

Ex-post evaluation

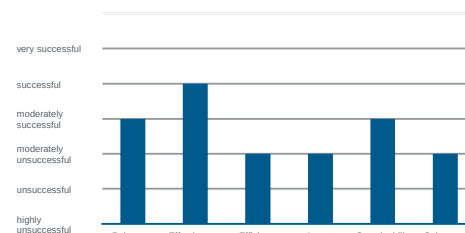
Water supply for Syrian refugees III and IV, Jordan

Title	Water supply and sanitation for Syrian refugees and host communities, phase III and phase IV		
Sector and CRS code	Water supply and sanitation and wastewater management 14020		
Project number	BMZ No. 2014 67 620 (Phase III), BMZ No. 2014 65 087 (Phase IV)		
Commissioned by	Federal Ministry of Economic Cooperation and Development		
Recipient/Programme executing agency	Hashemite Kingdom of Jordan / Water Authority of Jordan		
Project volume/ Financing instrument	EUR 25 million (EUR 15 million for phase III and EUR 10 million for phase IV), budget fund		
Project duration	09/2014 (Phase III), 04/2015 – 02/2022 (Phase IV)		
Year of report	2025	Year of random sample	2024

Objectives and project outline

The outcome objective was to improve the wastewater disposal situation for the local population and Syrian refugees in northern Jordan. At the impact level, the aim was to contribute to the efficient and sustainable management of the country's scarce water resources. To achieve this goal, an additional 35,000 people were to be connected to the sewage network. To this end, transport and collection pipes were built in Mafrq and the suburb of Manshiyah Bani Hassan, and house connections were financed.

Overall rating:
Moderately unsuccessful



Key findings

The achievement of objectives is below expectations. The project had limited development impact, the sustainability of which is, however, seriously at risk. The project is rated as "moderately unsuccessful" for the following reasons:

- The targeted improvement of the wastewater infrastructure is not one of the target group's urgent needs. Wastewater did not and does not pose a heightened risk of conflict between refugees and local residents. The project therefore did not contribute to stabilising the situation in Jordan. This detracts from the otherwise high relevance of the project.
- Although the sewage canal capacities have been substantially expanded, even optimistic estimates and the inclusion of illegal house connections indicate that they are far from being fully utilised. Structural defects have also led to damage to the existing infrastructure and legal disputes between the implementing agency and the municipality of Mafrq.
- Due to the low connection rates, production efficiency is low. In addition, the lack of revenue from sewage tariffs is a burden on the operator's economic viability.
- The operator's human and financial resources are insufficient to ensure the sustainable operation of the infrastructure that has been created. This affects the expected service life of the plants. Damage caused by structural defects also affects the service life of existing infrastructure. Sustainability was therefore assessed as unsuccessful.

Conclusions

- Even in urgent cases, a rough analysis of the needs of the target group and existing incentive systems is recommended in order to prevent risks of low utilisation rates.
- Pipe-based wastewater disposal seems hardly suitable for emergency contexts due to its high costs and low flexibility.
- In the context of continuous donor engagement, stronger incentive mechanisms should be created to establish an independent and sustainable maintenance concept among national authorities.
- The contradictory and incomplete data made it difficult to determine the utilisation rate and thus to assess the achievement of objectives.

Ex-post evaluation – assessment according to OECD DAC criteria

Overview of the rating per criterion:

Relevance	3
Coherence	2
Effectiveness	4
Efficiency	4
Overarching developmental impacts	3
Sustainability	4
Overall rating:	4

Exchange rate (Feb 2025) 1 JOD = 1.35 EUR

Abbreviations:

AFD	Agence Francaise de Développement
PCR	Project completions report/final inspection
GDP	Gross domestic product
BMZ	Federal Ministry for Economic Cooperation and Development
CAPEX	Investment costs
CEO	Chief Executive Officer
EIU	Economist Intelligence Unit
EPE	Ex-post evaluation
DC	Development cooperation
FC	Financial cooperation
FC-E	FC evaluation (department)
HDI	Human Development Index
JRPSC	Jordan Response Plan for the Syrian Crisis
JRP	Jordan Response Plan
JICA	Japan International Cooperation Agency
JVA	Jordan Valley Authority
MCC	Millennium Challenge Corporation
MoPIC	Ministry of Planning and International Cooperation
MP	Module proposal
NGO	Non-governmental organisation
PMU	Project management unit (of the WAJ)
SDG	Sustainable Development Goals
TC	Technical cooperation
UN	United Nations
UNDP	UN Development Programme
UNHCR	UN Refugee Agency
UPMU	Utilities Performance Monitoring Unit
USAID	US Agency for International Development
USVP	Environmental and social impact assessment
WAJ	Water Authority of Jordan
YWC	Yarmouk Water Company
ZGBA	Target group and stakeholder analysis

