposed for the Project, designed to mitigate, minimize, and compensate any negative affects and in fact to enhance the ecological benefits of the Project. The EA/EMP was disseminated in the project area and disclosed to all stakeholders. Details regarding consultations and disclosure are given in the section below and also in Annex 10.1.

(b) Natural Habitats. For details see Annex 10.1. As there are some critical natural habitats of national significance in the project area, OP 4.04 applies. The Racibórz polder area as well as some of the downstream floodplains include natural habitats that initially appear to be impacted by the proposed Project. However, the project impact on these would be minimal, localized and limited to the construction period. The EMP provides a plan to manage the potential risks to these habitats and the necessary safeguards during construction. In addition, these habitats would also be included in the overall water management plan for the project area.

(c) Cultural Property. The Project aims to protect the City of Wroclaw from flooding. This is an area of very old settlements. Archeological remnants have been found from all ages from Paleolithic Age

¹ The EU harmonization process is completed by May 2004. Many laws were revised during 2003. Current applicable laws include the Environmental Protection Law (Dz.U.No 62 of April 27, 2001), Regulation (DZ U 2002, 179-item 1490) by Cncl Ministers 24 Sept 2002; the Law on Spatial Planning and Development (Dz.U. 80 item 717 March 27, 2003) and amendments, the Law on Protection of Arable Land and Forests (1996; 2003), Water Law (Dz. U.115, 2001) ; the Construction Law, and the Cultural Value Protection Law (July 1994).

till the Middle Ages. A single significant historical rampart in the WFS is the only site close to the construction works that have been identified but the relevant embankment has already been diverted around this site. The Project does not expect to construct in any undisturbed areas of the city and surrounding areas. The archeological surveys have been carried out in Raciborz area as well as in the WFS area and maps were prepared. This information is being used for the detailed designs and preparation of bidding documents and for designating the borrow areas for construction materials. In case of any “chance find” during the construction activities, this will be dealt with in accordance with the procedures stipulated in Polish law, which are acceptable to the Bank. The “chance find” procedures would be included in the tender documentation for the construction contracts. Further details are given in Annex 10.1

(d) Involuntary Resettlement. Detailed information on SA and RAP is provided in Annex 10.2. A Social Assessment (SA) for the Project was carried out as part of the project feasibility study and a RAP was prepared. The full RAP has been prepared for the Raciborz Component of the Project, consistent with the provisions of OP 4.12. The detailed design of the proposed Widawa Transfer (in WFS) will be undertaken during project implementation. The Widawa Transfer would involve leased garden plots (with small sheds trees and some other assets) and possibly some land acquisition and/or revised lease agreements. A resettlement policy framework has been prepared for WFS (Component B5) and agreed. As part of the detailed design of the Widawa Transfer component of WFS a comprehensive RAP would be prepared and agreed for this component based on the principles and parameters of agreed resettlement policy framework and RAP for the Racibórz Component. The construction of the Widawa transfer Component would be started only after development of a RAP that addresses the resettlement and social issues acceptable to the Bank. The estimated cost for handling RAP issues and social costs in WFS have been incorporated in the Project.

(e) Dam Safety. See Annex 10.3 and Annex 10.1.

(f) Project on international waterways. The Odra River is an international waterway shared by the Czech Republic, Poland and Germany. Therefore, any works in the basin would trigger the Bank’s policy of notifying the other riparian states. The Polish Government, through its regular meetings of the International Commission for Protection of Odra River against Pollution (Odra Commission), involving the above mentioned countries, has already notified the Czech Republic and Germany about the Project. The Odra Commission has also considered and approved the Odra 2006 Program, which includes the details of the flood protection measures to be constructed under the Project. The Project has also been discussed bilaterally with the Czech Republic and Germany. Nevertheless, letters to notify the riparian states and the Odra Commission, advising them of the project scope, design details and possible environmental impact were sent on June 10, 2005. Both Germany and Czech Republic have responded to the notification stating (through their letters of July 15 and July 11, 2005 respectively) that works foreseen in the Project are also elements of the international flood protection program that has been coordinated with the Odra Commission Pollution and they have no further comments on this.

Disclosure and consultation

3. Directly interested stakeholders include the villagers and land- and garden owners at project sites that may either have to move, sell their land or deal with occasional flooding. These issues are discussed in the social assessment. Beneficiaries include the population of the downstream towns and villages. The indirect stakeholders include the various governmental and non-governmental organizations in the larger project area, especially those with objectives to maintain or improve the social and environmental conditions in the Odra valley.

4. Polish law requires an elaborate procedure for disclosure of any works and construction. This procedure was initiated in a systematic way at the gmina level through announcements and public hearings during 2002 as part of the preparation of feasibility studies even though the Project was under consideration for a long time and the local population was aware of such plans. The consultations were undertaken often on all project issues such as design, environmental impact and social impact of various project components. However, since resettlement was the major impact on the upstream side while most people benefiting from flood protection located on the downstream side, separate discussion and consultations were held with people affected due to resettlement issues. The consultations with stakeholders can be divided in four parts: (i) prior to starting preparation of formal feasibility studies (in 2001) particularly after devastating floods of 1997; (ii) during preparation of the feasibility studies from 2001 to 2003 for which consultations were carried out on all aspects of the project engineering designs, environmental impact, social impact etc. During this period several rounds of consultations took place based on the environmental, social assessments and engineering reports prepared by the consultants and concerned Government agencies. Some were undertaken for the purpose preparing application for obtaining location permits as required under the Polish laws; (iii) during 2004 after combining the Raciborz and WWF components in one project. The World Bank Preparation mission also participated in these consultations; and (iv) after completion of project feasibility study. An independent team of consultants reviewed the EA work carried out so far and prepared the revised Environmental Assessment and Environmental Management Plan (EMP) and the revised RAP was prepared. A short description of consultations and disclosure since the start of the preparation of the feasibility study is provided in the sections below.

5. During preparation of feasibility studies (July 2002) consultations/disclosure were held with wide ranging stakeholders which included: (i) Ministry of Environment, Agriculture and Rural Development Committee and Environment Protection, Natural Resources and Forestry Committee of the Sejm of Republic of Poland; (ii) Environmental Protection Committee of the Senate; (iii) Institute for Environmental Protection of Wroclaw; (iv) Wroclaw, Poznan Universities, Wroclaw Agriculture University; (v) Voivod Inspectorate for Environmental Protection in Katowice, Opole and Wroclaw; (v) WWF Poland; (vi) IUCN Poland; (vii) Environmental lobbying support office; (viii) League of Nature Conservation, European Environment Center; (ix) green federation – Opole; (x) Lubuski Naturalist Club; (xi) Lower Silesian Sustainable Development Foundation; (xiii) Polish Society for Protection of Birds; (xiv) Polish Society Nature Friends ‘pro-natura’; (xv) Center of Nature Heritage of Lower Silesia; (xvi) Polish Ecological Club – lower and upper Silesia Branch; (xvii) “Time Odra” – Nationwide network campaign; (xviii) Press specialists – *Wedkarz Polski* – Polish English magazine; Ecological Forum of Liberty Union; (xix) Ecological Forum of Social democratic Alliance (*sojusz Lewicy Demokratycznej*). The consultations and discussions were also undertaken with various stakeholders during 2003. These also included consultations in the Kotowice polder and Widawa transfer area regarding the WFS Component of the Project. In addition, the design team held various meetings directly with affected people and groups during the preparation of the feasibility study in 2002 and the design phase in 2003, and again during the environmental assessment in 2004¹.

¹ Poland's new EIA procedures require an assessment of the environmental impact of all proposed projects having a significant effect on the environment, such as land use, buildings, water abstraction, motorway location, etc. An application must assess the environmental impacts of a project, the possible means for preventing or reducing adverse impacts and the required scope of monitoring. If an application is accepted, a full EIA report must be prepared. It should include a description of the Project and possible alternatives that are most beneficial or least damaging for the environment. The alternatives deemed most favorable to the environment will be chosen. Within all the EIA procedures outlined above, the public enjoys the right to comment and submit recommendations within 21 days. Any non-governmental organization (NGO) refusing an opportunity to participate in the procedure can file a formal complaint. For decisions regarding domestic projects, programs and plans, the public may also be invited to an open hearing.

6. The Bank team organized a meeting in Wrocław with interested NGOs in March 2004. The consultations held by the Bank team included:

- (a) Meeting with Voivod environmental team at Katowice (3/8/2004);
- (b) Consultation with Lubomia council at Lubomia (3/9/2004);
- (c) Consultation with Lubomia council and citizens (organized by Stan);
- (d) Meeting with Raciborz major and selected Council Members (3/10/2004);
- (e) Consultation with regional environmental NGOs in Wrocław ((3/12/2004);

7. There was overwhelming support for the Project due to its positive impact in protecting large areas from flooding, damages to property and in saving lives. The support was highest in the downstream area from Raciborz primarily benefiting from protection against extreme floods. However, concerns were expressed regarding the social impact of the Project. The environmental NGO's concerns were regarding the overall impact on the potential Natura 2000 sites (as the list for submission of Natura 2000 sites was not finalized yet by Poland) and the possible impact on forests as they are 99% owned by the Government and the concerns were that the Government may avoid more costly options for rehabilitating them. Among various suggestions made for various ecologically important sites the important message was not to control all floods but only the extreme floods as ecological conditions in the channels are determined by the most recurring floods.

8. During preparation of the draft final EA summary the EA team had discussions with WWF Poland, WWF Auen Institute of Rasatt, Germany, Archaeological Department University of Wrocław and a group of several experts involved in nature conservation, geology, soils, ecology, fisheries, and forestry. These persons and organizations made valuable contributions, especially in discussing possible remedial and compensation measures of potential impact. On November 29, 2004 and in December 2004, the EA team held a workshop in Raciborz, carried out field work and meetings in Lubomia Gmina office and the Archaeological Museum in Wodzisław Salaski (Powiat).

9. On March 10, 2005 the final draft summary of EA/EMP was discussed with a group of people from the RZGW WL, RZGW GL, Voivods, DiZGMiUw, and some NGOs staff. The key sections of the EA/EMP report were translated in Polish. The EA team received feedback on wide ranging issues such as use of existing culverts during low flow period instead of use of pumping stations to discharge drainage water to the Odra River from communities around the Raciborz polder, methods for preserving natural habitat in the Psina River, ways to improve water quality of the Miejska River, ways to manage Wielokat and Brzezie ponds and lower section of the Plinc streams and possible ways of land use in the Polder and channel below Raciborz Polder. These suggestions were useful in coming up with various alternatives for issues identified by the independent EA team. Further work on these and the components for enhancing ecological corridor and other enhancement compensation measures for possible Natura 2000 sites would be undertaken as part of the detailed design and during the project implementation period.

10. Preparation of the RAP included a social survey of residents in the polder area and inventory of their assets that were undertaken in 1998 and updated in 2002 and 2004. A number of public meetings were held to discuss resettlement issues related to the Project during the preparation of the feasibility study and afterwards, as well as smaller meetings between RZGW staff, consultants and members of the Committee for the Defense of Nieboczowy. The most prominent consultations were as follows:

- January 21, 2002 coordinating meeting in Silesian Voivodship office in Katowice, where proposals for resettlement plan were discussed, including negotiations and time schedule, Lubomia Gmina has proposed the preliminary location for new villages for people to be resettled.
- March 11, 2002 – the Social Research Centre of Economical Academy in Katowice, carrying social survey within Feasibility Study, has consulted Lubomia Gmina Board and representatives of Committee for the Defense of Nieboczowy Village.
- May, 2002, sociologists, local administration, community representatives, regarding the proposal for alternative alignment offered by residents of Nieboczowy.
- July, 2002, Nieboczowy (fire station) and Ligota Tworkowska (common room), citizens and local authorities, regarding the conclusions of the feasibility study – presentation of the evaluation of alternative alignment.
- July, 2002, Nieboczowy and Ligota Tworkowska, citizens and local authorities, regarding the findings of the resettlement village study.
- October, 2002, Nieboczowy and Ligota Tworkowska, citizens and local authorities regarding the project, called by Voivod.
- March 31, 2003 – meeting with Buków inhabitants.
- May 7, 2003 – meeting with Racibórz inhabitants.
- May 30, 2003 – meeting with Ligota Tworkowska inhabitants.
- July 10, 2003 – meeting in Lubomia Gmina Office.
- July 15, 2003 – meeting in Lubomia Gmina Office.
- October 10. 2003 – Distribution of information leaflets, elaborated within Feasibility Study and including general parameters of planned Racibórz reservoir.
- October 10.2003 – presentation of the Final Report of Racibórz Reservoir Feasibility Study in County Office (Starostwo Powiatowe) in Racibórz with participation of local authorities.
- October 25, 2003 – meeting with Nieboczowy and Ligota Tworkowska inhabitants– presentation of the Racibórz Reservoir Feasibility Study and justification of recommendation for the base option of the Project.
- November 14, 2003 – meeting in Ligota Tworkowska.
- December 5, 2003 – meeting with Committee for the Defense of Nieboczowy Village.
- July 10, 2004 – meetings with Sudół district inhabitants – landowners.
- July 6, 2004 – meeting in common room in Ligota Tworkowska.
- July 7, 2004 – meeting in Krzyżanowice Gmina Office and then in Tworków and Bieńkowice – landowners.
- July 9, 2004 – meeting with Voivode (RZGW, Gmina Lubomia, inhabitants representatives).
- July 13, 2004 – meeting in Lubomia Gmina Office –presentation of resettlement village study.
- October, 2004 – meeting of Jacobs Team with Defense Committee.
- November, 2004 - meeting of Jacobs Team with Defense Committee – ‘Kotlarnia’ proposal.
- October, November, 2004, RZGW staff and consultants with Committee for the Defense of Nieboczowy regarding alternative alignments and sites.
- December 2004, Bank staff and RZGW consultants, open discussion with Committee for the Defense of Nieboczowy.
- May, July and October 2004, meetings in Racibórz (Sudół residents), Lubomia Gmina, Krzyżanowice Gmina, villages of Tworków and Bieńkowice between RZGW staff, consultants and landowners who reside outside polder area.
- December 2004, Nieboczowy and Ligota Tworkowska, discussions between RZGW consultants and Bank staff and owners who have sold to RZGW.

11. The Polish version of the draft RAP and EA/EMP was placed on the RZGWs and DZMiUW websites in April, 2005 and made available in Lubomia Gmina office. On April 11, 2005, the draft RAP and Summary and on April 13, 2005 EA/EMP summary were submitted to InfoShop.

12. **Final Round of Consultations and Disclosure.** The final draft of the EA/EMP was distributed to local authorities and relevant stakeholders in the Project. The draft EA was also published on the websites of RZGWGL, RZGWWL, DZMiUW on June 15th for a period of 4 weeks. Advertisements in local newspapers in Wroclaw and Raciborz were published with invitations to the public to participate in two public consultation meetings: (i) a Public Consultation/disclosure meeting organized by RZGWWL, DZMiUW in Wroclaw on 30 June 2005 discussing the impacts of WFS; in this meeting which was held in the Agricultural University 52 persons attended, mainly representing nature conservation organizations and the scientific community. Discussions mainly focused on legal issues, absence of adequate spatial plans and ecological concerns regarding natural habitats in the Widawa valley; (ii) a second Public consultation meeting organized by RZGWGL on July 1, 2005 in the Art Hall in Raciborz, discussing the impacts of the Raciborz dry polder. This meeting was attended by 51 persons, including 7 journalists, a large group of farmers with land in the dry polder, and some representatives of the Defense Committee and a few NGOs. The discussions in this meeting focused mainly on the social impacts of the Project and hardly on environmental issues. More details on public consultation meetings are given in the Main EA Report. The Bank mission also participated as observer in the final consultations/disclosure meetings in Wroclaw and Raciborz.

13. The final EA/EMP has been placed in the Ministry of Environment and implementing agencies websites, it was placed in the Bank's InfoShop on November 1, 2005 and submitted to the Board of Directors on November 8, 2005. The RAP was submitted to the Bank's InfoShop on November 1, 2005.

14. RAP Disclosure. After thorough consultations for preparation of RAP given above and sharing various drafts, the disclosure process for the final RAP report was as follows:

- Announcements. Advertisements were placed in local newspapers, which described the disclosure process, listed locations where the summary and full RAP were available, gave the address of the web site where they were posted and invited public discussions; and gave the address to submit written comments and to go for live discussions.
- Mailings. A copy of the announcement and the RAP Summary (in Polish) were sent to all households on the list of affected persons prepared for the location permit,
- Posting. The full RAP and Summary (in Polish and English) were placed on the RZGW web site and the full RAP and Summary (In Polish) were placed for public review in Gmina and City Council offices around the polder area, RZGW offices in Raciborz and Gliwice and the parish office in Nieboczowy.

15. The disclosure period lasted from the middle of June to July 11, which coincided with the conclusion of the EA report disclosure period. By the end of the disclosure period, RZGWGL received three letters: from residents Bieńkowice, the Regional Board of Roads Management, and the Defense Committee for Nieboczowy. In addition, a delegation consisting of members of the Defense Committee and other residents of Nieboczowy met with RZGWGL officials at its Inspectorate office in Raciborz.

16. The Roads Office asked for clarification of the future status of roads within the polder area. The residents of Bieńkowice declared their willingness to negotiate with RZGWGL for land sales and swaps, based on a concrete and reasonable offer from RZGWGL. The letter from the Defense Committee asked for justification for rejecting the Committee's alternative design; expressed a willingness to cooperate with RZGWGL for consultations and participate in decision-making; questioned the need for a resettlement village and criticized the proposed sites; asked about the location of replacement land; and

requested RZGWGL to develop a specific program to assist the vulnerable. RZGWGL responded to specific points by letter, but was overall pleased by the constructive nature of the letters. Further details are given in Annex 10.2.

Annex 10.1 Environmental Assessment and Environmental Management Plan

Odra River Basin Flood Protection Project.

1. This annex is prepared based on, and many sections are copied as such from, the Executive Summary of the Environmental Assessment prepared by an independent team of consultants for the Government. The team reviewed and updated the environment assessments of the Project prepared as part of the feasibility studies and also prepared an environmental management plan for the project. For project background, Odra 2006 program and detailed project description please refer to Annex 1 and Annex 4 of the PAD. Also the social assessment and Resettlement Action Plan is described in more detail in Annex 10.2 instead of incorporating in the EA/EMP.

Policy, Legal and Administrative Framework

2. **Decentralized government.** In 1999 GOP introduced a new decentralized government structure based on self-governance on *voivod* (provincial) level. The different levels of administration are defined on the level of *gmina* (the lowest one, which includes a few rural communities with a total of 10,000-15,000 inhabitants), *powiat* (a group of neighbouring gminas or a town with an average 80,000 -100,000 inhabitants) and *voivod* (a province with 1.5 - 5 million inhabitants). Gminas are responsible for landscape and land use management, environmental protection, including nature conservation, sewerage, waste disposal and treatment and reforestation. Powiats are responsible for town planning and buildings, water management, environmental protection, agriculture, forestry, inland fisheries, flood control security and emergencies. They are also involved in EIAs. Voivodships and powiats are responsible for environmental permits and control functions. The voivods are the most important bodies to implement a regional development strategy. The main responsibility for environmental management, nature conservation and evaluation of EIAs is also assigned to them.

3. **New legislation.** Poland applied for the membership of the EU in 1994, and in May 2004 Poland officially entered the EU as a full member. In order to meet the requirements of the so-called *acquis communautaire*, a complex process of harmonizing existing Polish legislation with that of the EU has been carried out. Most new legislation and procedures, as well as newly established local authorities, are now in place and an Agenda 2000 - programme for the transitional period 2000 - 2006 has been adopted. Understandably, more time is needed to enhance the capacities of the decentralized governmental structures and to transform the departments of the voivods into effective units needed to implement and enforce Polish environmental and other new legislation.

4. **Applicable Polish Environmental Laws:**

- Environmental Protection Law (2001), which includes provisions on Environmental Impact Assessment (EIA), and procedures for public consultation and public access to environmental information, amended on May 18, 2005¹;
- Historical Conservation and Protection Act (2003), which describes the objectives and measures needed for the protection of cultural heritage and historic and archaeological monuments;
- Nature Conservation Law (2004), which regulates the protection of the natural environment, including the protection of valuable habitats, flora & fauna and Natura 2000 sites.

¹ That amendment introduces amendments to other acts: o.a. Construction Law, Act on Land Use, Nature Conservation Law etc.

5. **Other Relevant Polish Laws:**

- Water Law (2001), which describes the objectives and instruments for management and conservation of surface and groundwater resources and of flood control risks;
- Odra River Act (2001), which defines the Odra 2006 programme;
- Land Use Act (1994), which describes the procedure to change land use and to obtain site permit for the selected location of the investment project;
- Building Law (1994), which describes the procedure to obtain a permit to start construction of an investment project.

6. **EIAs at Two Levels.** EIAs are required for the ORFPP at two different levels:

- Local EIAs of sub-components will be prepared in order to obtain administrative decision which will formulate environmental conditions for investments to be reflected in the final designs and obtain *site* and *construction permits* from local authorities. A recent amendment¹ to the Environmental Protection Law simplified the administrative procedure for an EIA to a one-stage procedure instead of two-stage procedure. The amended Law introduces a mandatory administrative procedure for all investors to obtain a *Decision on Environmental Conditions (DEC)*. Such a decision is to be issued prior to the procedure for the approval of final designs to obtain a construction permit for an investment project. The technical documentation should then properly address the issues raised in the DEC. In addition the documentation should be in line with provisions of local land use plans and site permit. Thus, the procedure is strongly integrated in the entire approval procedure for new investments implemented by the local and regional administration. EIAs are compulsory for all investments, which may change the land use and may have significant effects on the environment, specially for works to be conducted in or near special conservation areas, e.g. Natura 2000 sites.
- EIAs on national or regional level are required for major national projects and investments which may have impacts in more than one voivod. This is the case in the ORFPP, where the impacts of the Project will extend over the entire Upper and Middle Odra floodplain from Chalupki to Brzeg Dolny, which is an area belonging to three different voivods: Slaskie, Opolskie and Dolnoslaskie. According to the Ministry of Environment this EA study meets the requirements for a national EIA in compliance with Polish environmental legislation.

7. **Public consultations and disclosure.** Polish law requires an elaborate procedure for disclosure of construction and other works, in the preparation of projects. During the application for a site permit there is a process of disclosure on the proposed changes in land use, whereas before issuing a DEC, while a full EIA has been submitted to the authority there is disclosure of detailed plans and EIA findings including public consultations. The final EIA report should indicate how comments and remarks received during public consultations were reflected in the EIA.

8. **International Treaties.** Poland has signed most international treaties and conventions on environment, pollution control, nature and biodiversity conservation, including the Ramsar Convention, the Helsinki Convention, the Bonn and Bern Conventions and the Convention on Biological Diversity. No additional measures are required, since relevant issues are addressed under World Bank Policies and Polish law. Poland is a member of the International Commission on the Protection of the Odra against Pollution (IKSO). After the floods of 1997 this cooperation has been extended to issues of flood control and river basin management, amongst others through the implementation of the Odra 2006 programme. IKSO is aware of the works proposed to be included in the ORFPP and no further action is required.

¹ On July 27, 2005

9. **Applicable EU directives:**

- **Habitat Directive 92/43/EEC** on the conservation of natural habitats, wild fauna & flora. The fundamental purpose of this directive is to establish a network of protected areas called Special Areas of Conservation (SAC) throughout the Community in order to maintain both the distribution and the abundance of threatened species and habitats.
- **Bird Directive 79/409/EEC** on the conservation of wild birds. This Directive imposes strict legal obligations on Member States to maintain populations of wild birds according to ecological requirements and to take special measures to conserve the habitat of threatened species through the designation of Special Protection Areas (SPA).
- **Natura 2000** is the EU network of protected areas and includes both SACs according to the Habitat Directive and SPAs of the Birds Directive. GOP has published (MOE, May 2005) a list of areas in Poland, which are proposed to EU as Potential Natura Sites (PNS). The list includes 4 PNS (3 SACs and 1 SPA site¹) situated in or near the Raciborz dry polder and 6 PNS (4 SACs and 2 SPAs ¹) downstream of Raciborz in the impact area of the ORFPP. Approval for inclusion of the Polish PNS list in the European Natura Network still has to be formalized, but according to the procedure all potential sites have to be treated as protected areas under the Habitat and Bird Directives pending final EU endorsement.
- **EU Council Directive 85/337/EEC on EIA.** The requirements of the Polish environmental legislation are in line with this EU Council Directive on the assessment of the effects of certain public and private projects on the environment (and as amended by Council Directive 97/11/EC of 3 March 1997); and with Directive 2001/42 on the Assessment of the Effects of Certain Plans and Programmes on the Environment (Strategic Environmental Assessment Directive).
- **EU Water Framework Directive 2000/60/EC (WFD).** This directive is an important step towards sustainable use of water resources in Europe. Primarily through the development and implementation of River Basin Management Plans, the WFD requires Member States to take measures to achieve the environmental objective of 'good status' for their rivers, lakes and coastal waters by 2015. Integrated River Basin Management Plans will be prepared during the coming years.