General conditions and classification of the project

According to the United Nations Refugee Agency (UNHCR), Jordan is one of the countries most affected by the refugee movements resulting from the crisis in Syria. According to current estimates, around 1.3 million Syrian refugees are living in Jordan, of whom only slightly more than half are officially registered. Of the registered refugees, over 80% live in so-called host communities, around two-thirds in Amman and one-third in the northern governorates. The country's resources and infrastructure are under severe strain due to the high number of refugees. According to the Jordanian Ministry of Planning and International Cooperation (MoPIC), the provision of public goods (education, health services, water, energy and sanitation) for Syrian refugees has cost around USD 11 billion since 2011. At the same time, the Jordanian economy has been struggling with high unemployment and low growth rates for years. As a result, the UNHCR estimates that around 84% of refugees live below the poverty line.

Water is one of Jordan's scarcest resources. Jordan has less than 100 m³ of fresh water per capita per year, making it extremely water-stressed. Groundwater resources have been overexploited for decades, making long-term supply uncertain. The sharp increase in Syrian refugees, who are joining an already growing population, was identified during the project design phase in 2014 as a major risk to the functioning of the precarious water supply in northern Jordan and the associated political stability. This further exacerbated existing weaknesses in Jordan's water and sanitation services.

Phases III and IV, which are to be evaluated here, were designed as an "emergency procedure for natural disasters, crises and conflicts" with a limited review process (item 47), as the influx of refugees was extremely rapid and the situation was expected to worsen. In order to speed up planning and achieve results as quickly as possible, a target group and stakeholder analysis (ZGBA), an environmental and social impact assessment (USVP) and a carrier analysis were not carried out. Due to the framework conditions described in the review, only limited expectations of sustainable effects were formulated.

The measures followed on from the two previous projects, "Drinking water supply for Syrian refugees I and II", which focused on the short-term improvement and stabilisation of the drinking water supply in northern Jordan.¹ The third phase was based on a stock review, which was specified in the financing agreement in 2014. In the same year, the supplementary phase IV was reviewed. Phases III and IV were subsequently implemented as a joint project. As it is hardly possible to separate the content of the two phases and this would not make sense, they are evaluated and assessed together below.

Brief description of the project

The aim of the two FC projects "Drinking water supply and wastewater disposal for Syrian refugees and host communities III and IV" (hereinafter referred to as "Syrian Refugees III" and "Syrian Refugees IV") was to improve wastewater disposal for refugees and the population in host communities in northern Jordan, where around 60% of the population was not connected to the sewage network. The aim was to protect scarce groundwater resources and contribute to improving hygiene conditions in host communities. In addition, improved living conditions were intended to prevent potential conflicts. The measures included the expansion and rehabilitation of the sewerage system in the city of Mafraq by 27.4 km and in the nearby village of Manshiyah Bani Hassan by 43.3 km. The target group for the project was both Syrian refugees and the local population in the host communities. The original plan was for the expansion measures to enable an additional 35,000 people to be connected to the sewerage system. In fact, capacity was created for approximately 48,700 people, but only part of this is being used. Five years after completion of the construction work, essential parts of the financed infrastructure were no longer fully functional. In addition, there were construction defects that damaged the screens in the sewage treatment plant's inlet structure and caused damage to roads.

The recipient of the grant was the Hashemite Kingdom of Jordan, represented by the Ministry of Planning and International Cooperation (MoPIC), which forwarded the grant on unchanged terms to the project executing agency, the Water Authority of Jordan (WAJ). Responsibility for implementing the measures lay with the Programme Management Unit (PMU) within the WAJ. Responsibility for operating the infrastructure was transferred

¹ The projects were evaluated in 2023 with an overall rating of 3. The report can be found [here](#).