10. **World Bank environmental policies:**

- **OP 4.01 – Environmental Assessment.** The World Bank requires an EA for all projects proposed for Bank financing, in order to ensure that these projects are environmentally sound and sustainable. The ORFPP was classified as Category A, because of the scope of the expected impacts from construction and operation, the resettlement of two villages, the impacts expected on natural habitats, landscape and cultural property and the use of the Odra as an international waterway. A preliminary environmental analysis was carried out as part of the project feasibility studies by the engineering consultants. A team of independent EA consultants (see paragraph 6) reviewed this preliminary analysis and carried out additional studies, including detailed assessment of potential impacts and prepared a full fledged EA, including EMPs.
- **OP 4.04 - Natural Habitats.** In the Odra valley there are a number of critical natural habitats of national significance. The Racibórz polder areas as well as the downstream floodplains include sensitive and protected natural habitats, which will be impacted by the proposed Project. Therefore OP 4.04 applies. During the EA several consultations were held with national nature conservation organisations in order to plan potential mitigation measures to reduce adverse impacts of the Project on riverine habitats and wetlands, as defined by the Policy.
- **OP 11.03 - Cultural Property.** This Policy applies since the Project involves large scale earth moving and dredging in parts of the Odra floodplain with numerous old settlements and archaeological sites. Within the city of Wrocław there are many historic monuments including

¹ partly overlapping

hydraulic structures and bridges which also might be affected by the reconstruction of water management structures.

- **OP 4.12 - Involuntary Resettlement.** Two villages will be resettled affecting some 240 families (about 700 people). Separate social studies have been carried out and a Resettlement Action Plan (RAP) has been prepared aimed at minimizing resettlement and offering adequate compensation or settlement alternatives in conformity with World Bank policies and Polish law.
- **OP 4.37 - the Safety of Dams.** The Racibórz dry polder will be constructed upstream of a densely populated area. The Bank's O.P. 4.37 on Dam Safety is therefore applicable. GOP will be constituting an independent panel of experts to review the designs and the operational and maintenance aspects of the Project.
- **OP 7.50 - International Waterways.** The Project is situated along an international waterway which is shared by three countries: Czech Republic (6%), Poland (89%) and Germany (5%). The three governments are cooperating in the field of flood control, river management and water quality through the International Commission on the Protection of the Odra (IKSO), which is based in Wroclaw. Letters to notify the riparian states of the Odra River and the Odra Commission, advising them of the project scope, design details and possible environmental impact were sent on June 10, 2005.
- **BP 17.50 - Public Disclosure.** The EA report according to Bank Policy would be made available to the Public by disclosure at public libraries or other place accessible for project affected groups, NGOs and private persons.

11. **Compliance with Polish Legislation and World Bank Policy.** The present status of compliance of the Project with Polish legislation and World Bank policies is indicated in Table 1. For Component A the local authorities have issued a site permit in July 2004 and the procedure for obtaining a construction permit, including preparation of a local EIA for this Component is on-going and will be completed late 2005. For Component B, consisting of 13 contracting packages, 6 local EIAs will be prepared during 2005 and 2006 and construction permits will be issued following the completion of final designs. Requirements on public consultations and disclosure of EIAs have been followed and will be completed when the polish version of the national EIA report is disclosed later this year. Actions have been taken to meet the other requirements for the Project in order to be in full compliance with Polish legislation and World Bank environmental policies. For details reference is made to Table 3.1 and the Main Report.

Analyses of Alternatives

12. **Without Project Scenario.** The no Project option was rejected because damages due to recurrent floods in the Odra River are very high. At least ten large floods of the Odra were recorded during the last half of the 20th century. The flood of 1997 was by far the largest and most devastating ever recorded. During this dramatic event peak flood waves in the Odra and the Nysa Klodzka tributary overtopped embankments on a large scale. As a result, an area of 65,000 ha was inundated in three voivodships, Slaskie, Opolskie and Dolnoslaskie. The event took the life of 54 people, about 110,000 persons had to be evacuated and some 700,000 households were affected by inundations. Widespread damage was inflicted on property and infrastructure, especially in the historic city of Wroclaw. Other damage to be taken into account here is the effects of the floods on environmental 'intangibles', such as cultural heritage, and social aspects such as health and stress. Continuation of the existing situation, involving regularly recurring expenditures for flood damage control during emergency situations and continuing investments for the rehabilitation of private and public infrastructure after the floods have subsided, is an unacceptable option, especially taking into consideration the risk of loss of life in the densely populated floodplain. Therefore, a higher degree of protection against floods of major towns and population centres is needed.

13. **With Project Scenario.** After completion of the Project, it is expected that flood damage such as inflicted by this disastrous flood will be greatly reduced. Lower flood levels in the Odra for a large range of flood severities, together with modernized flood control structures and reinforcement of dikes on the most vulnerable locations, will minimize the risk of inundation of urban and industrial areas. In particular the Project will provide almost full protection to the city of Wroclaw against future floods of a similar magnitude as those of 1997.

Table 1 Compliance of project with GOP legislation and WB policies

| | Legislation/Policy | Actions taken to comply |
|--------------------------|---|--|
| GOP legislation | Environmental Protection Law | <ul style="list-style-type: none"> - Site Permit for component A approved (July 2004) - Complete local EIA to obtain Construction Permit for Component A - Complete disclosure and approve National EIA (MOE) - Prepare local EIAs for selected sub-projects under Component B - Implement disclosure and public consultation process EIAs |
| | Historic Conservation & Protection Law | <ul style="list-style-type: none"> - Inventories of cultural and historic monuments Component A completed (2005) - Complete Archaeological inventory Component B as soon as final design completed - Prepare Final designs in consultation with Conservator of Monuments - Include chance-find procedure in contract documents |
| | Nature Conservation Law | <ul style="list-style-type: none"> - Discuss with stakeholders and prepare detailed proposals for mitigation/compensatory measures for Tworkowski Forest and affected PNS downstream of Raciborz to be included in project (Component C5) |
| World Bank policy | OP 4.01 - EA | <ul style="list-style-type: none"> - Overall EA and Public Consultations completed - Prepare local EIAs for selected sub-projects under Component B - Follow up mitigation measures through implementation of EMP - Implement training and capacity building in environmental management |
| | OP 4.04 - Natural Habitats | <ul style="list-style-type: none"> - Implement Inventories, Monitoring, and Mitigation & Compensation measures for special conservation areas included in EMP |
| | OP 11.03 -Cultural Property | <ul style="list-style-type: none"> - Archaeological inventory for Component A completed - Implement compensation/relocation of Historic and religious property in component A (RAP) - Complete archaeological inventory for Component B after completion of final design - Include Chance find procedures in contract documents |
| | OP 4.12 - Involuntary Resettlement | <ul style="list-style-type: none"> - RAP and Public Consultation Component A completed - Complete RAP for Component B minimizing need for resettlement; - Implement RAP - Monitor results |
| | OP 4.37 - Safety of Dams | <ul style="list-style-type: none"> - Install Independent Panel of Experts to review designs - Prepare Emergency Preparedness Plan together with stakeholders - Modernize Flood Forecasting and prepare Flood Management Plans |
| | OP 7.50 - Projects on International Waterways | <ul style="list-style-type: none"> - Riparian states of the Odra River and IKSO have been notified about scope, details and environmental impacts of project |
| | BP 17.50 - Public Disclosure | <ul style="list-style-type: none"> - Disclose full results of EA in libraries, web-sites etc. |

14. **Overall Project Design Alternatives:** For overall project design three basic options were considered: (i) providing flood protection by only raising the dikes along the river; (ii) constructing reservoirs on the tributaries of the Odra; and (iii) raising dikes, where necessary, in combination with a

“dry” polder at Raciborz. Option (i) is an extremely expensive solution and would have significant adverse environmental impacts since all existing Odra dikes would have to be raised above probable maximum flood level and many km of new dikes to be constructed. Regarding option (ii), several retention reservoirs on Odra tributaries have already been constructed or are being proposed/constructed as part of the Odra 2006 programme and effectiveness of reservoirs on Odra tributaries for flood control in the Odra floodplain is low. Option (iii), building a dry polder with a capacity of 185 Mm³ at Raciborz for temporary storage of flood peaks, is by far the superior solution as it reduces the peak flow of large floods by about 20-50% and the corresponding water levels by about 0.5-1.0 m for more than 500 km of dikes. The first plan to build a reservoir upstream of Raciborz was prepared during the Prussian regime at the end of the 19th century. Subsequent follow-up concepts were developed during the 20th century and all agreed on the suitability of the site for building a large retention polder. Meanwhile, somewhat upstream of the projected reservoir site another flood storage facility, the Bukow Polder, with a partly controlled storage capacity of 53 Mm³, was completed in 2001. It has also been considered to construct only the Raciborz dry polder and delay the proposed upgrading of the WFS. This option would continue to expose Wroclaw to the danger of severe floods, which is unacceptable to the Polish authorities and the inhabitants of Wroclaw city.

15. **Embankment Alternatives for Raciborz Polder (Component A).** The alignment to be selected for the dike of the Raciborz dry polder does not leave much freedom and is largely determined by the width (4 km) of the floodplain between the relatively high river terraces and the two railway lines on both sides of the valley. Specific features within the polder are two minor villages situated not far from the Odra, as well as two special protected areas: the Tworkowski riverine forest (130 ha) and the Wielikat fish ponds (700 ha), both PNS areas. The remainder of the polder area is predominantly agricultural land or used for the exploitation of gravel. For the design of the alignment of the Raciborz dry polder, three main alternatives were studied by the engineering consultants:

- The base option (selected alternative) with a dike across the river near the town of Raciborz and left and right embankments of the polder parallel to the existing railways on both sides of the valley. This option would require resettling the inhabitants of Nieboczowy village and Ligota Tworkowska village (about 240 families with about 700 people), the Tworkowski forest would be included in the dry polder and subjected to “artificial” floods and the Wielikat Fish Ponds would just remain outside the embankments of the reservoir;
- The option proposed by the Local Defence Committee, whereby the dikes would circumvent Nieboczowy village, which would reduce the population to be resettled from 700 to 125 persons. The other features would remain the same as in the base option. This alternative would increase the length of the embankments by about 9 km, but reduce the reservoir capacity by 19% and the estimated project benefits by 8.2%. In addition, groundwater levels in Nieboczowy would rise during operation of the reservoir, and the risk in case of an emergency for the population would increase;
- A third alternative, under which the layout of the dikes would be the same as in the base option, but Nieboczowy village would be reconstructed at or near its current location but above flood level, and provided with access to the polder dike. This alternative, though slightly cheaper, was found impractical.

16. **Design Options for the Psina River.** The Psina River is a tributary of the Odra which at the present time is flowing into the Odra through the designated polder area. By constructing the embankments for the Raciborz Polder, the Psina will be cut off from its outlet. Two design options were studied: (i) creating a new Psina outlet by connecting the Psina with the Old City Odra by constructing a new 2.5 km long canal outside the polder. This option would require the purchase of a considerable area of agricultural land West of the polder and would have significant negative environmental effect on the natural vegetation along the old Psina outlet, which would dry up completely; (ii) in the second variant the Psina River would flow through the polder in its present channel during normal discharges and only

be diverted around the polder during operation of the reservoir. This requires the construction of a stormwater flood channel of about 2.0 km length between the embankment of the polder and the existing railway. This option has been selected, since it minimizes resettlement and environmental impacts.

17. **Alternatives for Component B.** Hydrological simulations revealed that only in combination with the construction of the Raciborz dry storage reservoir the Wrocław Floodway System (WFS) could provide the required level of protection for Wrocław city. Four different options for improvement of the WFS were studied:

- Option 1: Construction of the Kotowice polder, upstream of Wrocław city, as a dry polder for controlled storage of peak flows, modernization of hydraulic structures and dike reconstructions around Wrocław, and removal of the Paniowice polder. Implementation of this option would require the acquisition of much land in the polder, would restrict land use, have high social cost and considerable negative environmental impacts. A small settlement in the area would either have to be resettled or encircled with dikes at high cost to prevent the area from flooding when the polder is inundated.
- Option 2: As Option 1 plus Odra channel improvements around Wrocław to increase the hydraulic capacity of the Odra River. This option has no additional social impacts, but some temporary and permanent additional environmental impacts for natural habitats along the Odra;
- Option 3: As Option 2 plus improvement of the Widawa flood transfer channel and increase of the capacity of the Widawa River bed in order to divert part of the peak flow via this river. This option would give additional social impacts because of the removal of 2000 garden allotments, including summer houses of Wrocław residents. Additionally there would also be some negative environmental impacts;
- Option 4: As Option 3, but without the Kotowice polder. Simulation studies revealed that the effect of the additional (minimal) storage capacity created in the Kotowice polder would have hardly any effect on the reduction of peak Odra flood levels. Therefore, Option 4 was eventually selected as the most effective option, taking into account technical, economic, social and environmental considerations.

Baseline Data

18. **Project and Impact area.** The ORFPP has two project areas: (i) the area of the Raciborz dry polder between Bukow and Raciborz; and (ii) the WFS area which is the Odra floodplain between Siedlce (about 30 km upstream of Wrocław) and the mouth of the Widawa River (about 15 km downstream of Wrocław). The impact area of the Project is much larger and consists of the entire floodplain between Raciborz and Brzeg Dolny. River flood levels in this entire stretch will be affected by the Project. Simulation studies show that downstream of Brzeg Dolny the effects of the Project are negligible. Moreover, another Odra barrage is under construction not far from this town.

19. **Climate.** The Odra basin is influenced by two different climatological systems: (i) the temperate North Atlantic system; and (ii) the continental system. This causes great variations in weather, both seasonally and from year to year. The upper catchment of the river is characterized by a relatively high rainfall, ranging from 800 to 1300 mm per year. Very high daily rainfall rates of 150 mm and more are not exceptional in the uplands. In winter, most precipitation is in the form of snow, which results in a considerable snow melt and runoff in springtime. July is usually the wettest month. Consequently, most floods are in summer, although minor floods may coincide with the melting of snow in March. Average annual rainfall in the lowland plains is much lower and amounts to 500 and 600 mm in the Wrocław area. Winters can be very cold, and the Odra River, especially the Lower Odra, is often frozen for long periods (30 days), making navigation impossible during winter months.

20. **Geology and Landscape.** The Odra catchment area is located in a large geological basin bordered by the Sudetes and Beskid Mountains in the South. Most of this lowland basin is strongly influenced by the Pleistocene glaciations. During the Holocene most of these sediments were covered by wind-blown sands and loess and alluvial sediments such as gravel, fine sands, silt and clay. In the floodplain of the Odra a natural river landscape was formed under the influence of erosion and sedimentation processes. Extensive swamps developed, causing the accumulation of peat deposits. Over time these swamps silted up, allowing woody vegetation to establish itself, and these areas gradually developed into riverine forests. Formerly, rivers had been strongly meandering, and in this dynamic environment meanders were often cut off from the main river channel, when the river broke through its natural levees, thereby forming meander belts and oxbow lakes, which are of high hydro-biological importance. At some locations river dune complexes developed.

21. **Hydrology and Catchment characteristics.** The source of the Odra River is located at 634 m above sea level in the Silesian-Moravian part of the Eastern Sudetes Mountains. After 107 km the river enters Poland near Chalupki through the 'Moravian Gate' and changes its course towards the Northwest. Here the river transforms into a typical lowland river, with a low gradient and a tendency to meander. The Odra then flows through the Silesian lowland plain through a several kilometres wide river floodplain in the direction of Wroclaw and from there further towards the border with Germany at the confluence of the Odra with the Nysa Lucycka. A large number of left bank tributaries, each with their entire catchment on Polish territory, join the Odra, including the most important tributary, the Nysa Klodzka. The relief in this part of the catchment is steep. The right bank tributaries such as Ruda, Klodnica, Mala Panew and Stobrawa do not have the character of montane rivers, and flood waters from these streams are less pronounced than those of the left bank tributaries. Near Raciborz the Psina River joins the Odra and from there the Odra flows along the city of Raciborz towards Kozle (km 92) and Opole (km 148). This stretch is strongly regulated; early in the 20th century most meanders were cut off and straightened by canalization, and numerous groynes were constructed to protect and stabilize the embankments. At several places diversion channels were constructed.

22. **Regulation of the Odra.** When the regulation of the Odra started and dikes were constructed, there was a considerable change in the flood and sedimentation regime of the river. In the 18th and 19th century the length of the Odra was reduced by 160 km and later by another 30 km, shortening the river by one quarter of its original length. Several thousands of kilometres of embankment were constructed in the active floodplain. These embankments reduced the width of the floodplain from an average 4-6 km to less than 2-3 km, increasing the rate of sedimentation. Narrowing of the floodplain deteriorated conditions for flood control, requiring the construction of higher embankments and polders for controlled flood storage. For navigation and control of erosion the construction of many weirs and groynes in the river bed was required. Between 1880 and the outbreak of the First World War, 21 weirs and about 10,000 groynes were built.

23. **Water Quality.** Under influence of urbanization, strong industrialization and development of mining in the areas upstream (Silesia, Ostrava region) the Odra used to be heavily polluted. During the last decade a gradual improvement in water quality has been observed. This is the result of the closure of old industrial establishments and mines and the construction and improvement of a large numbers of sewage and industrial waste water treatment facilities in these areas. The quality of Odra water, which is internationally monitored, is now improving, although more treatment facilities have to be installed and more problems of pollution with e.g. heavy metals will have to be solved. Groundwater can be found in the alluvial floodplain of the Odra at a depth of 1-4 m. In some industrialized and mining areas the groundwater aquifer is heavily contaminated with salts and phenol. Most aquifers are relatively small, and near urban areas these can be heavily polluted with organic compounds and coliform bacteria, in the absence of adequate sewage systems.

24. **Natural Environment and Biodiversity.** Dynamic fluvial processes of alternating erosion and sedimentation caused by periodic flooding, have created a wide transitional zone between land and water, with a large variety of aquatic and semi-aquatic and terrestrial habitats. These habitats are characterized by a high biological productivity and an extremely high biological diversity. Softwood forests of willow and black poplar usually develop first on the fringes of the regularly flooded areas. Alder-ash forests develop in backswamps, and elm, oak and hornbeam grow on the natural levees and less frequently flooded parts of the floodplain. Maturation of these habitats can take a considerable time. An exceptionally high biological diversity is usually found in riverine forests and associated wetland complexes. It is estimated that about 70% of the breeding bird species of Poland can be found in these habitats. The specific nature of the riverine forests and wetlands have been internationally recognized, after the publication in 2001 of the International Odra Auen Atlas by WWF Germany in cooperation with a large number of Polish and Czech organizations for nature conservation. In this Atlas a detailed inventory and description of all natural habitats in the entire Odra Floodplain is made, including identification of bio-indicators.

25. **Riverine Habitats and Birdlife.** The riverine habitats along the Odra Valley can be divided into three categories: (i) aquatic habitats, such as oxbows and ponds or muddy river banks; (ii) open terrestrial habitats, such as natural and semi-natural grasslands including the wet *Molinia* meadows and mires and fens; and (iii) forest habitats including oak-hornbeam forests, alluvial forests (willow or poplar) and riverine forests (elm or ash). The highest fauna and flora diversity is found on the remnants of semi-natural wet tall-herb meadows, flooded meadows, oxbows with surrounding wetlands and mature riverine deciduous forests. Oxbow lakes and accompanying wetlands are not common in the Odra Valley, especially in its upper part. 170 species of birds occur in these habitats, of which 154 strictly protected and 6 partly protected.

26. **Fish.** Trout can be found in the river from the source of the Odra River in the Czech Republic, over a short distance until the confluence with the Jicinka River. From there until the mouth of the Ostravica River, graylings are common, and from there up to Kedzierzyn, it is the area of the barbel. The full list of the Odra River fish fauna contains 54 native species and lampreys and 19 purposely or accidentally introduced species. Five species are critically endangered: sea lamprey, zahrte, ziece, spirlin and golden loach. Three species are endangered: river lamprey, barbel and nase. Apart from the numerous obstacles in the Odra River blocking migration, fishes in the Odra system have also suffered from poor quality river water. In recent years water quality has considerably improved because of the implementation of many sewage treatment plants in the basin, but the river structures, such as the numerous weirs and barrages, remain a major constraint to the recovery of the fish fauna.

27. **Ecological-Corridor.** The Odra and its floodplain provide an important habitat for many species, including migratory fish that seasonally move upstream to spawning areas and nurturing grounds, whereas fish fry are transported downstream by the flow of the river. The Odra Valley is also an important north-south migration route for many bird species, as well as for certain mammals such as otter and beaver. In spite of alterations to the river channel and the floodplain, the Odra River and its valley still constitute one of the last remnants of a major ecological structure in the largely man-made landscape of the Central European Lowlands. The entire stretch of the Upper and Middle Odra Valley is recognized as an important international bio-corridor. The area can be divided into two parts: (i) the international ecological corridor along the Upper Odra; and (ii) the international core area downstream of Opole. The first corridor is strongly fragmented and deforested, and along this stretch only small patches of forests, wet meadows, wetlands and oxbows remain. The second part of the corridor is covered by a more or less continuous forest belt starting a few kilometres downstream of Opole up to Wrocław.

28. **Historical Development.** The presence of the river and the fertile alluvial plain has attracted people since ancient times, because of the fertile loess soils and the possibility to use the rivers for

transport, trade and defence. The riparian lands were occupied and settlements and urban communities flourished along the river. Both the Raciborz reservoir area and the area around Wrocław are located in a zone that has been densely inhabited since about 4,500 B.C. Wrocław was already mentioned as capital of Silesia in the 11th century. Construction of embankments for the purpose of flood protection started in the 15th and 16th centuries. Systematic improvements and modifications started in the 18th century, when Prussian emperor Frederic the Great began a large-scale programme to regulate the Odra River. From the end of the 19th century, urbanization and industrialization increased. New infrastructure, built-up areas and industrial sites were developed in the active floodplain, further reducing the space for the river and increasing the risk of flood damage.

29. **Wrocław City.** The historic city of Wrocław attracts an increasing number of tourists from Germany and many other places in the world. The Odra River channel network with its numerous historic bridges, control structures and sluices is one of the most attractive elements in the city. Wrocław is the only city in Poland – and one of the few in Europe – which has so many hydraulic engineering monuments. The historical and cultural monuments in the old City of Wrocław, including Ostrów Tumski and other islands, are preserved against any new development. A number of older water management structures in the WWS have developed into real monuments, and are fine examples of the state of hydraulic engineering and water management of the 19th and first decades of the 20th century.

30. **Land Use.** The project area is located in three voivods: Śląskie, Opolskie and Dolnośląskie, each of which has a very different character and history. Dolnośląskie is by far the largest. Śląskie, with its long industrial history, is strongly urbanized and has major industrial agglomerations and mines. It is also the most densely populated voivod. Opolskie, with the lowest population density, has a more rural and agricultural character, although some larger industrial sites can be found in towns along the Odra River. More than 50% of the area of Dolnośląskie and Śląskie is used for agriculture (maize, wheat, rapeseed, sugar beet and other field crops), while in Opolskie this is about two-thirds. The acreage of arable land in the floodplain is expanding, since groundwater tables along the Odra River have decreased and former meadows and haylands have been converted to arable crops. Forests (mainly production forests) cover about 30% of the three voivods. Forestry is an important economic activity on the sandy and unfertile soils that extend over large areas of the glacial plateau. The Odra riverine forests are not of particular interest for commercial forestry, and are mainly in a more or less natural state.

31. **Land Use in the Raciborz Polder.** Present land use in the proposed Raciborz Polder is as follows: arable land and pastures cover about 71% of the area, while natural forests and waste land cover about 17% of the area. One important natural forest is the Tworkowski forest complex. The remainder (12%) is divided between residential areas, infrastructure, the Odra River and gravel pits. Residents own 23% of the land, mostly in small plots used as home or vegetable garden or orchard. Most of the residents have employment outside the reservoir area and not in agriculture. Most agricultural land in the reservoir area is owned and used by farmers living elsewhere, and most of them have agriculture as their main source of income.

Significant impacts of the Project and their mitigations

Overall Impact of the ORFPP.

32. **Improved Safety of People and Property.** The most important impact of the Project will be the very significant positive effect on the protection level of major population centres, industrial areas and property in the floodplain of the Odra River between Raciborz and Wrocław. The Project will considerably improve the safety of hundreds of thousands of people living in this part of the floodplain,

reduce the huge economic and financial risks of large floods like the 1997 event, prevent large-scale damage to cultural heritage and historical monuments, and improve the safety and well-being of people.

33. **Potential Risk from Dam Failure.** Since the Project involves the construction of a dry polder (to be used as a dam or reservoir for temporary storage of peak flood flows) upstream of a densely populated area dam safety issues are of concern. Any damage or break of the dam could immediately affect nearby villages, as well as Raciborz city. In the unlikely event of dam failure it has been estimated that a possible flood wave could reach Raciborz (pop. 61,000) within one hour. The next main population centre of Kedzierzyn-Kozle would be reached after 12 hours, which is however sufficient for emergency warning and evacuation. Thus the population of Raciborz, located a few kilometres downstream, would be especially at risk. Concerns regarding dam safety will be addressed during design, construction and subsequent operation of the dam:

- Design stage: Review of detailed designs prepared by design consultants by an Independent Panel of Experts (IPE);
- Construction stage: Main responsibility for safety of structures lies with Contractor, project engineer supervises adequacy of measures taken; IPE meets intermittently to review safety of construction;
- Operational stage: Dam safety inspections by the Dams Monitoring Centre (OTKZ), which has overall responsibility as an independent national body, and upgrading of Flood Management and Emergency Preparedness Plans together with RZGWs, local authorities, emergency services and other stakeholders.

Social Impacts of the Raciborz Dry Polder

34. **Changes in Land Use and Resettlement.** The decision to use the Raciborz dry polder as a reservoir for storing peak floods will be conflicting with most existing land uses within the proposed polder area, such as housing, agriculture, public utilities, water supply, industrial and commercial establishments. Most of these uses will have to be phased out, although certain uses can be permitted after reservoir construction, albeit under strict regulations (e.g. agriculture- meadows and pastures only, gravel extraction, establishment of certain types of forests and wetlands, day recreation and military use). RZGW is in the process of acquiring the reservoir area and one of the most negative impacts will be the required resettlement of about 240 families (about 700 people) living in the villages Nieboczowy and Ligota Tworkowska. RZGW has prepared a detailed Resettlement Action Plan (RAP), dated July 2005 to address the issues related to the relocation of these two villages.

35. **Relocation of Public Utilities.** Another major impact will be the removal or relocation of some public utilities such as electric power lines, transformers, telephone lines, drinking water wells, oil tanks, sewerage systems and waste dumps etc. located within the proposed reservoir area. These will have to be either dismantled or relocated for safety reasons and not to contaminate soil, surface water and groundwater resources in the area during operation of the reservoir. The drinking water wells and related infrastructure in Tajchow, which is currently supplying drinking water to several neighbouring villages (4000 inhabitants) in the Gmina Lubomia will be closed and RZGW and local authorities are jointly working on alternative solutions.

36. **Risk of Damage to Cultural Properties.** RZGW has recently prepared a detailed inventory of archaeological sites and physical cultural resources (such as church, cemetery, places of worship etc) currently located within the reservoir area. Plans to prevent damage and to relocate these properties, prepared in consultation with communities, are included in the RAP. In addition, the identification of borrow areas for soils to be used for construction of embankments or any other earthwork will be based on, amongst other things, the above referred detailed inventory of known archaeological sites and other

cultural properties/resources. Proper procedures for dealing with “chance finds” will be incorporated in the contract documents.

Environmental Impacts of the Raciborz Dry Polder

37. **Risk of Damage to Natural Habitats during Construction.** There is a risk that during reservoir construction valuable natural habitats will be destroyed by earth-moving operations and other construction activities or used as borrow area. The most vulnerable natural habitats in the reservoir are the following:

- **Tworkowski Forest**
This is a protected PNS both under the Habitat and the Bird Directive. The forest and its undergrowth vegetation and associated wet meadows can easily be damaged by earth-moving activities, construction equipment and vehicles. It cannot be regenerated once disturbed. Therefore vehicles and other equipment will be banned from the area and a buffer zone (width 100-200 m) around the Forest will be respected.
- **Sudol oxbow complex and associated wetlands**
A large relatively undisturbed oxbow complexes with associated wet meadows of about 150 ha near the city of Raciborz. The site has no special protection status, but has an important function in the Upper Odra ecological corridor and is one of the last large natural oxbow lakes with gallery forest and wet meadows. A small area of the complex (about 1-2 ha) at the Western side will be lost due to the construction of the embankment. The remaining area will be protected and no vehicles and equipment will be allowed in the complex during construction.
- **Fringes of Wielikat ponds**
A few ha of characteristic trees and thickets along the road Lubomia-Bukow bordering the embankment of the Wielikat ponds, together with the Tworkowski Forest a PNS, will have to be removed due to construction of the polder embankment. Since these trees and bushes perform an important function as bio-corridor between Tworkowski forest and Wielikat ponds and they are situated within the PNS, some compensatory measures will be taken to replace these trees and bushes by planting a comparable area with new ones.
- **Meadows East of Nieboczowy**
A number of wet meadows East of Nieboczowy, situated in a typical mesotrophic seepage zone below the steep hill on the eastern side of the valley runs the risk to be damaged during embankment construction nearby. A number of protected plant species can be found there (documented in the WWF Auen Atlas). The area to be protected will be indicated in the field in order not to damage these unique ecosystems by construction activities.
- **Brzezie ponds and meadows**
The Brzezie ponds are located a short distance (about 0.5-1 km) north of the planned main dam. Although not situated inside the reservoir, the ponds and valuable fringes are close to the dam site and might easily be damaged. The area will be clearly marked in the field as a no-go area. There is also a risk that the water supply feeding the pond with a very sensitive eco-system would be interrupted or altered. Measures will be taken to avoid drying up of the water supply through constructing an alternative supply channel outside the polder embankment. Contamination of this new channel with sewage water from nearby residential areas has to be avoided.
- **Natural drainage channels and tributaries of Odra**
Closure of natural drainage channels and Odra tributaries (Psina, Plinc and other small streams) to the Odra and removal of thickets, hedges, forest elements, humid meadows and haylands during construction will destroy or damage a number of valuable habitats. This will also increase isolation and fragmentation of remaining natural habitat complexes. On the left bank of the Odra there is currently a more or less continuous North-South ecological corridor connecting the Tworkowski forest through gallery forest along the Odra bank towards the Psina outlet and

continuing along the Odra left bank to the Sudol oxbow and wet meadows complex. This main structure will be protected and enhanced as an important bio-corridor.

38. **Impact of Lower Flood Levels on Natural Habitats Downstream of Raciborz.** Impacts downstream on natural habitats will mainly depend of maximum river levels during flood events and these will largely be determined by the operational rules of the reservoir. Therefore, to minimize impacts on natural habitats located downstream, it is beneficial not to manage recurrent flood waves, with no risk for the flood defence system, so that they could pass the Raciborz structure uncontrolled. The capacity of the Raciborz outlet structure is designed that a flood with a return period of 10 years could pass undisturbed. RZGWGL intends not to regulate flows less than 10-year return period. Thus the following discussions on potential impacts on downstream natural habitats are based on the assumption that only peak flows in excess of 10-year return period flood levels would be temporarily stored in the polder.

39. Simulations on inundation carried out by design engineering consultants indicate that there would be an overall reduction in flood levels (with an average of 0.50 – 1.00 m) during large floods with a return period of more than 10 years. Although less frequent, these floods are important for the survival of a number of habitats, some of them belonging to the most precious and threatened ecosystems in Poland. The main impact on these areas will be a drying out effect, caused by less frequent flooding and lower groundwater tables. Ecosystems specialized to survive and flourish under influence of occasional floods would be affected and might eventually be replaced by less valuable dry meadows and forms of hardwood forests not requiring flooding. Table 2 gives a list of potential Natura 2000 sites, which might be affected. However, in order to determine the extent¹ and nature² of these impacts more data are needed, which are not available at the present time. It should be realized that modelling cannot predict these events and potential impacts, which can only be assessed by detailed inventories and mapping of the affected areas. Also, since these impacts could only develop over a long period of time an adequate hydro-biological monitoring system would be more useful not only to monitor the impacts, but also to adjust the reservoir operating rules and to provide feedback to the Ministry of Environment.

40. **Risk of Damage to Tworkowski Forest during Reservoir Operation.** The Tworkowski Forest (170 ha) situated in the proposed dry polder, is one of the last remaining larger complexes of riverine natural forests and a PNS proposed by GOP³. The impact of floods on a complicated ecological system like Tworkowski forest and its associated flora and fauna depends on many factors and is difficult to predict. However, duration of floods and time of the year are important factors. Floods- for instance - longer than 10 days, especially in summer can be very damaging. Therefore, flood retention in the reservoir should be as short as possible in order to minimize impacts. The engineering design consultants have carried out inundation simulations⁴ (peak flood flow storage periods and corresponding water levels) for different flood return periods and different discharge rates. These simulations indicate, that when flood flows with a return period of up to 10 years are allowed to pass through without any regulation, there would be no impacts on the Tworkowski Forest. For larger floods, when the reservoir is in operation the impacts, in terms of level and period of inundation period, vary not very significantly up to 100-year return period flood flow. For example, a 50-year flood with an outflow of 800 CMS (which is 20 % less than the design outflow of 1000 CMS) would inundate the forest for a maximum period of 8 days up to a depth of 3 m and a 100 year flood for 8 days up to 5 m. For exceptional floods events- like the 1997- flood the forest could be inundated up to 6.0 m.

¹ For assessment of impacts detailed relief maps (not available) and expected flood levels should be compared.

² Detailed biological inventories are lacking, only a general inventory of natural habitats along the Odra (Odra Auen Atlas, WWF, 2001)

³ SPA (Bird Directive): Wielikat Ponds & Tworkowski Forest and SAC (Habitat Directive): Tworkowski Forest

⁴ For detailed discussions on these simulations see the EA Main Report.

Table 2 Potential Natura 2000 sites downstream of Raciborz affected by changes in flood regime

| | Name PNS | Size in ha | Potential Natura 2000 sites | | Remarks |
|---|-----------------------------------|------------|-----------------------------|------------------|--------------------------------------|
| | | | SAC ¹ | SPA ² | |
| 1 | Opolska Dolina Odry | 3740 | X | | Impacts expected in some parts |
| 2 | Grądy Odrzańskie | 20 461 | | X | Minor impacts expected in some parts |
| 3 | Grądy w Dolinie Odry ³ | 8 027 | X | | Minor impacts expected in some parts |
| 4 | Dolina Widawy | 909 | X | | Minor impacts expected |
| 5 | Legi Odrzanski | 18108 | X | X | No impacts expected |

Source: GOP, Ministry of Environment, published on web site, May 2005

41. Since detailed data on the composition of the forest and its flora and fauna as well as detailed information on soils, hydrology and relief are lacking, a baseline survey of hydro-biological conditions of the forest will be carried out. A monitoring network will be installed to follow and evaluate possible changes in hydrology and ecology of the forest. On basis of the findings the operational rules of the reservoir will have to be reviewed from time to time to balance the requirements for maximum safety and reduction of ecological impacts. Therefore it is proposed to engage the services of an ecologist, with a good background in river ecology, as part of the team responsible for developing and implementing Component C1 (Flood management plans, including reservoir management).

42. **Risk of Damage of River Continuum and Ecological Corridor.** Construction of the dry polder embankments and outlet structure might result in significant site-specific impacts and blocking of the river continuum. Similarly this might occur due to closure of the smaller Odra tributaries and natural drainage channels flowing through the polder. Removal of associated thickets, hedges, forest elements, humid meadows and haylands might further reduce the area of wildlife habitats and block ecological corridors within the area connecting outside natural forest elements and lakes on both sides of the valley. Interruption of the river continuum will be partly be mitigated by adequate reservoir management (as discussed above) but the outlet structure and associated works and embankments will form major obstacles for migration of flora and fauna. This will lead to fragmentation of the important North-South international bio-corridor along the Odra River and reduce migration. A mitigation measure will be to preserve and enhance natural complexes on the left bank of the reservoir and to ban gravel exploitation West of the river, which only leads to further destruction of landscape and natural environment.

43. **Risk of Drowning of Animals.** During floods it is expected that a number of animals may drown in the reservoir, since the water level in the reservoir may rise rapidly. It is expected that most larger mammals, such as deer and boar hiding in the forest areas, will safely reach higher grounds beyond the left and right embankments of the reservoir. However, for small mammals and reptiles this could be difficult, in view of the speed of the rise in water level, which could be between 0.20 – 0.30 m/h. In such circumstances a high percentage of small animals may perish. Therefore, it is proposed to use the soil deposits left during the gravel mining operations to create refuge hills for animals and (lateral) bio-corridors.

¹ SAC: Special Area of Conservation according to Habitat Directive

² SPA: Special Protection Area according to Bird Directive

³ > 90% overlap with Grądy Odrzańskie

Social Impacts of the Modernization of WFS

44. **Removal of Homestead Gardens and Trees.** About 2000 homestead gardens covering about 77 ha will have to be removed, including sheds, trees and other property. The compensation procedures, including possible reallocation of these gardens and associated infrastructure are worked out in detail in a separate document: Resettlement Policy Framework for Widawa Transfer Channel and Popowice-Kozanow.

45. **Risk of Damaging Archaeological Monuments.** Archaeological sites and objects might be accidentally damaged during WFS project works. Here, a distinction should be made between: (i) known sites, which are the legally protected sites; and (ii) unknown archaeological sites and objects, which might be discovered during earthworks. A detailed inventory of known archaeological sites will be prepared as part of sub-project specific EIA preparation, which will be used by the engineering consultant to prepare a plan for siting borrow pits and implementation of earth works. For the category of unknown archaeological sites proper procedures for dealing with 'chance-find' will be incorporated in the contract documents.

46. **Risk of Damaging Historic Water Structures and Retaining Walls.** Especially within the city of Wrocław a large part of the old flood protection system, including many embankments and a number of bridges and sluices, are objects of historical, cultural and touristic value. Special attention will be given to supervision during (re)construction works design and construction to ensure prevention of irreparable damage of these objects. Designs of retention walls along boulevards of Wrocław to be reconstructed will be in compliance with designs and criteria prepared by the Office of the Conservator of Monuments of Wrocław.

Environmental Impacts of the Modernization of WFS

47. **Risk of Damage to Natura 2000 Sites during Construction.** Compared to the Raciborz reservoir fewer negative impacts are to be expected from the modernization of the Wrocław Floodway System (WFS). This is mainly due to the nature of this component, i.e. the reconstruction and improvement of an existing flood protection system. Impacts described here refer to the construction stage only, since:

- Operation-related impacts will largely depend of the operational rules to be implemented for transfer of floods through the Widawa-transfer channel and Widawa river;
- Impacts will be spread over a large area and cannot be described in detail because final designs and specific locations of alignment and details on earth-moving and dredging are not yet available¹;
- Most impacts will be mitigated by undertaking sub-project specific local EIAs and by incorporating appropriate mitigation measures into final designs and contract documents.² For example, a local EIA is being carried out for one of the sub-projects, (Siedlce-Kotowice embankments, Widawa- Odra confluence) and as part of the EIA, alternative design options such as: (i) realignment of dikes; (ii) application of special construction techniques; and (iii) creation of buffer zones are being considered, to avoid and minimize potential construction related impacts on nearby wetlands and meadows.

¹ Potential impacts on Natura 2000 sites and their mitigations should be described in the local EIAs.

² As might be required by the Decision on Environmental Conditions to be issued by Local Authorities and approved by the Conservator of Nature.

48. **Impacts due to Dredging Operations.** The alluvial forests and wet meadows along the Odra floodplain and close to the river channel might be affected by the dredging works to deepen and widen the river bed. The construction of access roads and the deposition of excavated soil and sediments in forest areas can also be detrimental for some of these vulnerable habitats, and this is to be avoided. While deepening and enlarging of the Widawa River bed will result in an increase of its conveyance capacity, it would also cause less frequent inundations of the river valley. Other potential impacts could include improved drainage, felling of small parts of forest (a strip of 100- 200 wide and 0.5 km long, upstream of Redzin barrage) close to the channel, lowering of groundwater tables, drying of some wet meadows, temporary withdrawal of most fish species from the affected stretch of the river and disposal of dredged material. In the absence of detailed baseline data and design information, it is not feasible to predict these impacts and develop appropriate mitigation plans. However, these impacts will be studied in detail as part of the proposed local EIA required for obtaining site and construction permits.

49. **Impacts on Small Landscape Elements.** The (re)construction of embankments involving widening and heightening of dike profiles might affect small landscape elements with natural value (small oxbows, river dunes, monumental trees and characteristic lawns, small bushes, hedges and thickets) or with cultural historic value (old dike breach scours, historic embankments, etc.). An inventory of monumental trees inside the city of Wroclaw has been made, but landscape elements have not been systematically surveyed. In order to prevent damage to these elements a review would be made during preparation of local EIAs and existing procedures to protect monumental trees and measures to protect landscape elements would be followed. If protection is not possible some compensatory landscaping would be developed (e.g. by planting trees) by involving a landscape architect in designing such measures.

Other Relevant Non-Project Related Issues

50. **Coordination of Plans required.** A potential risk is that through insufficient coordination between the various agencies involved in spatial planning, planning of the Odra 2006 Programme and infrastructural works the overall benefits of ORFPP would be reduced. Improved coordination during preparation of detailed design is needed with the following projects:

- Proposed Flood Control Project to construct new embankments between Turzein Kozle and Opole narrowing the flood plain to 600 m and widening of the Odra riverbed, prepared by the Amelioration Department in Opole (OZMiUW); this Project might influence Odra levels around Wroclaw;
- Development of residential and service areas in the Widawa valley at locations, which are conflicting with the flood relief function of this valley. This problem is also related to legal constraints since designation of the Widawa valley as an area with flood risk as defined by Article 82 of the Water Act has not yet been formalized;
- Infrastructural plans which are insufficiently integrated with the planning of WFS works, e.g. the project of a powiat road (Wroclaw) near Trestno in the Blizanowice-Trestno Polder, the new circular road around Groblice, the northern ring road of Wroclaw and the highway by-pass (Obwodnica Autostradowa) Project, crossing both the Odra and the Widawa valley in Wroclaw.

These issues should be addressed by the investors together with local authorities both at administrative level and at technical level to improve the legal and spatial and technical integration of projects.

51. **Pollution by Coal Waste Dump.** Continued dumping of coal waste at the Bukow coal dump near the projected Raciborz dry polder could enlarge the inflow of polluted groundwater and surface water into the polder. Tailings of this waste dump have already spread over part of the surface waters in the reservoir area and the neighbouring Wielikat Ponds, and this process will be accelerated by continued dumping and gravel excavation. This could cause further deterioration of the quality of surface and

groundwater in the reservoir. It is recommended that RZGWGL requests the Environmental Department of Slaskie to monitor the situation and take appropriate action before levels of groundwater and surface waters become toxic for people and animals, especially fish.

52. Fish migration hindered at the Wroclaw Hydro-power plant No 1 and Redzin. Most migrating fish in the Odra prefer to use the South City Odra River because of high flow velocity in this branch. The weir at the Wroclaw Hydro-power plant No 1 is a barrier for migrating fish, since no fish passage is available in the structure. A fish passage in the structure will be needed in future in order to comply with the requirements of the Water Framework Directive of the EU and therefore it is worthwhile for RZGWGL to study whether it is feasible to include a fish passage in the present design. There is suitable design for a fish pass available (IMGW). Also, in the modernization plan for the Redzin Barrage there is no proposal for improvement of the existing, but not functioning fish ladder. In the Redzin barrage there is a fish ladder available, but this structure is not functioning. Replacement of this facility by a working fish pass is to be included in the Project.

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53. Categories of mitigating measures. All the above discussed potential impacts or risks to natural habitats would be prevented, mitigated or compensated by implementing appropriate measures as discussed below. These measures can be grouped into three categories: (i) measures which can be included in design and construction bid (contract) documents; (ii) stand alone mitigation measures; and (iii) proactive compensatory measures to preserve and enhance the ecological corridor.

54. Measures in Design and Construction Bid Documents. Most of the construction related impacts and a few of the operation related impacts will be prevented or minimised and mitigated by following environmentally friendly design options and by including special conditions in the respective construction bid documents. The EA process was instrumental in improving some of the earlier design options (e.g. Psina river outlet, on dike design and construction technique, change in embankment alignment etc). The engineering consultant will incorporate general and specific environmental protection measures into the contract document. During construction the engineering consultant, supported by the M&E consultant responsible for implementation of EMP and RAP will supervise civil works contractors and verify that they implement the works in accordance with the measures mentioned in the construction bid documents. They will also raise environmental sensitivity and awareness of the personnel of contractors and sub-contractors working on the Project.

55. Reservoir Operating Rules to Mitigate Impacts on Natural Habitat. The outlet structure of the Raciborz dry polder is designed to allow a 10 year return period flood to pass through. RZGW will primarily be using the proposed polder as a reservoir to temporarily store floodwater from peak floods with more than a 10 year return period. As a result (and as discussed in Chapter VI) potential impacts on natural habitats inside and down stream of the proposed polder are likely to be rather small, since they are restricted to lower flood levels during peak floods with a return period of more than 10 years. However, in the absence of detailed information on terrain conditions (relief, soils, groundwater, hydrology) and any historical information on impacts from past floods, it is not possible to make an accurate assessment of the impacts on natural habitats and to design plans to mitigate potential risks. Therefore, RZGW will be commissioning two separate hydro-biological studies to monitor and analyse potential impacts on key natural habitats. One to monitor those habitats inside and in the near vicinity of the proposed Raciborz dry polder and the other to monitor those habitats in the downstream between Raciborz and Wroclaw and particularly focussed on those parts of the PNS Opolska Dolina Odry, Grady Odrzanskie and Grady w Dolinie Odry and Dolina Widawy (see Table), which might be most affected. Draft TOR outlines for these two studies are given in the main EA report. RZGW will be using these study results as one of the key determining factors to regulate discharges from the polder with a view to maximise the ecological

benefits without compromising the safety of people. The cost of the hydro-biological studies including monitoring activities (spread over 6 years) is estimated at € 480,000 and € 600,000 respectively.

56. Proactive Compensatory Measures to Preserve and Enhance the Odra Ecological Corridor.

Measures to mitigate or compensate unavoidable impacts on natural habitats and species affected (inside and downstream of the dry polder), will have to be prepared in comparable proportions considering the size and the nature of the habitats and species affected. One must also bear in mind that the objective of Natura 2000 is to form a *coherent* European ecological network. This means that it is not enough to develop a site which is of good quality on its own, but the flora and fauna for which the site is meant should also be able to reach the new site. Therefore measures under ORFPP will not only be aimed at the protected sites, but also at the smaller areas that can act as corridors, narrow areas, for example riparian areas along rivers and streams, and separate patches, so-called 'stepping stones' such as ponds and small woods, which must be located close enough to each other, so that organisms can use them to migrate from one place to the other. Two types of activities to enhance the ecological conditions in the impact area and to compensate for possible negative impacts on natural habitats are proposed:

- ***Measures to strengthen the ecological corridor between Chalupki and Raciborz***, as compensation for potential impacts to the Tworkowski forest and surrounding natural habitats in accordance with the guidelines for compensation measures for Natura 2000 sites. This Component will be implemented by RZGWGL in cooperation with WWF-Poland and could include the following activities: (i) Strengthening of the Border Meander Conservation and Re-naturalization Project (WWF-Poland), by purchase of 50 ha to increase the area of this original meander (PNS); (ii) enhancement of the ecological belt between Wielikat ponds and Tworkowski Forest; (iii) preserving and strengthening of the corridor at the left bank of the Odra between Tworkowski Forest, Psina outlet and Sudol complex; and (iv) alternative water supply for Brzezine ponds/wetland complexes. These measures would be implemented under Component C5 of the Project by RZGWGL in cooperation with WWF-Poland. Implementation cost are estimated at € 800,000.
- ***Measures to strengthen the ecological corridor between Raciborz and Brzeg Dolny***, This Component would include a number of measures to mitigate potential impacts on natural habitats and species in the Odra section downstream of the dry polder. Measures have to be worked out on basis of the findings of the monitoring study and could include some engineering works to improve hydrological conditions (e.g. by raising groundwater tables, lowering terrain levels, opening up embankments and other measures to mitigate negative impacts on affected habitats. Other measures could include the purchase of land to restore natural habitats in order to compensate for losses elsewhere. One of the other recommended measures is to establish a Nature Education Centre near Wroclaw, for information and education on floodplain ecology and wetland restoration. This in view of the general lack of knowledge and awareness of the importance of protecting riverine forests and habitats in Poland. Such a centre could be instrumental in creating environmental awareness in flood plain ecology and associated fields among schoolchildren, students, engineers, authorities and general public. Exploitation of such a centre could be commissioned to one or more local or national nature conservation NGOs or the City of Wroclaw. RZGWGL and DZMiUW supported by nature conservation organizations and WWF would implement this component. Tentatively a budget has been reserved of € 2,2 million (works to be implemented in 4 Natura sites estimated at € 500,000 per area and € 200,000 for establishing a Nature Education Centre).

57. Monitoring. The monitoring programme has a dual purpose. It is designed: (i) to monitor the contractor's work during project implementation in order to check contractual compliance with specified mitigation measures; and subsequently; (ii) to assess the actual environmental impacts of the project over

the years following completion of dry polder and the modernization programme of WFS. The first type of monitoring will be done by the Engineering consultant and supervised by the M&E consultants. The second type of monitoring will be commissioned and carried out by local organisations/consultants with sufficient experience in hydrological and ecological monitoring. Monitoring will be continued for a period of 6 years. Result of monitoring of impacts will have to be reviewed and evaluated from time to time by the M&E consultants. Findings might be used to revise operation rules of the dry polder and the Widawa transfer channel.

58. **Cost of EMP.** The overall budget requirements, spread over the entire project period (from 2006 to 2011), for EMP implementation and monitoring is about 1% of the total project cost as can be seen below:

Table 3 Summary of cost Environmental Management Plan

| Nr | C. | Item | Funding | Cost in € |
|-----------|-----------|---|----------------|------------------|
| 1 | | Hydro-biological study upstream Raciborz, including 6 year monitoring | Comp C5 | 480,000 |
| 2 | | Hydro-biological study downstream Raciborz, including 6 year monitoring | Comp C5 | 600,000 |
| 3 | | Enhancement project upstream Raciborz purchase of land/ engineering works | Comp C5 | 800,000 |
| 4 | | Enhancement project downstream Raciborz, incl Nature Education Centre | Comp C5 | 2,200,000 |
| 5 | | PCU environmental/social specialist (50% EMP) | Comp D1 | 100,000 |
| 6 | | RZGW teams (3 x 3 persons), allowances (50% EMP) | Comp C5 | 240,000 |
| 7 | | Training RZGWs in environmental management, 6 years x 30,000/yr | Comp D2 | 180,000 |
| 8 | | Individual Consultants to be recruited, 6 years 50,000/yr | Comp D1 | 300,000 |
| 9 | | Fish passages Wroclaw Power Plant I and Redzin barrage | Comp B2 | 300,000 |
| | | TOTAL COST | | 5,200,000 |

59. **Overview of Impacts and Mitigating Measures.** An overview of all impacts and mitigation measures, including responsibilities and monitoring requirements is given Table 4.