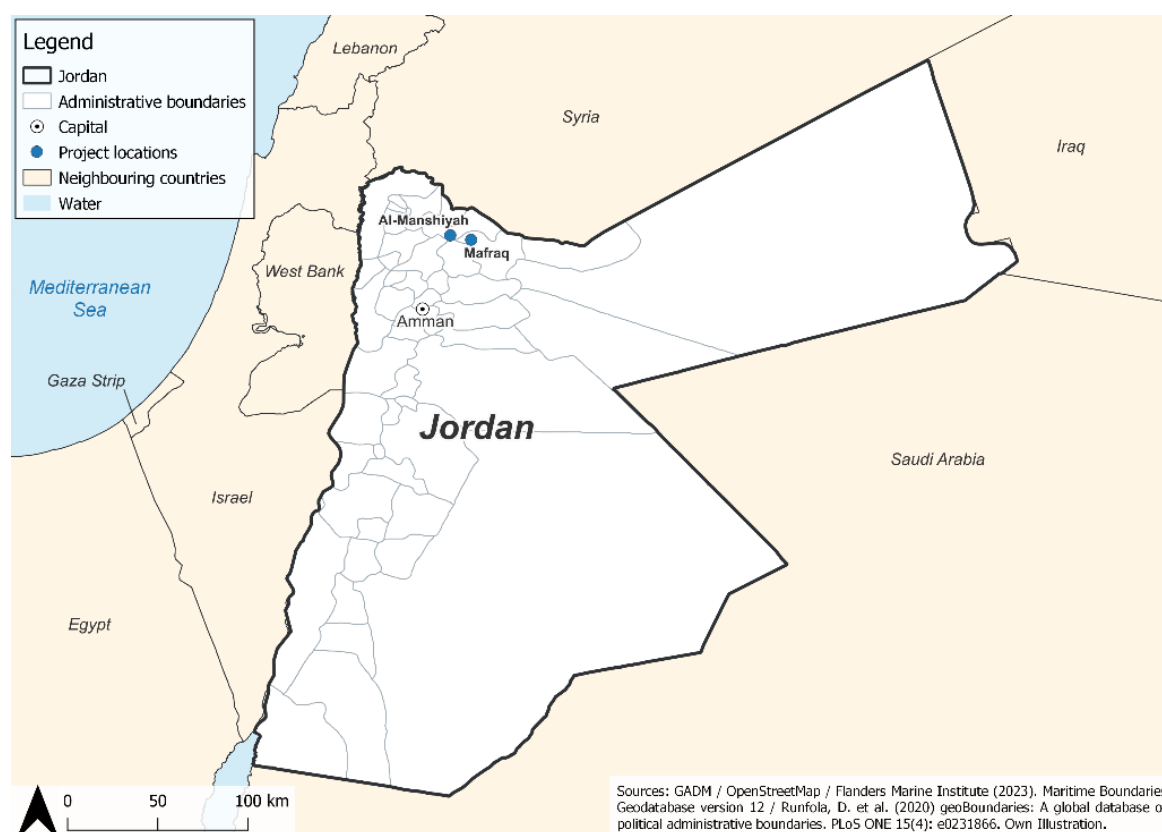
to the regional water utility Yarmouk Water Company (YWC) after completion of the work. The YWC is a subsidiary of the WAJ and operates the water and sewage networks in the northern governorates.

Breakdown of total costs

In million EUR	Phase III (planned)	Phase III (actual)	Phase IV (plan)	Phase IV (actual)
Total costs	15	14.7	10	10
Own contribution	0	0	0	0
External financing	15	14.7	10	10
<i>of which BMZ funds</i>	<i>15</i>	<i>14.7</i>	<i>10</i>	<i>10</i>

Map of the project country including project locations

Figure 1 – Map of the project region



Rating according to OECD DAC criteria

Relevance

1. *Alignment with policies and priorities*

According to the Jordanian Ministry of Water, Jordan is one of the most water-stressed countries in the world, with only 61 m³ of renewable water resources per capita per year. The situation could worsen significantly by 2040, with a projected water availability of only 35 m³ per capita. The massive influx of Syrian refugees since the outbreak of the civil war in Syria has further increased the demand for clean drinking water and regulated wastewater treatment.

The violent suppression of a peaceful protest in the southern Syrian city of Dar'ā in March 2011 is considered the starting point of the Syrian civil war. In the wake of increasingly violent clashes, many Syrian families crossed the border into Jordan to seek temporary protection with friends and relatives. As the conflicts intensified, the number of internally displaced persons and refugees continued to rise. In June 2012, the United Nations declared for the first time that Syria was in a state of civil war, prompting the international community to mobilise refugee aid. At that time, there were already 37,000 registered refugees in Jordan and a large number of unregistered Syrians living with Jordanian host families. The number of officially registered refugees was already 600,000 in the year of the review (2014) and approximately 700,000 ten years later, at the time of the evaluation. Jordanian estimates put the total number of Syrian refugees, including unregistered ones, at around 1.3 million, which is significantly higher. Due to its proximity to the Syrian border, the project region in northern Jordan has the highest proportion of Syrian refugees outside Amman.