Table 4 Overview of environmental impacts, mitigation measures and monitoring activities

| Impacts/issues | Mitigation measures | Implementation Schedule | Budget Cost in € | Responsibility | | Monitoring Indicators | Frequency of monitoring |
|--|---|-------------------------|-----------------------------------|--|-------------------------|--|--|
| | | | | Implementation | Supervision | | |
| 1. Odra River Basin Flood Control Project | | | | | | | |
| Very significant positive effect on safety level of major population centres. Strong reduction in risk of damages and losses of private and public property due to flooding, especially in city of Wrocław | Desirable outcome of the Project. | 2006- 2011 | 500 million Component A+B+C+D | RZGWGL RZGWWL DZMIUW | PCU ONDR | Reduction in area inundated, inundation period and flood water levels | During floods |
| Raciborz dry polder Dam failure Flood wave could reach Raciborz town (pop. 61,000) within 1 hour risking loss of life and high damage of property | - Dam break analysis - Emergency Preparedness Plan (EPP), incl. Early Warning System - Flood Management Plan (FMP) - Design review by Independent Panel of Experts (IPE) | 2006-2010 | 4.5 million Component C1 | RZGWGL RZGWWL IMGW- OTZK SMOK | IPE Project Engineer | - EPP and FMP prepared and implemented - Training of key stakeholders implemented - Reservoir design reviewed by IPE | During design and construction stages and annual during operation. |
| 2. Construction of Raciborz dry polder (Component A) | | | | | | | |
| Changes in land use inside the dry polder and resettlement of population of villages Ligota Tworkowska and Nieboczowy | - Detailed Resettlement Action Plan (RAP); | 2004 - onward | 63.3 million for RAP Component A2 | RAP RZGWGL | M&E Consultants | - Land acquired - Persons resettled | See RAP |

| Impacts/issues | Mitigation measures | Implementation Schedule | Budget Cost in € | Responsibility | | Monitoring Indicators | Frequency of monitoring |
|---|---|---|------------------|--|--|---|--|
| | | | | Implementation | Supervision | | |
| Removal and relocation of public utilities: - Closure of Tajchow drinking water wells - Risk of pollution from existing waste, fuel and chemical depots and storage tanks | - Create alternative water supply for 4000 people residents in Lubornia; - Dismantling, removal of existing services infrastructure and storage facilities | 2006 - onward | Component A2 | RZGWGL/ Gmina Lubornia | M&E consultants | New water supply installed Number of sources of pollution removed | Annually |
| Risk of damage to sensitive natural complexes due to construction activities: - Tworkowski forest - Sudol oxbow complex - Fringes of Wielikat ponds - Meadows E of Nieboczowy - Brzezic ponds & meadows - Tributaries of Odra | - No traffic and activities in sensitive areas (no-go area) - Create buffer zones of 100-200 m wide around these complexes - No earth movement and borrow pits | 2006 and onward | Component A1 +A3 | Construction Supervision consultant, Contractors and sub-contractors | M&E consultant | Contractors violating procedure | Permanent by supervising consultant, Quarterly by M&E consultant |
| Risk of damage to physical cultural properties | - Inventory of known archaeological and cultural sites/objects - Update plan for earth moving and borrow areas - Removal/relocation of historic monuments /places of worship - Chance-find procedures to be included in tender documents | Inventory and Plan: 2005 2006 - onward | Component A3 | RAP Engineering Consultants RZGWGL Engineering Consultants & Contractor | M&E consultants COA ¹⁸ | - Status of known archeological sites - Number of objects removed/ secured - Compliance with chance-find procedures | Permanent by supervising consultant, Quarterly by M&E consultant |

¹⁸ COA: Conservator of Antiquities of voivod

| Impacts/issues | Mitigation measures | Implementation Schedule | Budget Cost in € | Responsibility | | Monitoring Indicators | Frequency of monitoring |
|---|--|--|---|--|---|---|---|
| | | | | Implementation | Supervision | | |
| Potential damage to Tworkowski alluvial forest (PNS) due to operation of the reservoir | <ul style="list-style-type: none"> - Reduce damage to forest by optimizing reservoir operations - Hydro-biological inventory (baseline study in first year) and installation observation network - Monitoring during 6 years - Evaluation during year 3 and year 6 - Prepare Forest Management Plan | <p>2006-onward</p> <p>2006-2007</p> | <p>Component C1</p> <p>Baseline study & Monitoring 480,000</p> | <ul style="list-style-type: none"> - RZGW/IMGW & stakeholders - Consultants recruited from Universities, NGOs - Forest Dept supported by ecologists | <p>IPE</p> <p>M&E consultants</p> <p>CNS¹⁹</p> | <ul style="list-style-type: none"> - Operational rules prepared & implemented - Surface & ground water levels - Water quality - Bio-indicators - Forest Mngt Plan approved | <p>Hydrology monthly or as required</p> <p>Ecology bi-annually</p> |
| Reduction of flood levels and area inundated, decrease of gwt ²⁰ in flood prone areas downstream of Raciborz and up to Brzeg Dolny may lead to degeneration of flood-sensitive natural habitats and wetlands, including areas belonging to 4 PNS | <ul style="list-style-type: none"> - Optimization of reservoir operations - Hydro-biological inventory (baseline study) in sensitive areas, installation of observation network and monitoring and evaluation of results - Updating operational rules - Mitigation/compensatory measures (see next point) | <p>2006 - onward</p> <p>2006- onward</p> <p>2011</p> | <p>Component C1</p> <p>Study & monitoring 600,000</p> <p>Component C5</p> <p>Component C1</p> <p>Component C5</p> | <ul style="list-style-type: none"> - RZGW/IMGW & stakeholders - Consultants recruited from Universities, NGOs - RZGW/IMGW & stakeholders | <p>IPE</p> <p>M&E consultants,</p> <p>IPE, MOE</p> | <ul style="list-style-type: none"> Operational rules prepared and implemented - Surface & ground water levels - Water quality - Bio-indicators | <p>Permanent</p> <p>Hydrology monthly or as required</p> <p>Ecology bi-annually</p> |

¹⁹ CNS: Conservator of Nature in Slaskie

²⁰ gwt: groundwater tables

| Impacts/issues | Mitigation measures | Implementation Schedule | Budget Cost in € | Responsibility | | Monitoring Indicators | Frequency of monitoring |
|--|--|---|-------------------------------------|---|--------------------|--|-------------------------|
| | | | | Implementation | Supervision | | |
| Interruption of the river continuum and blocking main international ecological corridor along Odra floodplain Cutting off minor ecological corridors along the Odra tributaries by the polder and reducing the migration of biota and biodiversity | Prepare and implement a plan for enhancement of bio-corridor of the Upper Odra in order to compensate for negative impacts of changed flood regime on natural forests and wetland habitats | Planning: 2006 Implementation: 2007 and onward | Component C5 2,200,000 + 800,000 | RZGW/Forest Dept supported by ecologists recruited from Universities/NGOs | M&E consultant CNS | Plan prepared and approved Plan implemented | Permanent |
| Drowning of wildlife and small animals during operation | Construct a number of artificial refuge hills or ridges in reservoir | 2006 and onward | Component A1 | RZGWGL/Design Consultants | M&E consultants | number of refuge hills constructed | Annually |
| 3. Construction of Wroclaw Floodway System (Component B) | | | | | | | |
| - Removal, compensation or relocation of homestead gardens and recreation centre in Widawa Valley, - Removal of homestead gardens in Kozanow - Removal of illegal landfill and illegal commercial or residential structures in Widawa valley | - Apply principles of Involuntary Resettlement: OP/BP 4.12 - Implement local EIAs when detailed design is completed | 2007- onward | Component B3 | RAP RZGWWL/ DZMIUW | M&E consultants | Number of properties compensated or removed | Bi-annually |

| Impacts/issues | Mitigation measures | Implementation Schedule | Budget Cost in € | Responsibility | | Monitoring Indicators | Frequency of monitoring |
|---|---|--------------------------------|---------------------|---|--|---|-------------------------------|
| | | | | Implementation | Supervision | | |
| Risk of damage to sites and objects of cultural heritage due to earth-moving and dredging operations during construction | <ul style="list-style-type: none"> - Inventory of known archaeological sites - Update plan for borrow areas - Supervision by qualified expert - Chance-find procedures in tender documents | <p>2005</p> <p>2006-onward</p> | Components B1,B2,B3 | <p>Archaeologist RZGWWL/ DZMIUW</p> <p>Engineering & Supervising consultant</p> <p>Contractor</p> | <p>COA</p> <p>M&E consultants</p> | <ul style="list-style-type: none"> - Status of known sites - Compliance with chance-find procedures | Permanent during construction |
| Risk of damage to historic hydraulic structures (bridges and sluices) of the old protection system and the retaining walls of boulevards in Wroclaw | <ul style="list-style-type: none"> - Reconstruction plans to be prepared in compliance with designs and criteria of COM²¹ of city of Wroclaw - Supervision and inspection by restoration experts. | 2005 – onward | Component B2 | RZGWWL Engineering Consultants | CMW | Status of known sites | Permanent during construction |
| Potential damage to PNS Grady Odranskie and Dolina Widawy and other valuable habitats due to (re) construction of embankments upstream of Wroclaw (Work No 1, 20, 2, 3, 4, 5, No 7, 6, 8, 40, 45) and around the outflow of Widawa river (Work No 12, 27, 19, 42, 44) | <ul style="list-style-type: none"> Include mitigation measures in detailed design and contract documents including: <ul style="list-style-type: none"> - Avoiding damage to PNS through re-alignment of dikes or application of special constructions - Limiting tree cutting or removal of - Creating buffer zones around sensitive areas - No removal of soil and vegetation from old disused dikes in PNS and other valuable areas Implement local EIAs | 2005- onward | Components B1, B3 | <p>Contractor Qualified expert</p> <p>RZGWWL DZMIUW Engineering consultant</p> | <p>M&E consultants</p> <p>M&E consultant</p> | Contractors violating procedure | Permanent during construction |

²¹ CMW: Conservator of Monuments in City of Wroclaw

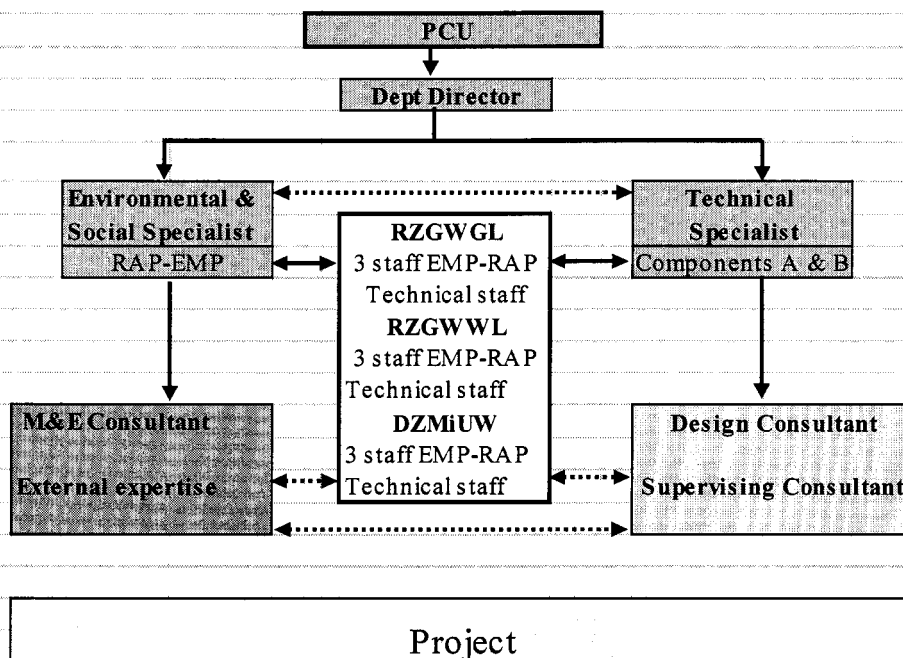
| Impacts/issues | Mitigation measures | Implementation Schedule | Budget Cost in € | Responsibility | | Monitoring Indicators | Frequency of monitoring |
|---|---|-------------------------|------------------------|--|-----------------|--|--------------------------------------|
| | | | | Implementation | Supervision | | |
| Risk of damage to terrestrial and aquatic habitats due to dredging operations in Widawa valley (PNS) will influence fish fauna and bank vegetation. | <ul style="list-style-type: none"> - Application of environmental friendly engineering solutions in sensitive areas - Detailed measures to be described in detailed design & contract documents | 2005- onward | Component B3 | RZGWWL/ DZMiUW & Engineering consultant | M&E consultants | Contractors violating procedure | Permanent during dredging operations |
| A number of small landscape elements with natural or cultural historic value, such as dike breach scours, historic embankments, small oxbows or wetlands, river dunes, riparian trees, rows of monumental or characteristic lawns could be affected or lost | <ul style="list-style-type: none"> - Existing inventory of monumental trees in Wroclaw to be expanded to small landscape elements in entire WFS area - Follow existing procedures to protect monumental trees - Include measures to protect other small landscape elements in detailed design & contract documents <p>If protection is not feasible, include compensatory landscaping measures</p> | 2005- onward | Components B1, B2, B3 | RZGWWL/ DZMiUW & Engineering consultant | M&E consultants | Contractors violating procedure | Permanent during construction |
| 4. Recommended additional measures (other non-project related issues) | | | | | | | |
| Suspected pollution of groundwater with heavy metals from Bukow coal dump | Monitor the (ground) water quality in reservoir on heavy metals (pH) and take appropriate action | Soonest | | RZGWGL in cooperation with Environmental Department of Slaskie | MOE | pH of surface and groundwater near coal dump and in Wielikat Ponds | Monthly |
| Insufficient coordination in flood control, spatial planning and infrastructural works | Improve the legal and spatial and technical integration of projects | 2005- onward | | RZGWWL DZMiUW and other agencies | MOE | | |
| Fish migration hindered at Wroclaw Hydro-electric Power plant -No 1 and at Redzin barrage | <ul style="list-style-type: none"> - Construct new fish passage at Power plant - Improve/renew existing fish ladder at Redzin | 2007 –onward | Component B2 € 300,000 | RZGWWL/ Engineering consultant | M&E consultants | Fish passages designed and operational | |

Institutional Aspects

60. **Institutional Structure.** The proposed institutional structure to implement the EMP is shown in Figure IX.1. The PCU will have the overall project coordination and management on a day-to-day basis. The PCU would consist of a project director, a deputy director, an environmental/social specialist and a technical specialist, in addition to a procurement specialist, a financial management specialist, an accountant and support staff. The Technical specialist will be responsible for the engineering aspects of the Project and will be supported by the design and supervising consultants and the M&E consultants. The Environmental & Social specialist will be responsible on a full-time basis for the implementation of RAP and the EMP.

61. **Environmental and Social specialist (PCU).** The Environmental & Social Specialist of PCU will be supported by the M&E Consultants, the Supervising engineering Consultant and short-term external international and local experts. He/she will work closely together with the Technical Specialist of PCU. Both specialists report to the Deputy Director of PCU.

Fig 9.1 - Institutional Structure for Implementation EMP-RAP



62. **EMP/RAP Teams.** Within RZGWGL, RZGWWL and DZMiUW the Environmental & Social Specialist will work together with a small team of 3 engineers within each of these organisations. These engineers belong to the regular staff of these organisations, but next to their normal duties they will be working on the implementation of RAP or EMP on a part-time basis. They will receive special training under the Project to perform these tasks. The teams will be recruited from the regular staff of these organisations on basis of a special recruitment procedure focussed on staff members shown interest in managing environmental and resettlement issues. In consultation with the organisations adequate incentives will be worked out in order to facilitate their career development. Detailed Profile description

of the Environmental and Social Specialist and the engineers working in the EMP/RAP teams are included in the Main EA Report.

63. **M&E Consultants.** The M& E consultants will support the Environmental & Social Specialist in implementing the EMP and will provide technical assistance and training to the various parties involved in the implementation of the Project: the water authorities (investors), the consultants involved in supervision of the implementation, and the contractors and sub-contractors involved in the implementation of the Project. The M&E consultants will work under the responsibility of the PCU and will be based in Wroclaw. The main task of the M&E consultants in respect of the EMP and RAP are the following:

- To guide and supervise the EMP and RAP activities to ensure that social and environmental impacts are effectively eliminated, controlled or mitigated;
- To guide and supervise local consultants and organisations recruited to implement baseline inventories and monitoring work and the ecological enhancement project;
- To build capacity within the implementing organizations in environmental management and managing resettlement issues;
- To provide training in environmental management to staff involved in construction and in the operation of the Project.

64. **Capacity Building and Training.** Capacity building will be aimed at strengthening the RZGWWL, RZGWGL and DZMiUW organizations in the field of integrated floodplain management and environmental management. Training in environmental management should focus on the implementing agencies, but should not be restricted to these organizations. Project staff involved in construction and operation of the project should also be trained. Various types of training should be given, for various target groups and always tailored to the specific needs. Training will deal with - among other things - nature friendly design and construction methodologies, which are widely applied and accepted in Germany, France, the U.K. and the Netherlands.

Public consultations and disclosure

65. **During Project Preparation.** Polish law requires an elaborate procedure for public consultation and disclosure of any works and construction. This procedure was initiated in a systematic way at the Gmina level through announcements and public hearings during 2002 as part of the preparation of feasibility studies, even though the Project had already been under consideration for a long time and the local population was aware of such plans. The consultations were undertaken on all project issues such as design, environmental impacts and social impacts of various project components. However, since resettlement was the major impact inside the Raciborz reservoir, whereas all people benefiting from flood protection were located on the downstream side, separate discussion and consultations were held with the people to be resettled during preparation of RAP.

66. **During the EA study.** During the preparation of the EA study there were two stages of consultations: (i) during the scoping stage of the study; and (ii) during presentation of the findings. During the scoping stage it was decided not to organise a separate public meeting on environmental issues, in view of earlier public meetings on resettlement. Instead of this the EA team had individual meetings with the various stakeholders, including, the Lubomia Gmina, the Archaeological Conservator in Wodzislaw Slaski, the Archaeological Department University of Wroclaw, the Forestry Department in Rudi, WWF Poland, WWF Auen Institute of Rastatt, Germany and various individual experts in nature conservation, geology, soils, ecology, fisheries, and forestry. In December 2004 the EA team attended a

resettlement workshop in Raciborz discussing findings of RAP. Preliminary conclusions of the EA were discussed with RZGWGL, RZGWWL and DZMiUW on March 10 and April 28, 2005.

67. **During the Presentation of Findings.** After approval of the draft EA version PCU distributed about 40 printed copies of the EA to local authorities and relevant stakeholders in the Project. The draft EA was also published on the websites of RZGWGL, RZGWWL, DZMiUW on June 15th for a period of 4 weeks. Advertisements in local newspapers in Wroclaw and Raciborz were published with invitations to the public to participate in two public consultation meetings: (i) a Public Consultation meeting organized by RZGWWL, DZMiUW in Wroclaw on 30 June 2005 discussing the impacts of WFS; in this meeting which was held in the Agricultural University 52 persons attended, mainly representing nature conservation organizations and the scientific community. Local authorities and press were not represented. Discussion mainly focused on legal issues, absence of adequate spatial plans and ecological concerns regarding natural habitats in the Widawa valley; (ii) a second Public consultation meeting organized by RZGWGL on July 1, 2005 in the Art Hall in Raciborz, discussing the impacts of the Raciborz dry polder. This meeting was attended by 51 persons, including 7 journalists, a large group of farmers with land in the dry polder, some representatives of the Defense Committee and a few NGOs. The discussions in this meeting focused mainly on the social impacts of the project and hardly on environmental issues. More details on public consultation meetings are given in the Main EA Report.

68. **Final disclosure of approved EA.** The final text of the EA Summary will be disclosed on the websites of RZGWGL, RZGWWL and DZMiUW. After approval by the Ministry of Environment the Main EA Report will be published on the website of this Ministry.

ANNEX I - Project works in modernization of WFS

| Nr | Work |
|----|---|
| 1 | Improvement of Kotowice- Siedlce embankment |
| 2 | Heightening of left side Olawka polder embankment |
| 3 | Improvement of Blizanowice – Trestno embankment |
| 4 | Improvement of Opatowice embankment |
| 5 | Heightening of Now Dom embankment |
| 6 | Heightening and improvements to the Janowice embankment |
| 7 | Construction of new Jeskowice embankment |
| 8 | Improvement of Kamieniec Wroclawski -Wojnow embankment |
| 9 | Improvement of the Zacisze –Zalesie embankment |
| 10 | Improvement of the Rozanka embankment |
| 11 | Reconstruction of the Redzin embankment |
| 12 | Reconstruction of the Lesica embankment |
| 13 | Improvement of the Szczepin embankment |
| 14 | Construction of the new Kozanow embankment |
| 15 | Improvement of the Kozanow embankment |
| 16 | Improvement of the Maslice embankment |
| 17 | Heightening of the Pracze Odrzanskie embankment |
| 18 | Construction of new embankment and improvement to existing one at Janowek WWTP |
| 19 | Removal of the Paniowice polder embankment |
| 20 | Completion of the Siechnice- Groblice embankment |
| 21 | Construction of a new boulevard along City Channel |
| 22 | Repairs to boulevards within Downtown Water System |
| 23 | Protection of Popowice harbour |
| 24 | Increasing of City Channel capacity |
| 25 | Increasing of Flood Channel capacity |
| 26 | Increasing of Old Odra capacity along City Channel |
| 27 | Increasing of Odra river bed capacity downstream of old Odra to Widawa River confluence |
| 28 | Increasing of Flood Channel capacity under Swojczycki bridge (Chrobrego) |
| 29 | Increasing of Flood Channel capacity under Jagiellonski bridge capacity including sill construction |
| 30 | Increasing of capacity under Warszawski road bridge |
| 31 | Increasing of capacity under Warszawski railway bridge |
| 32 | Increasing of capacity under Trzebnicki bridge |
| 33 | Increasing of capacity under Osobowicki bridge |
| 34 | Increasing of capacity under Poznanskie railway bridges |
| 35 | Modernization of the existing Flood Gate |
| 36 | Modernization of the City Navigation lock, incl. reconstruction of gates for high water discharge |
| 37 | Development of Rozanka barrage |
| 38 | Reconstruction of permanent sill at Wroclaw I Power Plant |
| 39 | Improvement of hydraulic conditions at Redzin barrage |
| 40 | Flap gated weir 3 x 20m opening |
| 41 | New spans of road and railway bridge over Odra – Widawa Channel |
| 42 | New spans of road bridge over Widawa Valley |
| 43 | Increasing of capacity under the bridge over Old Widawy in Psary |
| 44 | Construction of new embankments in Widawa valley |
| 45 | Heightening and widening of the embankments in Widawa valley |
| 46 | Removal of the embankments in Widawa valley |

Annex 10.2 Resettlement Action Plan

Poland: Odra River Basin Flood Protection Project

A. Racibórz Dry Polder

1. To comply with OP 4.12, Involuntary Resettlement, RZGW Gliwice (RZGWGL) prepared a Resettlement Action Plan (RAP) for the Racibórz dry polder that has been reviewed and agreed by the Bank and disclosed in the project area and the InfoShop. Basic elements of the RAP are briefly summarized in this section. In addition, a resettlement policy framework was prepared for the Widawa Transfer component of WFS which may involve some land acquisition and displacement of kitchen garden plots.

Project Site.

2. The RAP covers the area that will comprise the Racibórz dry polder, approximately 2,630 ha in total. It consists of mainly agricultural land and two villages, Ligota Tworkowska and Nieboczowy. About 37 percent of total area will be covered by the footprint of the embankments, and other hydraulic infrastructures of the polder, access roads and borrow areas. Current land use is as follows:

| Land Use | Area (ha) |
|------------------------------------|--------------|
| Agricultural (crop, pasture) lands | 1,853 |
| Forests | 148 |
| Coppices | 14 |
| Waters | 185 |
| Ditches | 25 |
| Mineral/aggregate excavations | 17 |
| Transport areas | 53 |
| Residential areas | 40 |
| Waste lands | 292 |
| Total | 2,627 |

3. **Land Ownership.** The data presented in the table below is based on the 2004 land register. This includes all plots that may be affected. Some large plots of which only a part lies within the polder area that may be divided and partially acquired are also included in this data. Therefore, the total area in the table is larger than the area of the dry polder stated above.

4. The private owners possess about 30% of the area (50% of the plots) and remaining area belongs to institutions and organizations, mainly state-owned. Less than 6% of the area belongs to private firms.

5. Much of the land is divided into small plots. The majority of the plots (more than 73%) are very small with an area not exceeding 0.5 ha while 88% of the plots are under 1 ha (covering 32% of the total area). The largest plots (more than 10 ha) cover about 33% of the polder area and belong only to institutions, mainly state owned. No private person owns any of the larger plots.

| Ownership | No of Plots | % of Total Number | Area (ha) | % of total area |
|-------------------------------|--------------|-------------------|--------------|-----------------|
| Private individuals a/ | 2,425 | 51.8 | 1,052 | 31.3 |
| Private firms | 176 | 3.8 | 196 | 5.8 |
| Organizations | 41 | 0.9 | 69 | 2.1 |
| Municipal offices | 1,140 | 24.3 | 477 | 14.2 |
| State, including | 900 | 19.2 | 1,567 | 46.6 |
| - ARPA b/ | 170 | 3.6 | 546 | 16.2 |
| - RZGW Gliwice | 135 | 2.9 | 92 | 2.7 |
| TOTAL | 4,682 | 100.0 | 3,361 | 100.0 |

Source: Project estimates based on 2004 land register

a/ number of owners are estimated about 1,250, one person usually has several plots

b/ Agricultural Real Property Agency (ARPA) lands that are leased mainly to farm enterprises.

| Plot Size (ha) | % of Area | % of Plots |
|----------------|-----------|------------|
| 0 to 0.5 | 18 | 73 |
| 0.5 to 1.0 | 14 | 15 |
| 1.0 to 5.0 | 27 | 10 |
| 5.0 to 10.0 | 8 | 1 |
| More than 10 | 33 | 1 |
| Total | 100% | 100% |

Categories of Impact and Project Affected People.

6. Even though the polder would only be flooded during extreme floods (with return periods of at least above 10 years), Polish regulations require the land/property within the polder to be acquired by the State and allocated to the RZGW Gliwice (RZGWGL) responsible for operation of the polder for flood management. Therefore, all land and buildings within the polder would have to be purchased/acquired by government. Project-affected persons directly or indirectly affected by the construction of the dry polder comprise as follows:

Direct Impact:

- (i) people who live in the dry polder area, primarily about 700 people in two villages Nieboczowy and Ligota Tworkowska;
- (ii) people who own land in the reservoir area and live outside –about 850 people and their families; and
- (iii) people who own or are employed by businesses located within the dry polder area – mainly residents in the two villages;

Indirect Impact:

- (i) Residents of the Gminas living outside the dry polder are; and
- (ii) People associated with the church and hostel.

Resident Project Affected Persons.

7. About 260 families, 700 people live in the two villages in the polder in some 161 household residential units.

| | Nieboczowy | Ligota Tworkowska | Total |
|---------------------------------------|-------------------|--------------------------|--------------|
| Number of Inhabitants | 564 | 125 | 689 |
| Number of Families | 210 | 50 | 260 |
| Inhabited Properties | 132 | 29 | 161 |
| Uninhabited Property (still existing) | 4 | 2 | 6 |
| Demolished Property | 0 | 11 | 11 |
| Total number of properties | 136 | 42 | 178 |

8. **Businesses and Community Properties.** Twenty businesses are located within the polder area, most of which will be relocated or closed.

| Type of Assets | Nieboczowy | Ligota Tworkowska |
|-------------------------|--|--|
| Agriculture | 1 Pig farm | 1 Chicken farm 1 Chicken slaughterhouse |
| Light Industry/services | 3 Mechanics, 1 Bakery 1 Refuse collection, 3 Gravel mines | 1 Electroplating shop 1 Craft workshop |
| Shops, cafes, hotels | 1 Tourist facility 1 Tourist facility (defunct) 1 shop 1 Restaurant 2 Bars | 1 shop |

Twenty-two community assets will also be closed or relocated elsewhere.

| Type of Assets | Nieboczowy | Ligota Tworkowska |
|-------------------------|-------------------|--------------------------|
| Church | 1 | |
| Chapel | | 1 |
| Cemetery | 1 | |
| Fire brigade building | 1 | 1 |
| Kindergarten | 1 | |
| Schools | 1 | |
| Bread House | 1 | |
| Village recreation room | | 1 |
| Sport club | 1 | |
| Wayside shrines | 4 | 1 |
| Crosses | 5 | 2 |

9. Based on the results of a household survey undertaken in 2002, it appears that about 11% of the population is engaged in agriculture, but few households depend on agriculture as the principal source of income. The remainder work in the gravel pits, coal mines, industry, commerce and services, most of which are located outside of the polder area, and some depend on their pensions. Many residents derive

their income from seasonal employment in Germany, Holland and from trade with these countries. Out of 36 owners who sold their property to the RZGWGL, three now live permanently in Germany.

10. The population is aging, but not aged and residents claim that youth and working age people are out-migrating in increasing numbers. According to the national identification database, the approximate age distribution of the 689 registered residents is as follows. These data will be updated and refined as baseline data are gathered through the negotiation and purchase process.

| | 18 and under (%) | 19 to 60 (%) | Over 60 (%) | Total (%) | Number |
|--------------------------|-----------------------------|-------------------------|------------------------|----------------------|---------------|
| Nieboczowy | 21 | 56 | 23 | 100 | 564 |
| Ligota Tworkowska | 22 | 64 | 14 | 100 | 125 |
| Total | 21 | 57 | 22 | 100 | 689 |

11. Half of the housing stock was constructed before 1950, and the incidence of new housing has declined with each successive decade since 1950. At this time no new construction is allowed as the area is designated for construction of a dry polder. In some household plots, there are two residential buildings, making a total of 178 residential buildings in the 161 household residential units. The age distribution of the residences is as follows.

| Construction date of Residences | Buildings (%) | Buildings (Number) |
|--|--------------------------|-------------------------------|
| 2000-1991 | 3 | 5 |
| 1990-1981 | 6 | 11 |
| 1980-1971 | 7 | 13 |
| 1970-1961 | 16 | 28 |
| 1960-1951 | 18 | 32 |
| 1950 or earlier | 50 | 89 |
| Total | 100 | 178 |

12. **Resident Private Land Owners.** The resident private owners of the land within the polder area are all residents of Nieboczowy and Ligota Tworkowska and their number is estimated about 500. Almost every adult resident of these two villages is a land owner. One private owner can have several plots, and can also co-own with a spouse. In that case there are two or more owners of the same plot.

Private Land Owners Living outside the Polder Area.

13. The owners of the land within the polder area who do not reside in the two villages live in many neighboring villages, and will stay in their houses after polder completion. Based on land records data from 2004 the total number of private land owners in the reservoir area is estimated to be below 1,250 of which over 500 living in the two villages while 850 land owners live in other villages outside the polder area.

Other owners, organizations and State Treasury.

14. More than 46% of the land in the polder area is owned by State Treasury and administered by different institutions. Most of the largest 45 plots (more than 10 ha) are state owned. The following

bodies are listed, inter alia: Agricultural Real Property Agency (ARPA), State Forests-Forest Inspectorate Rybnik, Polish State Railways, Light and Mineral Aggregates Production Enterprise in Katowice, RZGW in Gliwice. There are still many institutions that dissolved since 1991 who are still registered as landowners. Their lands are now administered by other units (eg. Public Roads District, Water Ways District, ODGW). The land that used to be administered by the Provincial Board of Agricultural Investments (WZIR) in Katowice is now under the control of RZGW. In addition some lands are owned by private firms, organizations and associations and municipal offices.

Leasers.

15. Leasing of arable land is very common in the area. Primarily the ARPA lands are leased under various terms. The private land owners also lease out land parcels. For ARPA land leased for agriculture purposes there are two categories of land leases: (a) short-term lease contracts many of which will expire during 2005 or soon after; (b) long-term leases, most of which will expire around 2011 or 2012 as these leases were for a 20-year period and most were signed just after 1991. Most of the long-term leases will expire by the time the polder becomes operational. The RZGW intends to lease back the land that lies within the polder area but with terms that recognize the increase in probability and severity of flooding and RZGW would not be responsible for crop losses. If the polder is used before the expiry of existing long term leases then the RZGW would pay for the crop losses to such lease holders.

Legal Framework.

16. Polish Law governing land tenure, resettlement and land and asset evaluation are covered by the Act of Management of Real Properties (MoRPA). Polish law enables administrative units to purchase land and property for public use through negotiations. If that fails, and the site in question has been identified in the local land use master plan and designated as needed for public purposes, the land and assets can be expropriated. RZGWGL has been granted a location permit for the Racibórz polder, thus it has the authority to purchase by negotiations or through expropriation. In practice, expropriation is only exercised as a last resort.

17. **Compensation can take three forms:** monetary compensation; swapping property; and both monetary compensation and swapping. Both land and homes can be subject to swap, at the choice of the owner. For compensation, "property" includes homes, other structures, income-producing trees, standing crops and other physical assets. If an agreement cannot be reached the competent public authority, in most cases the head of the Poviát (Strosta), establishes a two-month period for the landowner to execute an agreement on the conditions submitted during the negotiations.

18. Landowners and entities holding perpetual usufruct or limited proprietary rights are entitled to compensation for physical assets they own on the land subject to expropriation. The exchange for land and property is generally carried out as part of the administrative or expropriation proceedings. Tenants are compensated by landowners according to their lease arrangements. Although Polish laws do not entitle illegal occupiers to compensation, there are no indications that any property is illegally or informally occupied in the project area. Owners are compensated for all structures whether or not they were constructed with official building permits.

Development/Implementation of the Resettlement Action Plan.

19. **Socio-Economic Data.** The socioeconomic analysis for preparation of the RAP is based on an electronic database that incorporates data from several sources. The database was constructed by compilation of data collected during 1998-2005. The database covers the following data sets:

- A1 Real estates in Nieboczowy and Ligota Tworkowska (1998) covered by the stocktaking process – each real estate (occupied in the past and/or currently occupied) located at one single address is called “the household”;
- A2 Results of quantitative questionnaire surveys – Nieboczowy and Ligota Tworkowska inhabitants household survey (1998 and 2002);
- A3 Socio-demographic data concerning inhabitants of the two affected villages based on
 - the household surveys from 1998 and 2004;
 - population register – PESEL data base (national ID number database), obtained from Gmina Lubomia;
 - information obtained from the Lubomia Gmina Office (3rd Quarter of 2004);
- A4 Results of fragmentary survey of households already purchased by the RZGW (2004);
- A5 Cadastral data (land register) concerning land plots found within Project area (whole plot or its part within the reservoir footprint). Data was prepared from the register obtained from Geodetic Department of Raciborz Starosty, Wodzislaw Sl. Starosty and Raciborz City Office and dated January- March 2004 (documentation prepared by GEO-ROL Geodetic Services in Rybnik).
- A6 Results of analysis of the secondary sources of information (2004) – e.g. data concerning 43 resident households that did not appeal against location permit to the Ministry of Infrastructure; and
- A7 Reservoir area land use map.

20. These data are adequate for developing the RAP, they will be supplemented by household questionnaires at the point of negotiations, which will serve as a baseline for monitoring the implementation and impact of the RAP.

21. **Location Permit for the Project.** According to the Polish Law for land acquisition, the RZGW applied to the Gmina authorities for a Location Permit for the Raciborz dry polder. The Wojt (Chief Administrator) of the Lubomia Gmina refused to give the required decision, therefore according to the legal procedure, Wojewoda Śląski (the Voivode) was the competent authority to give this decision. The permit was granted on the July 5, 2004, effective immediately.

22. The location decision was subject to appeal and when the Minister of Infrastructure upheld the decision, a complaint was lodged by some residents to the Administrative Court, a response to which is pending. However this complaint does not stop the execution of the decision. The execution could be stopped in whole or in part only by relevant decision of the court and such a decision was not issued so far. Therefore the RZGW can proceed with implementation of the Project, including all activities related to property and land acquisition and resettlement of affected people.

23. **Compensation and Entitlements.** Residents and other property owners are entitled to compensation as summarized below. A detailed table of entitlements is included at the end of this annex:

- State entities will cede land for the polder;
- Non-resident private owners will be compensated for land at replacement value, be given alternative replacement lands, or a combination;
- Residents will have the following options:
 - Cash compensation for agricultural land, house and property;
 - Cash compensation for agricultural land and provision of alternative housing;
 - Provision of alternative agricultural land, cash compensation for house or provision of alternative housing in lieu of cash compensation;
- State owners and lease holders compensated according to the provisions of lease and tenancy agreements.

- Structures will be compensated for whether or not they are constructed with official building permits.

24. Land and property values are established by professional assessors. Owners are given a copy of the assessment, which sets the minimum threshold for negotiations. If negotiations are completed successfully, the assessment is revised to reflect the agreement. According to Polish law, assessors can calculate the value of land and physical assets (residences, other structures, income-generating trees and standing crops) in one of two ways: “market value,” established through previous sales; or “replacement cost,” which includes materials and labor for reconstruction. In practice, “market value” is used because “replacement cost” calculations must include depreciation, at the rate of 10% per decade. OP 4.12 requires compensation to be set at full replacement cost, thus the Polish concept of “replacement cost” does not correspond to the Bank definition. After a review of the compensation given by RZGWGL for recent purchases, and discussions with some of the residents who sold their land and homes to RZGWGL, the Bank team has determined that current application of compensation at “market value” corresponds to the Bank standard of full replacement cost, and is therefore acceptable to the Bank.

25. Cash compensation includes an adjustment for moving, based on negotiation with individual owners. Compensation does not include land preparation costs, typically related to preparing virgin land for cultivation. It does provide for investments in urban residential infrastructure (streets, waste management, lighting, and installation of access to other utilities). In the former case, no agricultural land preparation is envisioned, as the agricultural land to be swapped or purchased by owners is already under cultivation. If land development is needed that would be carried out under the Project as part of RAP implementation. In the latter case, RZGWGL will bear the costs of preparing sites for the resettlement village or villages. Assuming that residents are given the option to settle in the resettlement village or villages, those who decide to construct new homes on other sites will be expected to factor site preparation costs into their construction or purchase budgets. Businesses will be compensated for the loss of assets and the estimated cost of relocation to another site. Current purchases agreements enable businesses to continue function on site while they re-establish elsewhere, thus enabling them to maintain income flows. In addition to cash compensation for lost assets, businesses will be compensated for the direct cost of relocating to another site and the loss of income during the interim, if applicable.

26. Land lessees and tenants would be compensated according to provision of the lease and tenancy agreements. As stated above there are two types of land leases in the project area, short-term expiring around 2005 and long-term mostly expiring around the time of completion and start of operation of the dry polder. The RZGW would lease back the land within the polder area to former lease holders, with appropriate provisions recognizing increased probability and severity of flooding. If polder is used before the existing long-term leases expire then the RZGW would pay for the crop losses.

27. **Implementation of RAP.** The table below gives a breakdown of the land required for construction of the Raciborz dry polder infrastructure and the land that would be located within the polder. The area of land required for construction of the reservoir structures totals approximately 960 ha, or 37% of the total foot print of the dry polder. This area comprises:

- The footprint of the embankment, width varying between 40m and 120m according to the height of the embankment above ground level;
- Necessary access track along the downstream toe, 3m to 5m wide;
- A 100m wide cordon upstream of the upstream toe (150m along the main dam);
- A strip of land, situated upstream of the cordon which is designated as borrow area to supply the earthfill for construction, up to 500 ha of total area
- An area for the contractors offices and construction yard, 3 sites of total area 10 ha

- Site haul roads, which will generally be accommodated within the cordon and upstream reserve.

| Area Ha Ownership | Land Necessary for Infrastructure and Construction of Dry Polder (footprint) | | | Land Inside the Dry Polder |
|----------------------|---|------------|-----------|----------------------------------|
| | Front Dike | Right Dike | Left Dike | |
| Total | 212 | 415 | 462 | 1256 |
| Private | 58 | 122 | 108 | 542 |
| ARPA | 79 | 107 | 146 | 214 |
| RZGW | 9 | 30 | 28 | 25 |
| Other | 66 | 156 | 180 | 475 |

Note: The table includes all plots that may be affected. Some large plots (particularly those under the dikes) of which only a part lies within the polder area may be divided and partially acquired. Therefore, the total area in the table is larger and not fully consistent than the areas of the dry polder stated in earlier tables.

28. The area required for construction of polder infrastructure must be acquired by RZGW with high priority. The land would be acquired from the private owners through negotiations. Many owners, particularly with small plots have expressed interest to sell the land provided RZGW offers reasonable price, while some would like to get replacement land. Based on the available information and survey it is estimated that about 200 ha of land would be required as replacement land for acquiring land required for construction of infrastructure. Several parcels of land have been identified for this replacement land all of which are owned by ARPA and leased to various lease holders. For example, Agromax Ltd is a leaseholder of 3,000 ha from ARPA. Similarly there are several other leases by ARPA in the area surrounding the dry polder. ARPA land is also preferred by those interested in land exchange. The ARPA lease agreements have provision that the Agency can reduce the leased area by 20%, if such area is required for public investment such as the Racibórz dry polder. There are no legal or administrative constraints in making these land available to people who may opt for replacement land.

29. About 180 ha of land needed for construction of infrastructure in the early phase of the Project is owned by ARPA that has been leased out. This land has four short-term leases (2 years long contract) expiring in September 2005 covering an area of 100 ha. The remaining 80 ha are under a long-term contract with Agromax Ltd which will be acquired through provision of the lease contract that allows a reduction of 20% of the leased area.

30. The breakdown of 214ha leased by ARPA inside the reservoir is similar to land under the embankments: 50% is under short term leases, 50% under long term leases. Long term leases, mostly signed for 20 years in early 90s, expire before year 2011 - planned construction execution.

31. The acquisition of land within the polder area, houses and properties in the two villages would continue in parallel to the construction of the infrastructure. By the end of 2004, RZGWGL had purchased about 36 properties including 31 residential houses. Negotiations are ongoing with another 15 owners. To date the process has taken about three months from initial discussion to the signing of an Agreement. Due to its limited budget, RZGWGL has negotiated with owners who came forward, rather than seeking out owners. Once project funds are available, the pace of acquisition will speed up markedly. Most of the land acquired would be available to be leased back, however, and the houses will be demolished after they are vacated.

32. Land belonging to State Treasury and administrated by either self government or other state institutions will be acquired according to the Act on Management of Real Property that allows transfer of land from one Government agency to the other. The RZGW has already applied for transfer of land which will be expected during 2006 after completing all internal procedures.

33. RZGWGL has identified three sites for resettlement of residents, if they choose to do so. Two of the sites are located adjacent to urban areas at Lubomia, where residents would be able to build their own homes or swap their residences for new units constructed by RZGWGL. A third site would be suitable to re-establish a rural community, for which residents would be able to swap agricultural and residential land to re-establish agricultural units. The residents would have the choice to select the replacement house at the alternative village site or at the other suitable site in the Gmina. According to Polish Laws, the replacement house is provided as part of the administrative or expropriation proceedings. Residents will be offered these alternatives, with participation entirely voluntary. If demand is adequate, the sites will be fully developed, with urban infrastructure, prior to settlement. Prospective residents will be encouraged to participate in the process of designing the site plans and residences in a process to be established once the scale of demand is determined. Acquisition of land, houses and property would be completed by 2010-2011 before putting the polder into operation.

34. **Mitigating Factors.** The overall impact of resettlement for residents of Nieboczowy and Ligota Tworkowska, land owners and other affected persons will be mitigated by a number of factors which affect households to varying degrees:

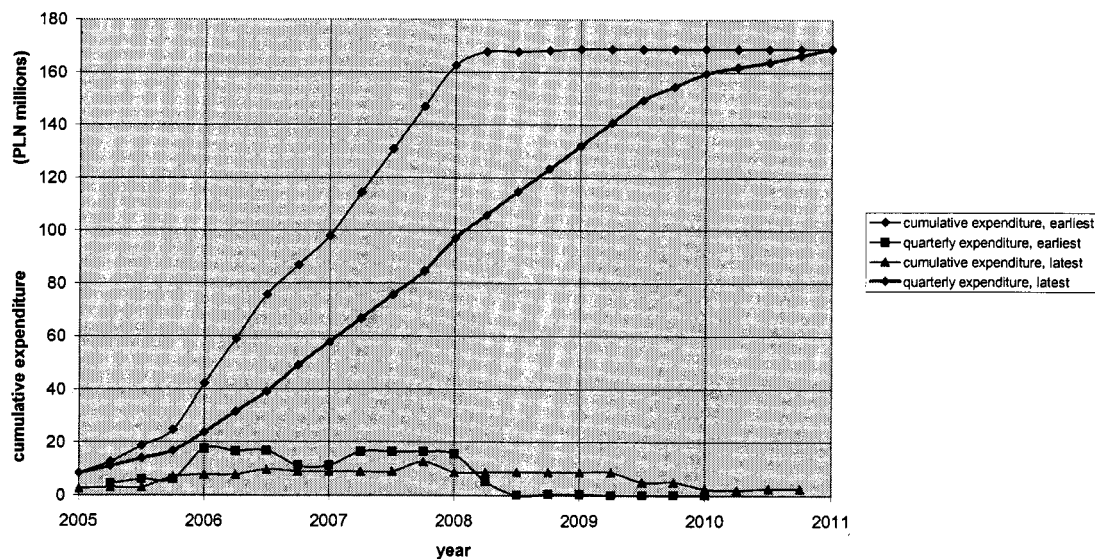
- No residences are located within the footprint of the embankments, thus resettlement of the population is not required immediately and can proceed until the end of 2010;
- Non-agricultural income sources are primarily outside of the polder area, in nearby towns and Germany, and some people expect to move closer to employment sites;
- Few households depend primarily on agricultural income; the land-for-land option will enable some farmers to continue farming and cash compensation will enable others to capitalize their assets for other uses. Also, the land under agricultural use would be acquired and leased, with former owners and lease holders given preference. The lease terms would recognize the increase in probability and severity of flooding, however;
- Some families have already built or purchased homes outside of the polder area in anticipation of resettlement;
- RZGWGL is flexible in the timing of relocation, giving residents two years or more to purchase or build new housing and prepare for a smooth transition;
- Residents who want to maintain community ties will have the option of moving to one of the resettlement village sites;
- Vulnerable people will be given special assistance in finding alternative residential sites and moving.

35. **Resettlement and Land Acquisition Cost estimate.** The estimated total cost of implementing the RAP is PLN 176 million without resettlement village and PLN 183 million if a resettlement village is fully constructed. Allowing for some reserves and VAT, Euro 64.9 have been allocated under the Project for financing of the RAP related costs. The RAP costs will be financed from the Bank loan ensuring proper cash flows and prompt payments to the people that is determined to be a key factor in smooth implementation of RAP at this stage. The breakdown cost for various elements of RAP is as follows:

| Component Description | Option I (without village) (PLN million) | Option II (with village) (PLN million) |
|--|--|--|
| Property already purchased | 9.4 | 9.4 |
| Residential property to be purchased | 47.9 | 30.4 |
| Public buildings | 4.8 | 4.8 |
| Religious property | 2.5 | 2.5 |
| Commercial property | 2.3 | 2.3 |
| Decommissioning infrastructure and demolishing buildings | 2.0 | 2.0 |
| Land | 65.0 | 65.0 |
| Infrastructure compensation | 18.5 | 10.2* |
| Village for 50 families | | 32.0 |
| <i>Subtotal</i> | <i>152.4</i> | <i>158.6</i> |
| Legal, evaluation and administration @5% | 7.6 | 7.9 |
| Contingency 10% | 16.0 | 16.6 |
| TOTAL | 176.0 | 183.1 |

*If construction of village including infrastructure is transferred to Lubomia Gmina, the compensation would be reduced by PLN 8.3 million.

36. **Implementation Schedule.** The bulk of expenditure for RAP implementation will occur between 2007 and 2009, as shown in the following cash flow diagram:



37. Assuming that a resettlement village is constructed, the polder area will be evacuated by the end of 2011.

38. **Implementation Management.** RZGWGL will implement the RAP, drawing on the resources of appropriate social service authorities as needed. The Gmina, Powiat, Voivodship, and other local

administration will be involved according to the provisions of Polish Laws for land acquisition and resettlement. Property assessments are obtained through contracts with an assessment firm, but negotiations are conducted directly by RZGWGL staff. RZGWGL pays directly to the accounts of owners from its budget, using funds designated for land acquisition. To date, the funds have been very limited, thus relatively few purchases have been made. With the availability of funds from the loan, current cash flow constraints would be removed substantially, thus speeding up the implementation of RAP. Construction of the Raciborz dry polder has been in planning stages since 1940's and the Government has discussed the purchase of land and property on several occasions. The social assessment showed that residents are concerned that negotiations be fair and compensation be paid promptly for lost land and other assets. It is therefore crucial that the negotiation and payment precedents established recently be maintained to assure smooth implementation of RAP and thereby timely completion of the Project.

39. **Monitoring and Evaluation.** A systematic monitoring program will be undertaken to ensure that the RAP is implemented properly. Regular reporting will be the basis for monitoring. The actual progress in property and land acquisition will be reported to decision makers each month and include at least the following information: the number of agreements signed; the number of houses purchased; the area of acquired plots; vacated houses purchased houses still occupied; other buildings purchased and buildings purchased and still in use; demolished houses; costs incurred; and the number and status of court cases contesting compensation. Simultaneously the map of the area will be updated. In case of any delays or problems (unsuccessful negotiation) early identification will allow for relevant action: updating the implementation schedule, initiating expropriation procedures or revising appropriate elements of the RAP.

40. Similarly all activities related to consultation, design and construction of the resettlement village location of residents will be reported monthly.

41. Monitoring of the status and concerns of displaced people will be closely linked to the communication activities and be reported in both quantitative and qualitative terms. The household data collected at point of sale will be used to update the baseline for further precise assessment of resettlement impact.

42. The RZGW will maintain case notes of each family to be displaced from the time of first contact to three years after the family has relocated. The case notes shall include:

- Personal details of the family members – numbers, age, disabilities if any, source of income;
- Inventory of assets and compensation entitlements;
- Details of negotiations;
- Correspondence;
- Copy of purchase agreement;
- Details of new home and/or land;
- Schedule for relocation;
- Comments on concerns, expectations **or any additional observations;**
- **Details** of court appeals and challenges.

43. The database created to prepare the RAP will be continuously updated during preparation and implementation of the RAP. A baseline will be established through the brief survey administered to each household at the point of sale, which covers compensation levels, income sources, socio-economic status, property holdings and post resettlement plans. This baseline will be incorporated into the larger database and used for follow-up monitoring to assess resettlement impacts and, if appropriate, to identify

unforeseen problems that need mitigation or deficiencies in RAP implementation. RZGW Gliwice will manage the database with support from independent consultants.

44. The notes prepared and data collected during the property acquisition/sales, the level of monitoring of each family will be determined. During this process the vulnerable families will be easily identified. For these families it will be important to liaise with local social services, NGO's and, where appropriate, the Church. A plan of visits and contacts would be prepared to resolve any problems that might arise and to reassure and advise. These will be particularly important during and after the removal from the village to the new home.