The efficient and sustainable management of water resources is a high political priority in Jordan. The national water strategy for 2023-2040 aims to increase the amount of treated wastewater for reuse (e.g. for irrigation) and to protect groundwater resources from pollution by overflowing septic tanks, thereby adapting the water sector to the effects of climate change at a higher level.

Promoting sustainable water resource management has been and remains a priority of bilateral German-Jordanian development cooperation. At the time of the audit, the project was contributing to the objectives of the special initiative launched in 2014, 'Addressing the root causes of flight – (re)integrating refugees (re-)integrate', which aims to improve the living conditions of people on the ground and thus create prospects for them to remain in their home countries. The projects reviewed here supported the German Federal Government's emergency aid provided through the United Nations. While this aid was primarily aimed at accommodating and supplying refugees in camps, the project evaluated here focused on improving living conditions in host communities.

2. *Alignment with the needs and capacities of the beneficiaries and stakeholders*

The target group of the project was Syrian refugees and the population of the host communities in the city of Mafraq and Manshiyah Bani Hassan, both located in the northern governorate of Mafraq. According to the latest census in 2023, Syrian refugees make up a third of the 651,100 people living in the Mafraq governorate.² At that time, 78,000 refugees were living in the Zaatari camp, with the remaining 130,000 Syrians living outside the camp in host communities.³ In the northern governorates, the average annual income per household is below the national average of 8,824 JOD (approx. 11,200 EUR). Syrian refugees are a particularly vulnerable group within the host communities. Many do not have official work permits and are dependent on savings, undeclared work or external support. The living conditions of refugees are correspondingly precarious: 68% live below the Jordanian poverty line, and 17% live in extreme poverty.⁴ Due to their poverty and often precarious housing situation, Syrian refugees are among those most excluded from access to water resources and adequate and affordable sanitation services. At the time of the review, the northern governorates were considered to be disadvantaged compared to the central governorates in terms of public investment and funding, but they bore a substantial share of the refugee influx. The selection of the target group and the intervention area is therefore appropriate.

In the year of the audit, approximately 60% of the population in the northern governorates was not connected to the sewerage system. At that time, around 1.7 million people lived in this area. The unconnected part of the

² [Jordanian government census from January 2023.](#)

³ The data comes from ZGBA, which was compiled for phases VII and VIII.

⁴ See ZGBA Syrian Refugees VII and VIII.

population disposed of faeces and sewage via cesspools, which had to be emptied regularly by tanker trucks. According to the audit report, poor households paid up to ten percent of their income for emptying. If the soil is permeable, tanker trucks do not need to be called as often because the watery phase of the faeces seeps away well. However, in this case, the contamination of the groundwater with organic pollutants and coli bacteria is particularly severe. If, on the other hand, the soil is not permeable, the additional costs for operating the septic tanks are significantly higher. Irregular emptying can lead to surface overflow of the pits, which causes a particular odour nuisance and poses a health hazard. Inadequate wastewater disposal was therefore identified as a core problem to be addressed. Most Syrian refugees live in rented accommodation, often in poor conditions and without a connection to the sewage system. At the time of the audit, it was assumed that these households, and thus Syrian refugees, would benefit disproportionately from the expansion of the sewage disposal network. At the same time, it was assumed that women would benefit more than men from an increased connection rate, as they are usually responsible for the household and caring for sick family members. However, due to the urgent nature of the situation, no target group or stakeholder analysis was carried out to verify the above assumptions and identify specific measures that could improve living conditions in the places where they were most precarious at the time of the crisis.