45. **Independent Evaluation.** The monitoring, and any necessary follow-up action, will be monitored by an independent consultant to be appointed by the PCU. External monitoring will comprise a twice yearly visit throughout the implementation period. The main objectives of this monitoring are:

- to observe the functioning of resettlement operation at all levels;
- to assess effectiveness of activities and compliance with RAP with special regard to adequacy and timing of compensation;
- to verify internal reporting and monitoring of the PIU;
- to check the functioning of grievance redress mechanisms;
- to assess the effects of the resettlement on people standards of living;
- to advise project management regarding possible improvements in RAP implementation, if appropriate.

46. The monitoring, and any necessary follow-up action, will be monitored by independent consultants (Monitoring and Evaluation, M&E Consultants) to be appointed by the PCU. M&E consultants would be appointed according to the agreed procedure under the Project using resources allocated under Component C4 of the Project (about Euro 3 million). The M&E consultants, among other things, will review the implementation of RAP and provide reports to the RZGW Gliwice, Ministry of Environment, Project Steering Committee and the project financing institutions along with any mitigating measures required during RAP implementation. The RZGW Gliwice and PCU will issue quarterly monitoring reports including RAP implementation, which will be reviewed during supervision missions of the international financing institutions, followed up by field visits. In addition, two surveys will be undertaken by the M&E consultants: one at the completion of the land acquisition and resettlement process; and another two years later or at the end of the project period. Using the baseline established during implementation of RAP, the surveys will assess the impact of land acquisition and resettlement on households and, if appropriate, recommend steps to be taken to achieve the objectives of the RAP and to mitigate negative impacts that were not foreseen in the RAP.

Consultation and Communications

47. The Racibórz polder has been the subject of discussion and planning for more than a century, but the information flow to residents has been erratic and signals are often contradictory, fostering mistrust and opposition. This culminated in the creation in 2002 of the Committee for the Defense of Nieboczowy, the larger of the two settlements in the polder area. To prepare for evacuation of the polder, RZGWGL commissioned a detailed inventory of population and property in 1998, followed by another survey in 2002.

48. Since January 2002 a series of public meetings were held to discuss various aspects of the Project with the affected population also to seek ideas and advice to minimize the negative social affects of the Project and develop a pragmatic resettlement action plan. A list of these meetings is provided in the RAP, Annex 10. Public meetings have been contentious, with expressions of concern about both polder

construction and compensation levels. RZGWGL's recent consultations seem to have had an impact, as over the last year or so the opposition to the Project has declined. This is also because the Location Permit was issued for the dry polder, a decision which cannot be overturned, and because of the relatively good compensation package being offered to affected people by RZGWGL. With successful negotiations of more than 36 properties in the two villages, and reducing public opposition an increasing number of people are coming forward to sell their properties.

49. Nonetheless, RZGWGL will implement a new communications strategy that aims to keep affected people and the public informed about the status of the Project and to obtain feedback on the success of the strategy. The strategy has five elements:

- Up-to-date database, incorporating the household survey administered at point of sale, as well as data regarding the status of each household in the acquisition/resettlement process;
- Direct consultations with affected people and local officials. Experience has shown that the most effective public meetings are small groups focused on specific issues. These will continue and increase in frequency as the acquisition process accelerates;
- Regular Meetings with organizations will continue, especially with the Committee for the Defense of Nieboczowy. The goal is to keep the Committee informed about current plans and options, with the expectation that the information will be passed to constituents;
- Written Communications will be more frequent and focused. Starting with the distribution of the RAP Summary to all affected households, RZGWGL will send a simple newsletter to each affected household on a quarterly basis to keep people informed about progress and to remind them whom to contact in RZGWGL for questions or complaints. In addition, RZGWGL will obtain professional assistance to prepare a series of information leaflets that will be distributed to affected households and made available to the general public.
- Media contacts will become more systematic and regular. RZGWGL representatives will participate periodically in radio and television programs to discuss progress and address questions raised by correspondents and the public. Information on project implementation, decisions and actions taken, as well as on specific problems, will be transmitted regularly to representatives of the local press, radio and television.

RAP Disclosure

50. After thorough consultations for preparation of RAP given above and sharing various drafts, the disclosure process for the final RAP report was as follows:

- (a) The RAP Summary and a full version of report were placed on the investor's website;
- (b) A public announcement was published in June 2005 in local newspapers: Nowiny Raciborskie and Dziennik Dolnośląski. The text of the announcement is attached in Appendix D of the RAP, point 3. The announcement invited the public to contribute to an open discussion concerning the RAP report and:
 - stated that a summary of the RAP report was mailed to affected residents and land owners,
 - identified sites where full reports were placed for disclosure;
 - specified the investor's website address where people could access the summary and full report;
 - listed the address of the RZGW Inspectorate in Racibórz where comments could be sent by mail or submitted personally.
- (c) The RAP summary was mailed to all affected people (residents in the polder area and owners of land within the polder who reside outside) according to the address list of people notified during the Location Permit notification process (over 1200 persons). The RAP summary and full reports

were distributed in the two villages within the polder area and a few in nearby villages where people whose land may be acquired reside. Together with the summary RZGW enclosed a letter informing recipients about the disclosure procedure, giving the contact details included in the announcement. The authors of the RAP report also enclosed a letter encouraging people to read the summary and present their comments and recommendations (see RAP, Appendix D, point 4) for consideration of points to be incorporated in the final version of the report;

- (d) The RAP full report was placed at the Gmina offices in Krzyżanowice, Lubomia and Kornowac; in the City Council office in Racibórz; RZGW offices in Raciborz and Gliwice; and the parish office in Nieboczowy; and
- (e) The final date for submitting comments and discussing the report was July 11, 2005, which corresponded to the end of the disclosure period of the EIA for the Racibórz reservoir.

51. **Disclosure Results.** Public response was limited. The total public response resulting from the distribution by mail to all affected households, the announcement in the press and the disclosure of full reports in public places and internet websites consisted of 3 letters sent to RZGW and one meeting between representatives of Nieboczowy village and RZGW staff.

52. The meeting was organized spontaneously when the Committee for the Defense of Nieboczowy and residents visited the RZGW Inspectorate. A copy of full report was to the Committee as requested during the meeting.

53. The three letters received in response to the RAP report were sent by:
- (a) Committee for the Defense of Nieboczowy;
 - (b) Residents of Bieńkowice;
 - (c) Regional Board for Roads Management;

54. In their letters, representatives of the three groups referred to the text of the report and further actions that will be taken during project preparation. The most important issues are described below.

55. The Committee for the Defense of Nieboczowy addressed the following issues:
- (i) A methodological discussion raising questions about the alternative alignment proposed by the Committee and the reasons for its rejection at the stage of feasibility study.
 - (ii) An expression by the citizens of Nieboczow of their willingness to cooperate with the investor and statement of their belief that the cooperation should be organized as a social dialog with ongoing consultations concerning decisions being made.
 - (iii) A criticism of both the idea of constructing a resettlement village and the proposed locations for a village in the area of Gmina Lubomia.
 - (iv) A question by farmers enquired about the locations of replacement land.
 - (v) An expression of concern about the residents of the village who are weak and without resources and about the future of those who decided to sell the land to the Investor. It was suggested that a plan of action to help those residents should be prepared and presented to them.

56. Land owners from Bieńkowice expressed their unambiguous willingness to sell or exchange land through negotiations. In case of land exchange, they indicated their interest in the land belonging to Agricultural Real Property Agency located near Bieńkowice village. Fourteen farmers who signed agreements with RZGW chose replacement land as compensation for land under the reservoir structures. The farmers said they were interested in negotiations based on specific binding proposals.

57. The Regional Board for Roads Management in Wodzisław Śląski submitted a request for legal agreement procedures for managing roads in the area of reservoir.

58. **Implications for the Project and text of the RAP report.** The results of the disclosure procedure and letters sent to the investor were analyzed and their conclusions were introduced in the final report as stated below:

59. The following responses were made regarding the comments of the Committee for the Defense of Nieboczowy:

(i) In response to the Committee's questions regarding the alternative alignment, experts analyzed the option once again, taking into consideration all hydrotechnical, economic and environmental aspects. Among other arguments the analyses proved that the alternative alignment would decrease the volume of the reservoir to such an extent that it would be unable to provide flood protection for Racibórz and other cities located downstream from the polder and would put at risk the lives and property of 2.5 million residents of the area planned for protection.

(ii) The Committee's declaration of willingness to cooperate with the investor is a good starting point for social dialog. The public disclosure of the RAP report and associated meetings demonstrates a responsiveness to the concerns of residents of the villages and includes them in the decision making process. The investor's objective in undertaking the Project is to protect millions of residents in the areas downstream of the polder from harm and to enable residents of the reservoir area to maintain or improve their standards of living.

(iii) The proposed resettlement village is only one of many solutions offered to residents. It is not the only and binding solution. Rather, it is but one alternative for those who are unwilling or unable to find a new place to live on their own. In addition to being relocated to a resettlement village, residents can be compensated with money to enable them to purchase or construct a new house or receive a new house at a site of their selection. The sites shown in the RAP as potential locations for resettlement village were those offered by the Gmina Lubomia and are subject to change depending on the preferences of potential residents and indications of how many people are interested in such solutions. The proposal presented is a basis for dialogue and common decision concerning regarding the need to build a village and, if so, the design of the village site.

(iv) The location of the replacement land belonging to the Agricultural Agency and plans for handing the land over to the Investor are shown in Section 4.2.2 of the RAP. The process of taking over the land will be continuous throughout the years of project implementation.

(v) The RAP report is the basis to assess the current social situation in the project area and project impact. One of its goals was to identify problems and work out suitable plans for future action. Chapter 9 of the report concerns the issue of ongoing monitoring of the social and economic status of relocated residents after execution of the Project and describes the allocation of responsibilities among different institutions and the investor. During the period in which the investor carries out its purchase procedures residents can stay in their homes for a period of 2-3 years after the sale, giving them time to purchase or build a new house without time pressure. According to the investor's policy, people who receive money from the sale of their houses can invest and choose a new place to live according to their own wishes. The situation described in the Committee's letter, where residents would be left without shelter, definitely will not take place.

60. A very important result of the RAP disclosure procedure is the declaration by residents of Bieńkowice who own land located under the reservoir structure of their willingness to negotiate to sell or replace their lands.

61. Accordingly, RZGW held a consultation and information meeting with farmers from Bieńkowiec July 11, 2005, and agreement was reached that RZGW will submit written proposals for land purchase to individual farmers.

62. The planned construction of the reservoir does not require closing the regional road No. S 5052 from Lubomia-Paprotnik through Nieboczowy, Ligota Tworkowska to Buków. The road will be subject to slight modernization at the cross section with designed alignment and the Regional Board for Roads Management will be consulted on design details. This road will continue to be used during the reservoir construction period and later during gravel excavation. It seems that after reservoir construction works are completed, the regional road No. S 5052 would change class from a regional to a gmina road managed by the RZGW. Binding agreements concerning this issue will be taken by the investor at an appropriate time.

63. Copies of the three letters are enclosed in Appendix D, point 5. RZGW replied as indicated above. No party requested additional public meetings to discuss the content of the RAP report. As discussed in the RAP, RZGW will establish mechanisms to communicate regularly with affected persons who reside inside and outside the reservoir area.

B. Widawa Floodway System

64. The Widawa Transfer Component of WFS, which consists of broadening and deepening of an existing canal that carries flood water around Wroclaw, may also involve some resettlement and social issues. Several kitchen garden complexes, most of which have small sheds, trees and other assets, may be affected as embankments along the Widawa River are relocated and heightened to increase bypass flows away from Wroclaw during extreme floods. Detailed designs of the Widawa Transfer will be undertaken during project implementation, which will determine the extent to which such relocation will be required. RZGW prepared and disclosed a resettlement policy framework (attached at the end of this Annex) in anticipation of works on the WFS. The policy framework was accepted by the Bank and project funds have been allocated nominally to cover the costs of implementation. As part of the detailed design of the Widawa Transfer Component of WFS, a comprehensive RAP would be prepared and agreed for this component based on the principles and parameters of the resettlement policy framework and RAP for Racibórz Component. The construction of the Widawa Transfer Component will start only after development of a RAP that addresses the resettlement and social issues, acceptable to the Bank. The estimated cost for handling RAP issues and social costs in WFS have been incorporated in the project budget.

**Racibórz Reservoir Resettlement Action Plan
Summary of Compensation Entitlements**

| Project Impacts | Category of PAP's | Entitlement | Other Measures |
|----------------------------|--|---|---|
| Loss of settlements | Resident house and land owners in Nieboczowy and Ligota Tworkowska | Market value of house + land Allowance to cover removal costs OR Replacement house of equivalent of similar standard and value OR A combination of money and land | Provisions for temporary housing until new house ready |
| | Tenants | Removal and displacement costs (through tenancy agreement) | |
| | Vulnerable groups | as above – according to ownership or tenancy entitlements | Early identification and support from welfare department, church and NGOs |
| Loss of land | Land owners | Market value of the land to be purchased + value of fixed equipment + value of loss of crops + removal costs OR Exchange agriculture land from Agriculture Real Property Agency | Possibility to lease the land and continue farming of land not required for construction Assistance in conducting exchange |
| | Tenants | Removal and displacement costs (through tenancy agreement) | |
| Loss of enterprises | Business owners | Market value of the premises to be purchased + value of fixed equipment + removal and set-up costs + loss of earnings | Provision for continuance of operation if possible |
| | Employees | Removal and displacement costs OR Employment termination costs + loss of earnings (either through employment contract) | |
| Loss of religious property | Church and residents | Relocation to chosen location OR Replacement cost compensation | Provision for the pastoral service till the last resident |
| | Illegal occupiers | Not applicable | Support from Social services |

**Odra River Flood Protection Project
Wrocław Flood Protection
(Widawa Transfer Channel and Popowice Koaznow Dike)**

Resettlement Policy Framework

Project

65. The main development objective of the Project is to protect the population in the Odra River Basin against loss of life and damage to property caused by severe flooding. This would be achieved by: (i) reducing the extreme flood peaks through storage in a dry polder on the Odra river just upstream of Racibórz town, enabling a reduction of the flood peak downstream of the reservoir and allowing better control of the operation of the river system, and (ii) by increasing the flood carrying capacity of the Odra river channels through and around Wrocław. The Project would protect more than 2.5 million people against flooding in several towns, including Racibórz, Kedzierzyn, Kozle, Krapkowice, Opole, Brzeg, Olawa and Wrocław, and settlements in the three vovoidships of Slaskie, Opolskie and Dolnoslaskie.

Social Impacts

66. Project investments will occur in two areas: Raciborz, where a dry polder will be constructed to store flood water during peak flows; and Wrocław, where embankments will be strengthened, raised and constructed, respectively, and the Widawa Transfer Channel will be reconstructed to increase flood flows. Construction of the Racibórz polder will entail the acquisition of approximately 2,600 ha and the resettlement of almost 700 people. The agency that will implement the polder component, RZGW Gliwice, prepared a Resettlement Action Plan (RAP) that was reviewed and approved by the Bank.

67. It is still to be determined which works in and around Wrocław will require land acquisition or relocation of facilities or people. Two works may affect garden plots, agricultural activities or structures, however, depending on the outcome of the detailed designs for the works. This policy framework is prepared to outline how the agencies implementing the works, RZGW Wrocław and DZMiUW, respectively, will deal with the possible impacts of the works.

68. The two works and their possible impacts are as follows:

Widawa Transfer Channel

- Construction of new dikes in the Widawa Valley to increase the capacity of the transfer channel is expected to envelop a large garden unit (77 ha.) comprising about 2,000 homestead gardens and a gmina recreation center located next to the unit, requiring their removal;
- Construction of new dikes along the Old Odra near the Poznan Road and north may require the removal of commercial or residential structures, some of which were constructed illegally in the flood plain, others may have been issued building permits illegally;
- Construction of new dikes parallel to existing dikes near the confluence of the Widawa River and the Odra River will require the acquisition of land for the new dike, or swapping the land under the footprint of the new dike for the restored land covered by the old footprint;

- Clearing the Widawa Transfer Channel may require removing orchards and illegal landfill in the flood plain;

Popowice Koaznow Dike

- Modernization of the left bank dike at Popowice Koazanow may entail the removal of a unit of homestead garden plots located on the existing flood plain.

Status of Gardens, Orchards and Residential Areas

69. The large garden unit in the Widawa Valley is situated on government or municipality land. Such units typically are ceded to the Association of Garden Users by government or municipal authority under a 99-year lease. Many leases date back to the end of World War II. The association allocates plots to individuals for nominal fees, generally for an indefinite period. Although they are not owners, garden users treat the plots as their own family farmsteads. Some garden users divide their tiny plots into landscaped and cropped areas and small construct farm sheds or even miniscule weekend cottages on the plots; other plots have trees and grass around a small weekend cottage. Each composite garden unit ultimately resembles a colorful miniature dense farm village.

70. The orchards that may be affected are located on the Widawa flood plain. The precise status of these agricultural activities will be ascertained if the final design requires their removal. It is expected, however, that either they are incursions into the flood plain that predate formal restrictions on flood plain use or they were allowed to be established due to lax enforcement of flood plain restrictions.

71. The area along the Old Odra near the Poznan Road and north is adjacent to densely populated areas and the landfill and commercial and residential structures within the floodplain illustrate the recent spate of urban expansion. The structures were either constructed without building permits or were issued building permits illegally. Preliminary design of the new dike will require their removal, but the final design may avoid the structures. The landfill must be removed in either case.

72. The precise status of the garden unit on the flood plain at Popowice Koazanow that may be subject to removal has yet to be ascertained. It is possible that the unit is under the management of the Association of Garden Users, but it is believed to be an informal unit established without official sanction. The unit was devastated by the 1997 flood and subsequently re-established.

Legal Issues Regarding the Potentially Affected Sites

73. The Widawa Valley garden unit has legal status by virtue of a long-term lease granted to the Association of Garden Users by the Government or the Municipality, but the terms of the lease and the conditions under which it may be terminated have yet to be determined. Regardless of the terms, however, RZGW or DZMiUW will compensate garden users or relocate the unit to an alternative site.

74. The orchards in the Widawa flood plain are located on private land and the garden unit at Popowice Koazanow is on the floodplain without legal status. Nonetheless, the users will be entitled to compensation or substitute land if they are removed from their current sites.

75. Once the final designs are completed and it is possible to determine which specific sites will be affected by project activities, the implementing agency will develop appropriate site specific plans.

Principles to be Applied

76. RZGW and DZMiUW, respectively, will adhere to the following principles as they complete final designs of the investments and plan programs to mitigate any anticipated negative impacts:

- Minimize disruption and dislocation;
- Engage affected persons actively in the development of mitigation plans;
- Substitute land to enable people to continue their economic practices, if feasible and desired;
- Compensate people for lost assets (structures, plants, crops) at full replacement cost or replace the assets;
- Provide assistance for relocation or displacement;
- Assist all affected people to restore their incomes regardless of the legality of their land tenure.

77. The World Bank's Operational Policy on Involuntary Resettlement (OP/BP 4.12) require implementing agencies to compensate all affected persons for lost assets and to provide assistance to relocate (homesteads and farmsteads) and restore incomes, regardless of their legal status. Thus the impact of the removal of garden plots or orchards will be mitigated whether or not the users have legal use rights.

78. Homestead garden plots yield products that families might otherwise purchase, thus supplementing household incomes, but the overall economic impact is generally miniscule. Nonetheless, the garden plots serve a range of needs of garden users—cultural, recreational, health, aesthetic and even educational—that are hard to measure, but very important in the lives of the users. Moreover, different members of a household may value the plots differently, depending on age, gender and individual history. Accordingly, RZGW and DZMiUW will make every effort to find alternative garden sites as close to the original sites as possible.

79. Removing orchards may affect the incomes of affected households. Mitigation plans will therefore include provisions to restore incomes by compensating for lost income flows or assisting affected persons to find alternative sites.

Matrix of Entitlements

80. Based on available information, it is anticipated that there may be six groups of persons that may be affected by investments around Wrocław and the Widawa Transfer Channel. The actual number of groups, and the way they will be affected, will be determined once final designs are complete. Additional groups may also be identified during the preparation of mitigation plans, such as owners of structures that must be removed. The following matrix describes the anticipated affected persons and their respective entitlements.

**Wroclaw Floodway System—Resettlement Policy Framework
(Widawa Transfer Channel and Popowice Koaznow Dike)**

Summary of Compensation Entitlements

| Investment | Project Impacts | Category of PAP's | Entitlement | Other measures | |
|-------------------------|------------------------------------|--------------------------|--|---|--|
| Widawa Transfer Channel | Removal of Garden Site under Lease | Garden users | Replacement value plants and crops AND Replacement value of structures AND Compensation for termination (equivalent to purchase use right in alternate site) OR Replacement plot at new site | Reconstruction of structures at new site Transport Movables to new site | |
| | | | Employees of Unit | Employment at new site OR Severance payment | If also garden user, same entitlements as other users |
| | | | Orchard owners | Production value of current crop AND Production value of trees through normal productive period OR replacement value of new saplings. AND compensation for termination (equivalent to purchase use right) in alternate site. Replacement value of land or substitution | Delivery of new saplings |
| Popowice Koaznow Dike | Removal of Informal Garden Site | Land Owners | Land Acquisition for new dikes | | |
| | | | Home owners | Replacement value of Residences | |
| | | | Business Owners | Replacement value of land; replacement value of structures; compensation for lost income during transition | Income compensation applies to employees as well as owners |
| | | Garden users | Replacement value plants and crops AND Replacement value of structures AND Replacement plot at new site | Reconstruction of structures at new site Transport Movables to new site | |

Annex 10.3: Dam Safety Safeguard Issues

POLAND: Odra River Basin Flood Protection

1. Poland has a very reliable system of ensuring safety of the major hydraulic infrastructure. The hydraulic infrastructure is classified into various categories based on its size, complexity and number of people depending on the structure, its operation and maintenance (O&M) and that may be affected in the event of failure. Poland has regulations and/or standards for design and O&M of each class of structure and highest standards are applied to those classified as Class I Structures. The Raciborz dry polder and several structures in WFS are classified as Class I structures, and therefore, they would fall under rigorous regime of scrutiny during design, construction and operation stages.

2. **Dam Safety Inspection System.** Based on Article 64 of Water Law, the Dams Monitoring Center (OTKZ Polish acronym) has overall responsibility for monitoring the safety of dams and large hydraulic infrastructure in Poland. OTKZ was established in 1973, as an independent national body under the Institute of Meteorology and Water Management (IMGW) reporting to the Ministry of Environment. The primary responsibility of the Center is to carry out safety inspections provide expert opinion concerning technical and safety condition of dams in the country. Other responsibilities of OTKZ include: (i) research and development in modern tools for surveying and monitoring technical and safety condition of dams; (ii) research works on minimizing the risks of dam failure; (iii) defining/establishing technical regulations for the operation of dams; (iv) preparing methodology to determine the efficiency of anti-leakage protection of flood dikes through numerical analysis of flow through embankment and foundation; and (v) carrying complex analysis related to “index of risk for dams and environment” in order to determine zones of advanced flood risk and means of efficient monitoring of dam safety.

3. The OTKZ has highly qualified specialists in the fields of hydrology, hydraulics, structural engineering, geo-technology, geology, geodesy, information technology, mathematics and other fields necessary to formulate expert opinions concerning technical and safety conditions of dams. Moreover, the Center has developed an integrated methodology for examining and assessing dam safety. The center manages a vast database on all dams on the basis of which monitoring and assessment of safety of dams are carried out. All dams are surveyed and evaluated annually and an annual dam safety report is prepared. The Center is operating on the internationally accepted standards developed by institutions such as International Commission for Large Dams (ICOLD), Electricité de France, U.S. Bureau of Reclamation, and American Society of Civil Engineers.

4. **Safety during Design and Construction.** Polish as well as international design standards have been applied for design of various structures to be constructed under the Project. The design is being carried out by renowned and certified international and national engineering firms selected based on qualification and cost based criteria. Given the complexity of the Project and hydraulic structures, it has been agreed that designs of large structures such as Raciborz dry polder would be reviewed by an independent panel of experts (IPOE).

5. The construction would be carried out using FIDIC procedures and World Bank Standard documents with proper provisions of safety of the structures during construction stage, and remedial actions in case of emergencies. During construction, the contractor is responsible for implementing the proper designs, safety measures, warning and response. The project “Engineer” would ensure that implementation proceeds according to the expectation without undue risks of failure of embankments or structures. During construction IPOE would also meet intermittently or as required by the employer or the Project engineer.

6. **Safety during operation.** The primary responsibility for ensuring safety of the structures during operation lies with RZGWs and DZMiUW being the owner of the infrastructure being constructed under the project. The structures would be under the inspection regime according to the Polish laws and

regulations under which OTKZ would carry out safety inspection of Raciborz and other Class I infrastructure under the project.

7. Safe operation and proper maintenance of the dam and dikes would be the responsibility of implementing agencies, such as RZGW Gliwice, RZGW Wroclaw and DZGMiUW. Under Component C of the Project, funds are available to strengthen the capacity of these institutions especially in operation and maintenance of the structures being built. Also, an emergency preparedness plans would be prepared under the component for improving flood management in the Odra valley. In addition, the Polish national body for dam safety monitoring, Dam Monitoring Center (OTKZ) will be assessing and monitoring annually technical and safety conditions of all dams and dikes in the country including those built under the project.

8. **Emergency Preparedness and Flood Management Plans.** Under the ongoing EFRP flood forecasting and warning system has been developed and modernized which operates under IMGW in all parts of the country include the project area. This system consists of weather radars, supercomputer for operation of forecasting and warning models, communication system linking key locations for exchange of real time hydrological and meteorological data systems. A telemetric network has been installed to link about 1,000 hydromet stations to the weather and flood forecasting network. Also the capacity of the flood information centers (OKI) in Krakow for Vistula Basin and Wroclaw was upgraded and a new OKI was establish in RZGW Gliwice because of it closeness to Raciborz dry polder. The emergency and flood management plans would be further upgraded and improved under Component C with a particular focus to the emergency preparedness and improved operation of hydraulic infrastructure in the Project are i.e. upper and middle Odra River Basin. As explained in the project description, these plans would be improved in participation with the local agencies, civil administration, RZGWs, emergency services agencies, and other stakeholders.

9. **Bank Supervision.** The QER panel included several experienced engineers from within and outside the Bank and Dams Safeguard Specialist. Project supervision mission would include proper expertise in the relevant engineering fields depending upon the stage of project implementation and nature of the issues. If necessary, Bank seek views of well experts in the field.

Annex 11: Project Preparation and Supervision
POLAND: Odra River Basin Flood Protection

| | Planned | Actual |
|---------------------------------|------------|------------|
| PCN review | 06/15/2004 | 06/15/2004 |
| Initial PID to PIC | 06/21/2004 | 06/21/2004 |
| Initial ISDS to PIC | 06/21/2004 | 07/01/2004 |
| Appraisal | 08/05/2005 | 11/22/2005 |
| Negotiations | 10/15/2005 | 12/14/2006 |
| Board/RVP approval | 03/29/2007 | 03/22/2007 |
| Planned date of effectiveness | 07/31/2007 | |
| Planned date of mid-term review | 07/31/2011 | |
| Planned closing date | 11/30/2014 | |

Key institutions responsible for preparation of the Project:

1. Chancellery of the Prime Minister, Office of Natural Disaster Recovery (ONDR) was responsible for overall coordination of project preparation and feasibility studies. The Project Coordination Unit (PCU) located in Wroclaw coordinated the project preparation activities. The Ministry of Environment, RZGWwl, RZGWGL, DZMiGUW were responsible for carrying out the project preparation, they were supported by a consortium of consultants Jacobs Gibb, Gibb Polska, Hydroprojekt Warsaw and Hydroprojekt Wroclaw.

Bank staff and consultants who worked on the project included:

| Name | Title | Unit |
|-------------------------------|---|--------------------|
| Masood Ahmad | Lead Water Resources Specialist and TTL | ECSSD |
| Stan Peabody | Lead Social Scientist | ECSSD |
| Mahwash Wasiq | Operations Officer/Economist | ECSSD |
| Barbara Letachowicz | Operations Officer – Environmental Engineer | ECSSD |
| Willem Van Tuijl | Consultant/Water Resources Engineer | Consultant - ECSSD |
| Tjaart Schillhorn Van Veen | Consultant/Environmental and Safeguard Specialist | Consultant - ECSSD |
| Elmas Arisoy/Salim Benouniche | Procurement Specialists | ECSPS |
| Iwona Warzecha | Financial Management Specialist | ECSPS |
| Nicholay Chistyakov | Disbursement Officer | LOAG1 |
| Claudia M. Pardiñas Ocaña | Senior Counsel | LEGEC |
| Hans Juergen Gruss | Chief Counsel | LEGEC |
| Kathy Sharrow/Rathna Chiniah | Program Assistant | ECSSD |
| B. Koshie Michel | Program Assistant | ECSSD |
| Malgorzata Michnowska | Program Assistant | ECCU7 |

Bank funds expended to date on project preparation:

1. Bank resources: US\$ 224,525.52
2. Trust funds: N/A
3. Total: US\$ 224,525.52

Estimated Approval and Supervision costs:

1. Remaining costs to approval: US\$50,000
2. Estimated annual supervision cost: US\$220,000

Annex 12: Documents in the Project File
POLAND: Odra River Basin Flood Protection

Inception Report

| | |
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| Annex I | Hydrological data and analyzes |
| Annex II | Inventory of hydraulic structures (Chapter i-xi + ii drawings) |
| Annex III | Maps Amendment |

Midterm Report

| | |
|------------|---|
| Annex III | Simulating Modeling, Digital Hydrodynamic Model. Input data for flood simulation modeling. |
| Annex IV | Project Engineering Planning. General Design Data Technical solution for hydraulic structures. |
| Annex V | Environmental Data and Information for Environmental Assessment. Part 1 Environmental Study Data Collection – general basis Part 2 Project Environmental Impact Assessment. Reservoirs area natural valorization and prognosis of the reservoir influence upon flora and fauna. Part 3 Project Environmental Impact Assessment. Odra River Water Quality Assessment. Part 4 Project Environmental Impact Assessment. Odra River Aquatic Environmental Assessment in the Aspect of Fish Population. Part 5 Project Environmental Impact Assessment. Sedimentation Studies and Sediment Transport Management. Part 6 Odra River natural flow regime assessment and downstream channel morphological effect. |
| Annex VI | Social Local Studies and Basic Data for Resettlement Action Plan Part 1 Project Social Impact Assessment. Result of field social surveys. Part 2 Project Social Impact Assessment. Analysis of polish legislation related to land acquisition, compensation and resettlement. Part 3 The Socio-Economic situation in the Raciborz Reservoir Basis and the Resettlement of the Inhabitants. |
| Annex VII | Project Costs |
| Annex VIII | General Design Criteria for the Odra River Navigation Waterway in the Vicinity of Raciborz |
| Annex IX | Economic Evaluation. Input Data for Economic Evaluation |

Main Final Report, February 2004

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|-----------|--|
| | Executive Summary |
| | Final Report |
| | Synopsis of Final Report |
| | Annexes to Final Report |
| Annex I | Part 1 Hydrological Data and Analysis for Basic Upstream Trestno Gauging Station. |
| Annex II | Part 1 Inventory of Existing Hydraulic Structures within the Odra River Basin between Polish-Czech boundary and Wroclaw. |
| Annex III | Simulation Studies Part 1 Digital Hydrodynamic Model. Input data for flood simulation modeling. Part 2 Analysis and Conclusions. Part 3 Map Book. |
| Annex IV | Part 1 Project Engineering Planning. |
| Annex V | Environmental Assessment and Management Plan Part 1 Environmental Assessment. |

| | | |
|------------|---|---|
| | Part 2 | Natural Valorization and Prognosis of the Influence upon Fauna and Flora. |
| | Part 3 | Odra River Water Quality Assessment. |
| | Part 4 | Odra River Environmental Assessment in the Aspects of Fish Population. |
| | Part 5 | Sedimentation Studies and Sediment Transport Management. |
| | Part 6 | Odra River Natural Flow Regime Assessment and Downstream Channel Morphological Effect. |
| Annex VI | Social Impact Assessment | |
| | Part 1 | Sociological Team Survey and Analysis. |
| | Part 2 | Analysis of Polish Legislation related to Land Acquisition Compensation and Resettlement. |
| | Part 3 | Socio-Economic Report. |
| Annex VII | Part 1 | Project Cost Estimates |
| Annex VIII | General Design Criteria for the Odra River Navigation Waterway in the Vicinity of Raciborz Reservoir. | |
| Annex IX | Economic Analysis | |

Final Report for the Wroclaw Water System

Inception Report
Main Final Report, February 2004
Executive Summary

Final Report

Annexes to Final Report

| | | |
|------------|---|--|
| Annex I | Hydrological Data and Analyzes | |
| | Part 2 | Hydrological Data and Analyzes for Wroclaw Water System |
| Annex II | Part 2 | Inventory of Existing Hydraulic Structures. WWS area. |
| Annex III | Simulation modeling | |
| | Part 4 | Simulation Studies for WWS |
| Flood Map. | Longitudinal Profile of Odra River (Raciborz – Trestno) | |
| Annex IV | Part 2 | Project Engineering Planning for WWS |
| Annex V | Environmental Assessment and Management Plan | |
| | Part 7 | General nature valorization and opinion on the influence upon flora and fauna within the Wroclaw Water System. |
| | Part 8 | Environmental Appraisal within WWS |
| Annex VI | Social Impact Assessment | |
| | Part 4 | Sociological Study based on field works for Wroclaw Water System. |
| Annex VII | Part 2 | Costs Estimates for Modernization of WWS. |
| Annex VIII | Economic Analysis inclusive Modernization of WWS. | |

Annex 13: Statement of Loans and Credits

| Project ID | FY | Purpose | Original Amount in US\$ Millions | | | | Cancel. | Undisb. | Difference between expected and actual disbursements | |
|--------------|------|----------------------------|----------------------------------|-------------|-------------|--------------|--------------|---------------|--|--------------|
| | | | IBRD | IDA | SF | GEF | | | Orig. | Frm. Rev'd |
| P065270 | 2006 | POST-ACC RUR SPPRT | 88.80 | 0.00 | 0.00 | 0.00 | 0.00 | 90.72 | 1.47 | 0.00 |
| P096214 | 2006 | ROAD MAINTENANCE & REHAB 3 | 180.20 | 0.00 | 0.00 | 0.00 | 0.00 | 40.25 | -2.44 | 0.00 |
| P070246 | 2005 | ENERGY EFFICIENCY (GEF) | 0.00 | 0.00 | 0.00 | 11.00 | 0.00 | 3.87 | 1.04 | 0.00 |
| P083093 | 2005 | PL-COAL MINE CLOSURE | 100.00 | 0.00 | 0.00 | 0.00 | 4.62 | 44.61 | -2.04 | 0.00 |
| P088824 | 2005 | ROAD MAINT & REHAB 2 | 130.50 | 0.00 | 0.00 | 0.00 | 0.00 | 4.17 | 13.98 | 0.00 |
| P078170 | 2004 | ROAD MAINT & REHAB | 126.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.92 | 5.70 | 0.00 |
| P065059 | 2001 | KRAKOW ENRGY EFF | 15.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.63 | 3.89 | 0.00 |
| P008615 | 2001 | SEAWAY/PORT MODERN | 38.50 | 0.00 | 0.00 | 0.00 | 6.98 | 7.70 | 4.76 | 0.00 |
| P008593 | 1998 | ROADS 2 | 300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.27 | -6.09 | -6.09 |
| Total | | | 979.00 | 0.00 | 0.00 | 11.00 | 11.60 | 202.15 | 20.26 | -6.09 |

STATEMENT OF IFC's Held and Disbursed Portfolio In Millions of US Dollars

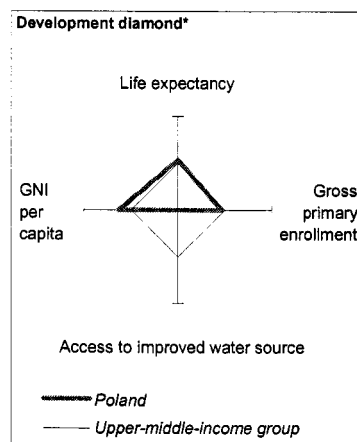
| FY Approval | Company | Committed | | | | Disbursed | | | |
|------------------|---------------|--------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|
| | | IFC | | | | IFC | | | |
| | | Loan | Equity | Quasi | Partic. | Loan | Equity | Quasi | Partic. |
| 1996 | Baltic Malt | 0.00 | 0.00 | 1.96 | 0.00 | 0.00 | 0.00 | 1.87 | 0.00 |
| 1997 | CPF | 0.00 | 0.43 | 0.00 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 |
| | ESCO Polska | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 |
| 1998 | Global Hotels | 4.08 | 0.00 | 2.77 | 0.00 | 0.00 | 0.00 | 0.70 | 0.00 |
| 1994 | Peters | 0.40 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.00 |
| 2004 | Schwarz Group | 49.40 | 0.00 | 0.00 | 0.00 | 49.40 | 0.00 | 0.00 | 0.00 |
| Total portfolio: | | 53.88 | 0.45 | 4.73 | 0.00 | 49.80 | 0.35 | 2.57 | 0.00 |

Approvals Pending Commitment

| FY Approval | Company | Loan | Equity | Quasi | Partic. |
|-------------|---------|------|--------|-------|---------|
|-------------|---------|------|--------|-------|---------|

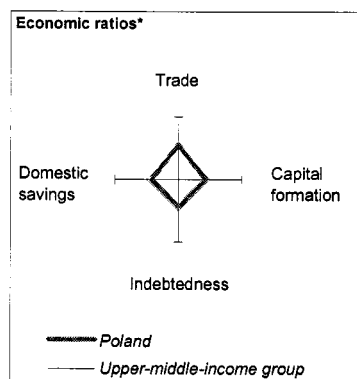
Annex 14: Country at a Glance

| POVERTY and SOCIAL | Europe & Central Asia | | Upper-middle-income |
|--|-----------------------|--------------|---------------------|
| | Poland | Central Asia | |
| 2005 | | | |
| Population, mid-year (millions) | 38.2 | 473 | 599 |
| GNI per capita (Atlas method, US\$) | 7,110 | 4,113 | 5,625 |
| GNI (Atlas method, US\$ billions) | 271.4 | 1,945 | 3,368 |
| Average annual growth, 1999-05 | | | |
| Population (%) | -0.2 | 0.0 | 0.6 |
| Labor force (%) | -0.2 | 0.6 | 1.2 |
| Most recent estimate (latest year available, 1999-05) | | | |
| Poverty (% of population below national poverty line) | .. | .. | .. |
| Urban population (% of total population) | 62 | 64 | 72 |
| Life expectancy at birth (years) | 74 | 69 | 69 |
| Infant mortality (per 1,000 live births) | 7 | 28 | 23 |
| Child malnutrition (% of children under 5) | .. | 5 | 7 |
| Access to an improved water source (% of population) | .. | 92 | 94 |
| Literacy (% of population age 15+) | .. | 97 | 94 |
| Gross primary enrollment (% of school-age population) | 99 | 104 | 107 |
| Male | 99 | 105 | 108 |
| Female | 99 | 102 | 106 |



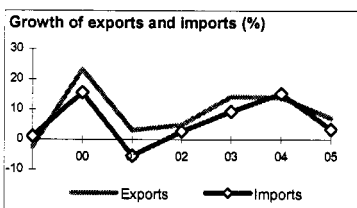
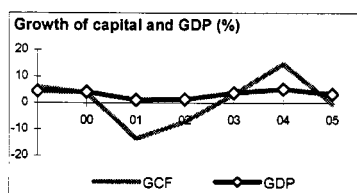
KEY ECONOMIC RATIOS and LONG-TERM TRENDS

| | 1985 | 1995 | 2004 | 2005 | |
|-----------------------------------|----------------|----------------|-------------|-------------|----------------|
| GDP (US\$ billions) | 71.0 | 139.1 | 252.4 | 299.2 | |
| Gross capital formation/GDP | 27.7 | 18.7 | 20.0 | 19.1 | |
| Exports of goods and services/GDP | .. | 23.2 | 37.6 | 37.0 | |
| Gross domestic savings/GDP | 29.2 | 20.9 | 18.0 | 18.7 | |
| Gross national savings/GDP | .. | 20.1 | 15.7 | 17.5 | |
| Current account balance/GDP | .. | 0.6 | -4.2 | -1.5 | |
| Interest payments/GDP | .. | 1.2 | 1.1 | .. | |
| Total debt/GDP | .. | 31.8 | 39.3 | .. | |
| Total debt service/exports | .. | 11.3 | 35.5 | .. | |
| Present value of debt/GDP | .. | .. | 38.0 | .. | |
| Present value of debt/exports | .. | .. | 98.5 | .. | |
| (average annual growth) | 1985-95 | 1995-05 | 2004 | 2005 | 2005-09 |
| GDP | 2.7 | 3.9 | 5.3 | 3.2 | 4.6 |
| GDP per capita | 2.4 | 4.0 | 5.3 | 3.3 | 4.7 |
| Exports of goods and services | 9.0 | 9.7 | 14.0 | 7.1 | 5.6 |



STRUCTURE of the ECONOMY

| | 1985 | 1995 | 2004 | 2005 |
|---|----------------|----------------|-------------|-------------|
| (% of GDP) | | | | |
| Agriculture | .. | 8.0 | 5.1 | 4.9 |
| Industry | .. | 35.2 | 30.9 | 30.7 |
| Manufacturing | .. | 21.1 | 19.1 | 18.3 |
| Services | .. | 56.8 | 64.0 | 64.5 |
| Household final consumption expenditure | .. | 59.5 | 63.2 | 62.6 |
| General gov't final consumption expenditure | .. | 19.6 | 18.8 | 18.7 |
| Imports of goods and services | .. | 21.0 | 39.6 | 37.4 |
| (average annual growth) | 1985-95 | 1995-05 | 2004 | 2005 |
| Agriculture | .. | 1.6 | 6.0 | -0.6 |
| Industry | .. | 3.6 | 9.9 | 4.4 |
| Manufacturing | .. | 6.2 | 13.8 | 6.0 |
| Services | .. | 3.9 | 3.0 | 2.9 |
| Household final consumption expenditure | 4.2 | 4.0 | 4.0 | 2.3 |
| General gov't final consumption expenditure | 5.2 | 2.9 | 3.9 | 2.7 |
| Gross capital formation | 1.8 | 3.6 | 14.7 | -0.3 |
| Imports of goods and services | 13.7 | 8.9 | 15.2 | 3.4 |



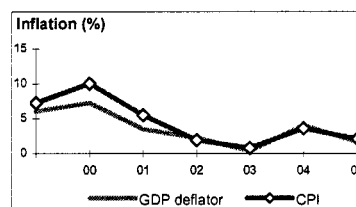
Note: 2005 data are preliminary estimates.

This table was produced from the Development Economics LDB database.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

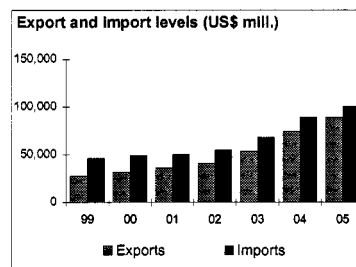
PRICES and GOVERNMENT FINANCE

| | 1985 | 1995 | 2004 | 2005 |
|--|------|------|------|------|
| Domestic prices | | | | |
| <i>(% change)</i> | | | | |
| Consumer prices | 11.5 | 28.1 | 3.6 | 2.1 |
| Implicit GDP deflator | .. | 40.8 | 4.0 | 1.6 |
| Government finance | | | | |
| <i>(% of GDP, includes current grants)</i> | | | | |
| Current revenue | .. | 38.9 | 38.3 | 39.7 |
| Current budget balance | .. | 0.3 | -2.8 | -2.6 |
| Overall surplus/deficit | .. | -1.8 | -5.7 | -5.6 |



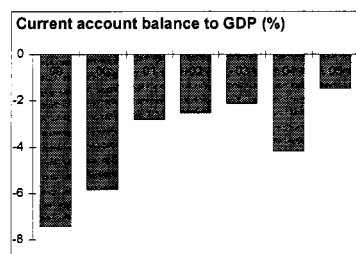
TRADE

| | 1985 | 1995 | 2004 | 2005 |
|-------------------------------|--------|--------|--------|---------|
| <i>(US\$ millions)</i> | | | | |
| Total exports (fob) | 11,489 | 22,898 | 74,467 | 89,243 |
| Commodity 1 | .. | .. | .. | .. |
| Commodity 2 | .. | .. | .. | .. |
| Manufactures | .. | .. | 43,242 | 43,242 |
| Total imports (cif) | 10,836 | 29,080 | 89,107 | 100,813 |
| Food | .. | 2,339 | 4,257 | 5,325 |
| Fuel and energy | .. | 2,650 | 8,157 | 11,615 |
| Capital goods | .. | 4,349 | 12,627 | 14,401 |
| Export price index (2000=100) | .. | 120 | 109 | 95 |
| Import price index (2000=100) | .. | 113 | 99 | 91 |
| Terms of trade (2000=100) | .. | 106 | 110 | 104 |



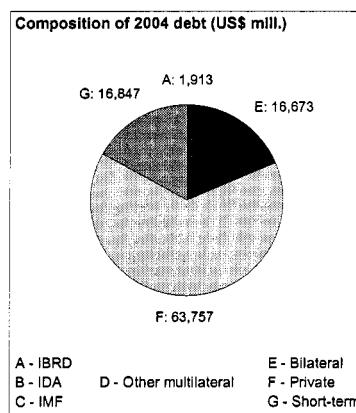
BALANCE of PAYMENTS

| | 1985 | 1995 | 2004 | 2005 |
|---|---------|--------|---------|---------|
| <i>(US\$ millions)</i> | | | | |
| Exports of goods and services | .. | 35,716 | 95,327 | 112,003 |
| Imports of goods and services | .. | 33,825 | 99,944 | 112,767 |
| Resource balance | .. | 1,891 | -4,617 | -764 |
| Net income | .. | -1,995 | -11,539 | -10,543 |
| Net current transfers | .. | 958 | 5,634 | 6,943 |
| Current account balance | .. | 854 | -10,522 | -4,364 |
| Financing items (net) | .. | 7,578 | 11,312 | 12,499 |
| Changes in net reserves | .. | -8,432 | -790 | -8,135 |
| Memo: | | | | |
| Reserves including gold (US\$ millions) | .. | 14,963 | 32,281 | 32,281 |
| Conversion rate (DEC, local/US\$) | 1.47E-2 | 2.4 | 3.7 | 3.2 |



EXTERNAL DEBT and RESOURCE FLOWS

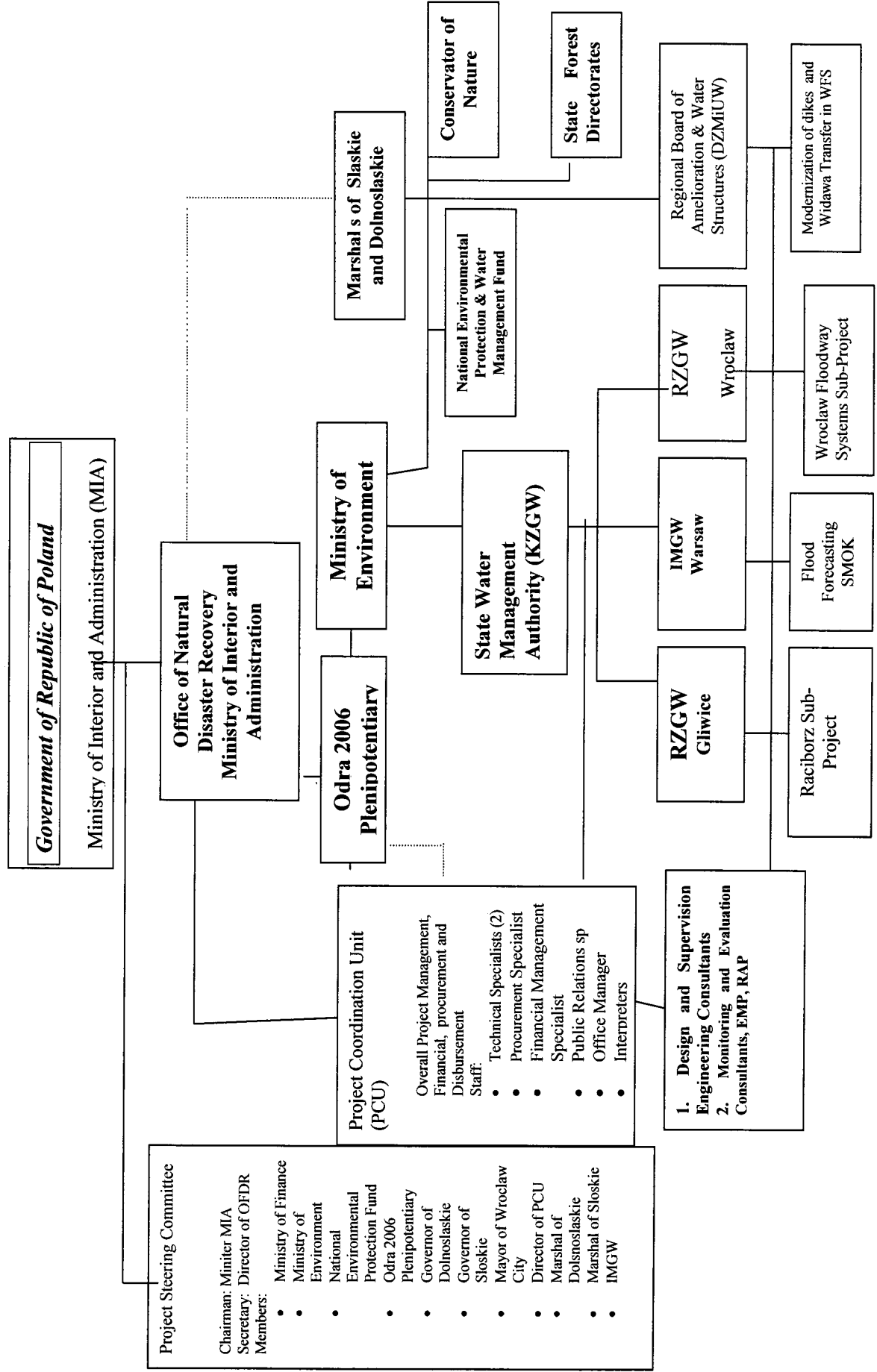
| | 1985 | 1995 | 2004 | 2005 |
|--|------|--------|--------|-------|
| <i>(US\$ millions)</i> | | | | |
| Total debt outstanding and disbursed | .. | 44,263 | 99,190 | .. |
| IBRD | .. | 2,067 | 1,913 | 1,796 |
| IDA | .. | 0 | 0 | 0 |
| Total debt service | .. | 4,147 | 34,551 | .. |
| IBRD | .. | 152 | 1,166 | 224 |
| IDA | .. | 0 | 0 | 0 |
| Composition of net resource flows | | | | |
| Official grants | .. | 3,408 | 1,424 | .. |
| Official creditors | .. | -84 | -2,824 | .. |
| Private creditors | .. | 478 | 3,270 | .. |
| Foreign direct investment (net inflows) | .. | 3,659 | 12,613 | .. |
| Portfolio equity (net inflows) | .. | 219 | 1,913 | .. |
| World Bank program | | | | |
| Commitments | .. | 0 | 426 | .. |
| Disbursements | .. | 210 | 399 | 253 |
| Principal repayments | .. | 19 | 1,076 | 174 |
| Net flows | .. | 191 | -677 | 79 |
| Interest payments | .. | 133 | 91 | 50 |
| Net transfers | .. | 58 | -767 | 29 |

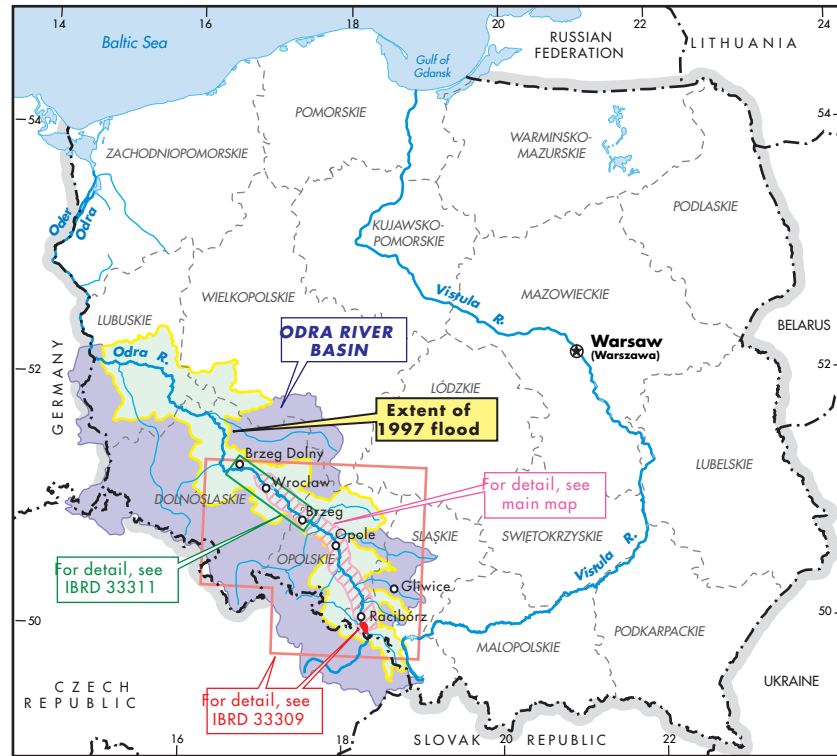


Note: This table was produced from the Development Economics LDB database.