Despite the higher medium- to long-term costs associated with maintaining septic tanks compared to connection to the sewerage network, it must be noted that piped sewerage was not one of the most pressing needs of refugees and host communities at the time of the assessment or today. This was also made clear during discussions with the local operator YWC and with residents during the evaluation mission. As long as there is no surface flooding, the local population does not pay any further attention to the issue of wastewater. It should also be noted that wastewater issues have not caused any tensions or disputes between the Syrian and Jordanian populations, either today or at the time of the assessment. The Jordanian government (WJ) also considered the potential for conflict among the population with regard to wastewater to be relatively low. This impression is reinforced by the fact that the local water utility makes little effort to prevent free wastewater disposal through illegal house connections. According to our own calculations, we estimate that approximately two-thirds of the house connections in Manshiyah Bani Hassan were installed illegally and can therefore be used free of charge. At the time of the audit and today, there are numerous challenges and problems – including high rents, housing shortages, high unemployment and an overburdened health care system – which, from the perspective of the target group of particularly poor people, take higher priority than environmentally sound wastewater disposal. The project was not designed to promote gender equality. In the evaluation team's assessment, no significant gender impact potential could have been achieved with a different design of the measure while maintaining the same objectives.

The project envisaged the expansion and extension of the sewerage system in Mafraq and surrounding villages, which were particularly affected by the influx of Syrian refugees. The selection criteria for prioritising the expansion measures were (a) the stage of planning and expected implementation period, (b) the proportion of refugees, and (c) the cost per inhabitant. KfW added the requirement that sewage pipes should only be financed in regions where sewage treatment plants were able to accept and treat additional volumes of wastewater. A master plan for the sewage network in the northern governorates, financed by JICA (Japan International Co-operation Agency), provided an overview of where the pressure on the sewage infrastructure was particularly high due to the additional Syrian population. This plan prioritised projects based on the same three criteria mentioned above. These selection criteria are understandable in the context of the need to mobilise a standard sewage project as quickly as possible.

The project was part of the development cooperation (DC) programme to implement Jordan's water strategy in an economically efficient, environmentally sustainable and socially equitable manner. The aim was to provide the Jordanian population with adequate and appropriate services in the water sector while ensuring the economic viability of water utilities. The project selection criteria therefore took into account economic efficiency and social equity at the outcome level and environmental sustainability at the impact level.

In addition to the construction of infrastructure, funding was provided for consulting services to support the project executive in preparing the planning and tender documents, selecting construction companies and supervising construction. The measures were intended to improve the wastewater disposal situation of the local population and Syrian refugees in the project region at the outcome level (module objective).⁵ The number of people additionally connected to the sewerage system was defined as an indicator for measuring the achievement of the

⁵ The objective was adjusted at the time of the evaluation. The original objective was *to improve the waste management situation for the local population and Syrian refugees in northern Jordan, prevent conflicts, protect the environment and adapt to climate change*. Both the climate and environmental protection objectives and conflict prevention are more likely to be found at the impact level.

objective during the review. The indicator is appropriate and, provided that a connection also includes use of the sewerage system, is a good measure of target achievement. As a supplementary measure of utilisation, the additional volume of wastewater treated at the pumping stations and the sewage treatment plant in Mafraq was included as a further indicator for the evaluation. At the impact level, the improved wastewater disposal situation should protect scarce groundwater resources and improve living conditions. At the time of the review, the goal was also to prevent conflicts between refugees and the local population. Although it is possible in principle that improved wastewater disposal could reduce the potential for conflict through better hygiene conditions, the chain of effects is long and would be difficult to verify with the available data. In this specific case, there were no indications of conflicts due to the wastewater situation. Apart from that, the target system and the impact logic of the project are coherent.

However, there are doubts about the appropriateness of the project's focus. Both the decision to prioritise improving wastewater disposal and the decision to build underground sewage pipes do not seem appropriate in the context of a crisis-related emergency aid programme. At the time of the review, only a limited sustainability requirement was set for the project, citing the crisis context and the urgency of the situation. This contradicts the chosen approach and the objective of the project, which is to collect wastewater through house connections and treat it in sewage treatment plants in order to contribute to a stable drinking water supply in the medium to long term through better protected groundwater resources. The approach and objectives are therefore more in line with those of a classic wastewater project, which, although implemented in a fragile context, does not have the character of an emergency aid measure in terms of its content and is therefore not understood as such in the sustainability assessment.