8/13/06

Odra River Flood Protection Project
Proposed Institutional Structure for Project Implementation





POLAND ODRA RIVER BASIN FLOOD PROTECTION PROJECT WROCLAW FLOODWAY SYSTEM

PROJECT WORKS:

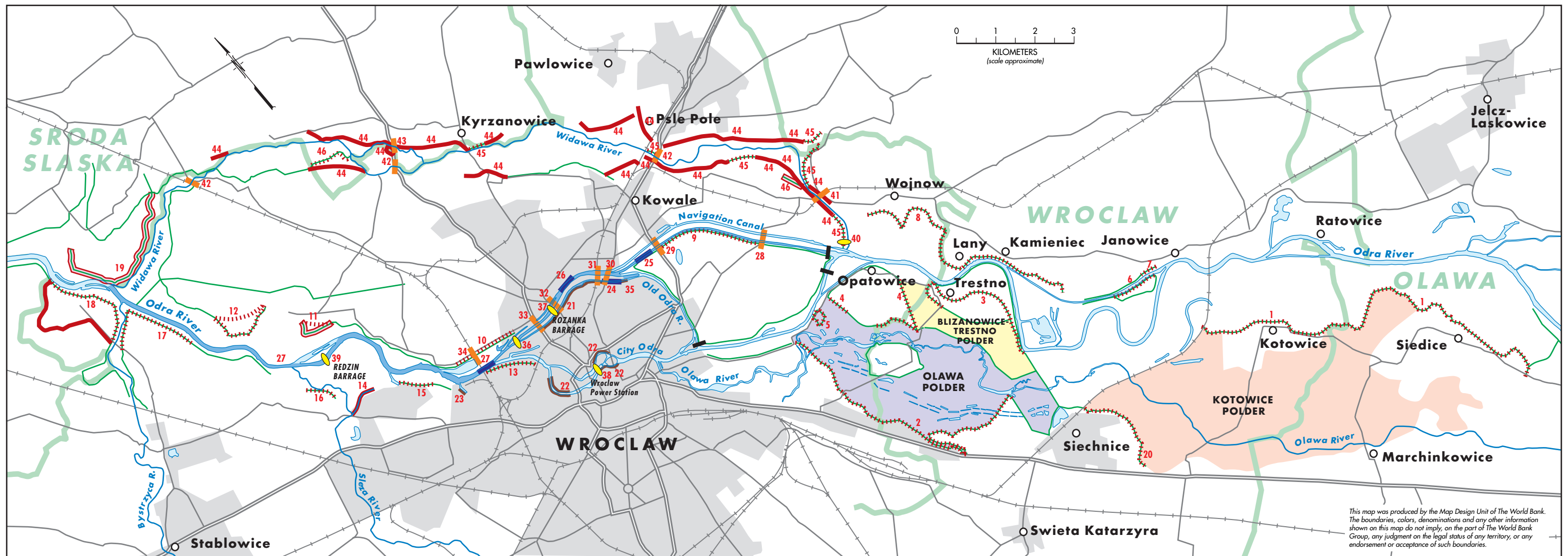
- ▬ EMBANKMENT REMOVAL
- ▬▬▬▬ EMBANKMENT REHABILITATION
- ▬ NEW EMBANKMENT
- ▬ RETAINING WALLS
- ▬ INCREASING CHANNEL CAPACITY
- ▬ INCREASING CHANNEL CAPACITY UNDER BRIDGE
- ▬ IMPROVEMENTS TO HYDRAULIC STRUCTURES

OTHERS:

- ▬ OTHER EXISTING WEIRS/BARRAGES
- ▬ EXISTING DIKES
- ▬ WATER CHANNELS
- ▬ BUILT-UP AREAS
- ▬ MAIN ROADS
- ▬ RAILROADS
- ▬ DISTRICT (POWIAT) BOUNDARIES

PROJECT WORKS

- 1 Improvements to the Kotowice-Siedice embankment
- 2 Heightening of the leftside Olawka polder embankment
- 3 Improvements to the Blizanowice-Trestno polder embankment
- 4 Improvements to the Opatowice embankment
- 5 Heightening of the Nowy Dom embankment
- 6 Heightening and improvements to the Janowice embankment
- 7 Construction of new Jeskowice embankment
- 8 Improvements to the Kamieniec Wroclawski-Wojnow embankment
- 9 Improvements to the Zacisze-Zalesie embankment
- 10 Improvements to the Rózanka embankment
- 11 Reconstruction of the Redzin embankment
- 12 Reconstruction of the Lesica embankment
- 13 Improvements to the Szczepin embankment
- 14 Construction of new Kozanów embankment
- 15 Improvements to the Kozanów embankment
- 16 Improvements to the Maslice embankment
- 17 Heightening of the Pracze Odrzańskie embankment
- 18 Construction of new embankment and improvements to the existing one at Janówek WWTP
- 19 Removal of the Paniowice polder embankment
- 20 Completion of the Siechnice-Groblice embankment construction
- 21 Construction of a new retaining wall along City Channel
- 22 Repairs to retaining walls within Downtown Water System
- 23 Protection of Popowice harbour
- 24 Increasing of City Canal capacity
- 25 Increasing of Flood Channel capacity
- 26 Increasing of Old Odra capacity along City Channel
- 27 Increasing of Odra river bed capacity downstream of Old Odra to Widawa River confluence
- 28 Increasing of Flood Channel capacity under Swojczycki bridge (Chrobrego)
- 29 Increasing of Flood Channel capacity under Jagiellonski bridge including sill reconstruction
- 30 Increasing of capacity under Warszawski road bridge
- 31 Increasing of capacity under Warszawski railway bridge
- 32 Increasing of capacity under Trzebnicki bridge
- 33 Increasing of capacity under Osobowicki bridge
- 34 Increasing of capacity under Poznanski railway bridges
- 35 Modernization of the existing flood gate for City canal navigation lock
- 36 Modernization of City navigation lock incl. reconstruction of gates for high water discharge
- 37 Improvements at Rózanka barrage
- 38 Reconstruction of permanent sill at Wrocław I Power Plant
- 39 Improvement of hydraulic condition at Redzin barrage
- 40 New Spillway: Flap gated weir with 3 x 20 m opening
- 41 New spans of road and railway bridges over Odra-Widawa Channel
- 42 New spans of road bridge over Widawa valley
- 43 Increasing of capacity under the bridge over Old Widawa in Psary
- 44 Construction of new embankments in Widawa valley
- 45 Heightening and widening of the embankments in Widawa valley
- 46 Removal of the embankments in Widawa valley

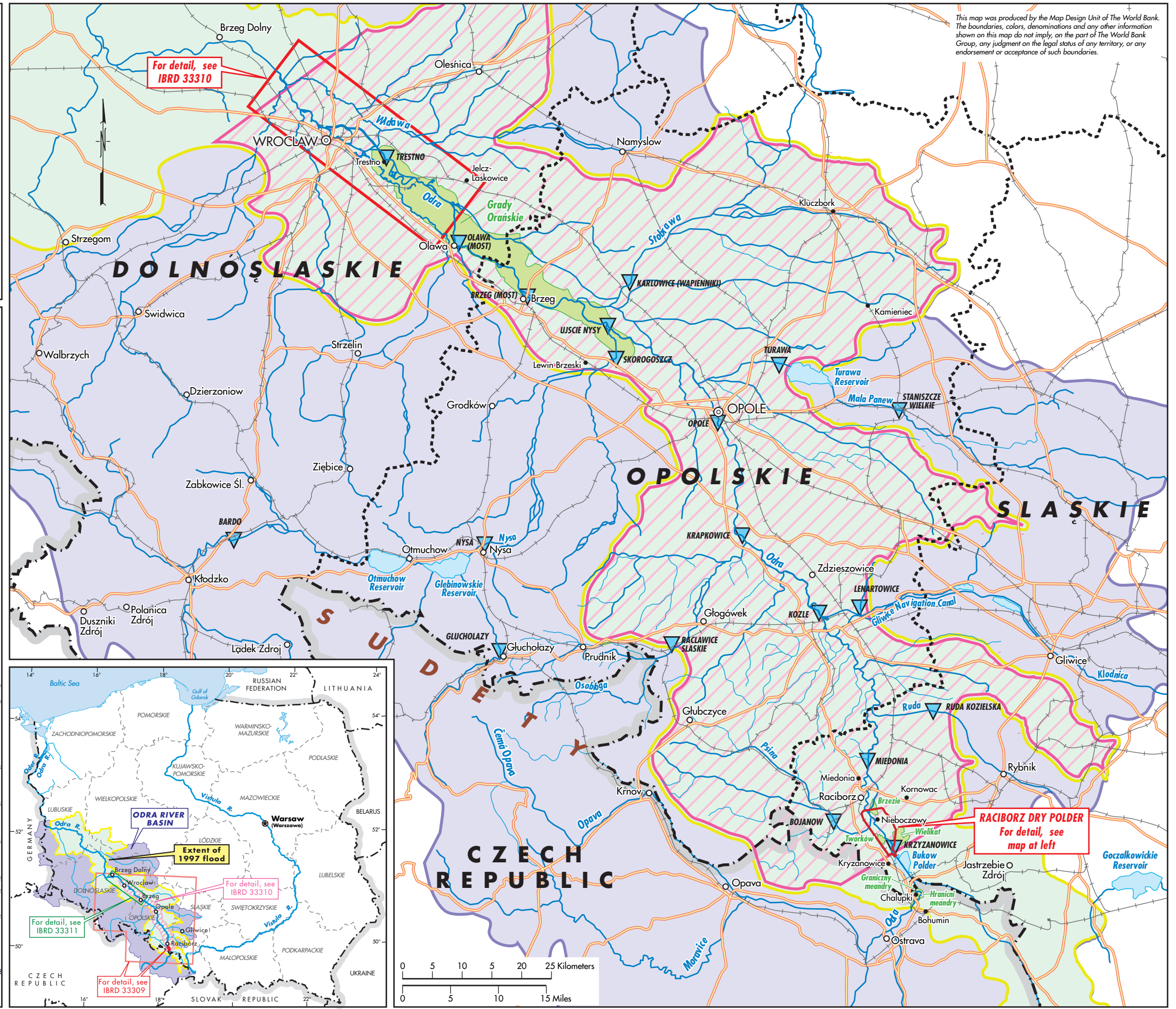


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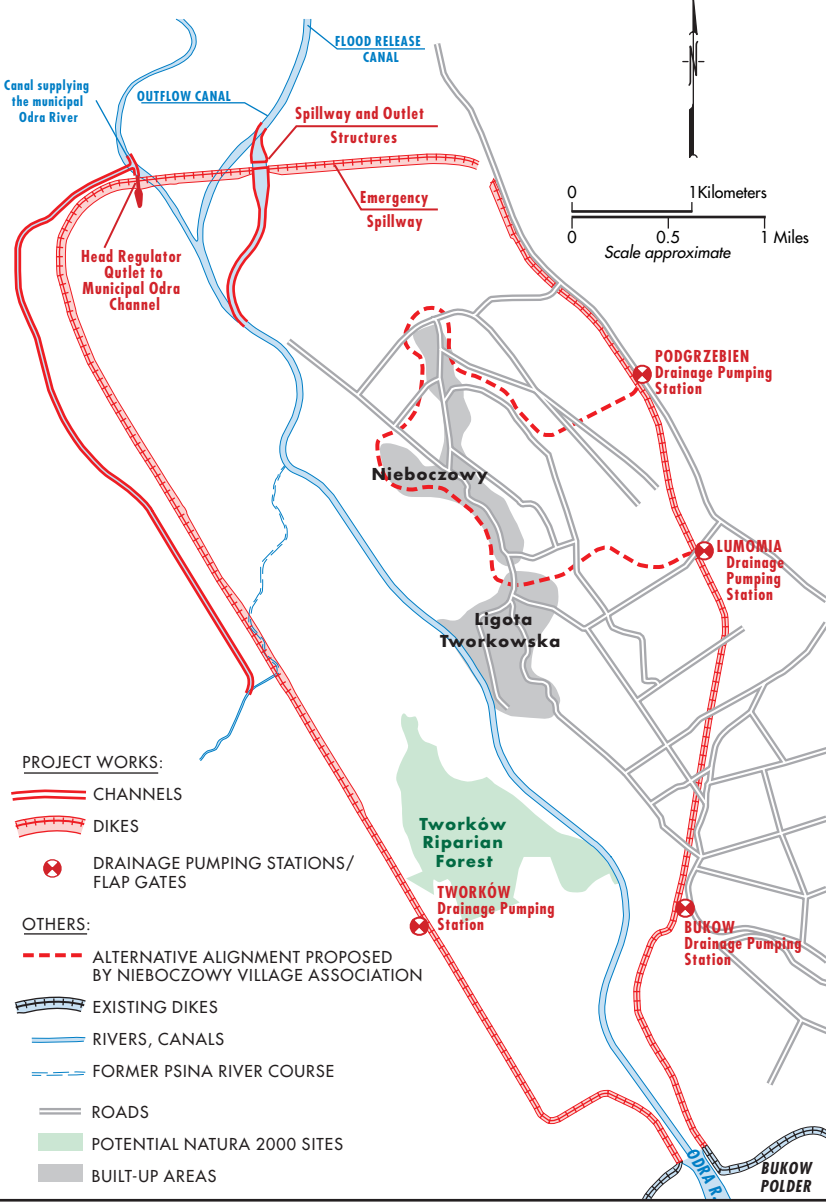
POLAND ODRA RIVER BASIN FLOOD PROTECTION PROJECT PROJECT AREA

- PROJECT AREA
- EXTENT OF 1997 FLOOD PLAIN
- Odra RIVER BASIN
- NATURA 2000 SITES
- GAUGING STATIONS
- MAIN ROADS
- RAILROADS
- SELECTED VILLAGES AND TOWNS
- MAIN CITIES
- PROVINCE (VOIDVOSHIP) CAPITALS
- PROVINCE (VOIDVOSHIP) BOUNDARIES
- INTERNATIONAL BOUNDARIES

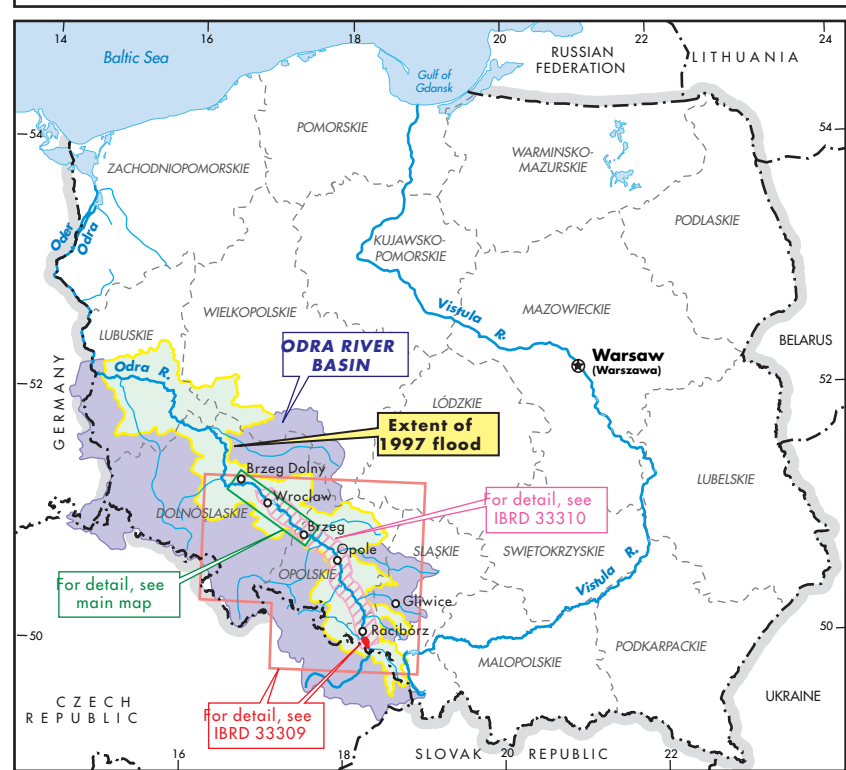
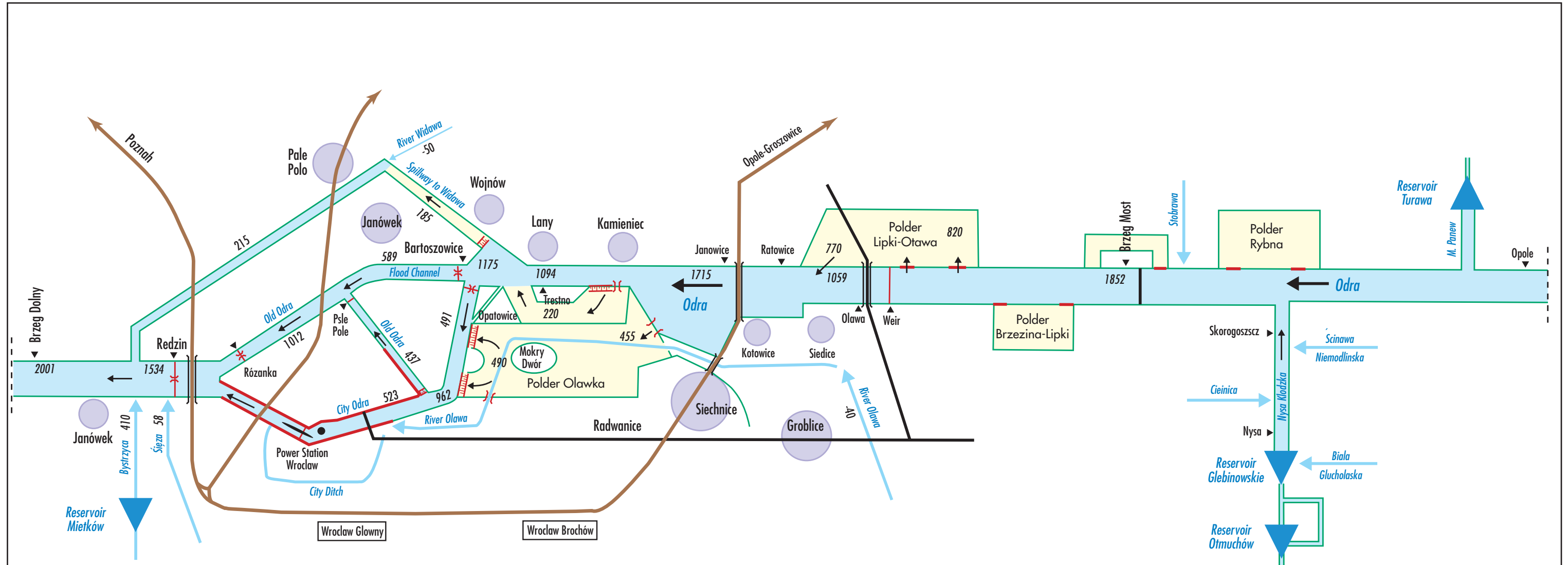
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POLAND ODRA RIVER BASIN FLOOD PROTECTION PROJECT RACIBÓRZ DRY POLDER

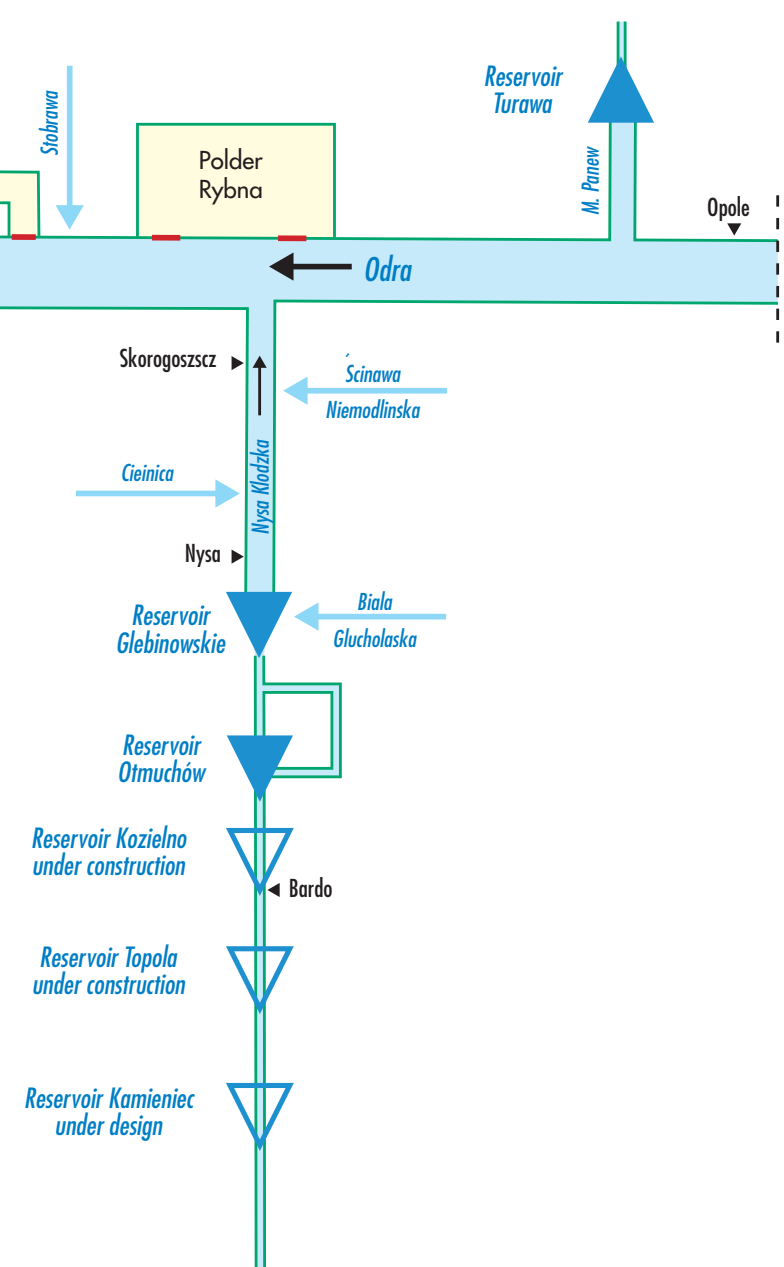


RACIBORZ DRY POLDER
For detail, see map at left



POLAND
ODRA RIVER BASIN FLOOD PROTECTION PROJECT
 SCHEME OF THE MODELLED FLOODWAY SYSTEM
 (SECTION BRZEG MOST - BRZEG DOLNY)

- Existing Embankments
- Retaining Walls
- X Weirs
- ▨ Spillways
- Polders
-)) Embankment Sluices
- High Elevated Area
- 1852 Design Flow with Raciborz Reservoir (m³/s)
- Roads
- Selected Villages



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