Even though the proportion of refugees and the costs per inhabitant were taken into account in the planning, the concept had further weaknesses, some of which were due to the urgency of the project. There was no needs analysis of the target group with regard to their willingness to pay for connection to the sewerage system, so that there was insufficient information on the economic viability of the infrastructure measures. A detailed ZGBA would probably have revealed that the target group was unwilling to pay, which is one of the main reasons for the low connection rates, and measures to achieve higher connection rates could have been planned from the outset. In addition, the design did not take into account the lack of capacity on the part of the responsible body to operate and regularly maintain the infrastructure that was built. The disparity in the project region and the limited project budget meant that only two pumping stations were built, so that the sewer had to be laid at a depth of up to 10 metres in some places. This meant that exceptionally deep screening systems (over 8 metres) had to be built at the pumping stations, which makes maintenance work considerably more difficult. Alternative, more maintenance-friendly concepts could have been investigated technically as part of a feasibility study. Instead, existing designs were used, which were only subjected to a design review. This made the project preparations quick and efficient at the time, but was to be at the expense of effectiveness and sustainability. In retrospect, it would have been sensible to carry out a "feasibility scoping" with close involvement of the target group, despite the time pressure at the time. This would probably have allowed some of the project risks to be identified earlier and, if necessary, avoided.

4. Response to changes / adaptability

The project design has largely been retained. There was a minor adjustment with regard to the final selection of the project region. The module proposal suggested prioritising the towns of Aidoon Bani Hassan and Ramtha. However, based on a master plan financed by JICA, the city of Mafraq and the catchment area of the local sewage treatment plant were selected as the project region instead of Ramtha in the same year, as the soil there is particularly impermeable and the inadequate sewage disposal via septic tanks was therefore particularly problematic. In general, the Mafraq region was also selected because it had received less aid commitments, even though a large number of refugees had also settled there. At the same time, a new sewage treatment plant was completed in Mafraq in 2014 (financed by *the United States Agency for International Development, USAID*), enabling additional wastewater to be treated. According to the operator YWC, Manshiyah Bani Hassen, a small suburb 20 km from Mafraq city, was selected because it was not connected to the sewage network and, shortly before the project was reviewed, numerous septic tanks had overflowed after the rainy season, contaminating the town's drinking water. The population complained to the Prime Minister, resulting in this region being selected as a priority. It was not possible to verify this information.

Rating summary

Jordan suffers from severe water scarcity. A piped wastewater system is in line with both the German government's strategy for the water sector in Jordan and Jordan's water strategy, which aims to protect groundwater resources and increase water reuse rates. From a development policy perspective, the collection and treatment of wastewater to produce fresh water is of great importance in the medium to long term. However, this goal was not and is not an urgent need for the target group consisting of Syrian refugees and host communities. Although the arrival of Syrian refugees has put pressure on the public infrastructure of the host communities in general, there have been no reports of explicit tensions or disputes between the Syrian and Jordanian populations with regard to wastewater disposal. The project is therefore only partially geared to the needs of the target group. In addition, the project has some conceptual shortcomings. For example, the limited sustainability claim, justified by the urgency and emergency nature of the project, contradicts the long-term objective of the project. Overall, the relevance is assessed as moderately successful.

Relevance: 3 (both projects)

Coherence

5. Internal coherence

Before the start of the Syrian war, German DC, which has been active in Jordan since the 1960s with a focus on drinking water and wastewater, divided its responsibilities as follows: The Federal Institute for Geosciences and Natural Resources (BGR) focused on water protection aspects in land use planning. Technical cooperation (TC) supported the human resources of the Ministry of Water, the WAJ (Water Authority Jordan) and the JVA (Jordan Valley Authority) through the CIM programme (*Centre for International Migration and Development*) and provided technical assistance in the field of water resource management. Financial cooperation (FC) focused on water resource management with projects on wastewater disposal, water loss reduction, use of treated wastewater, increasing energy efficiency in water supply and institutional development, with a particular focus on the then newly established YWC. Sector coordination was already well established and coordinated between the institutions at that time. This structure enabled German DC, especially FC, to mobilise support for the northern governorates in the drinking water and wastewater sectors within a very short time after the outbreak of the Syrian war. The rapid mobilisation of support for drinking water supply after the outbreak of the Syrian war was already confirmed in the evaluation report on the first two predecessor phases (Drinking Water Supply for Syrian Refugees I/II). At the time of the project review, the FC had the largest portfolio of all German implementing organisations. The 13 ongoing FC projects continued to be complemented by TC with the CIM programme, with the same division of tasks as described above. In addition, TC provided training for water utility managers and regulators to improve efficiency in water supply. In addition, the TC took over sector coordination. At the time of this evaluation, coordination between the TC and the FC was still going well, enabling the engagement in Jordan's water sector to be continuously developed. The current DC programme focuses on climate resilience for the population through secure access to drinking water and sustainable wastewater disposal.

There are no known violations of international norms and standards to which German DC is committed. The targeted increase in water efficiency and reduction of groundwater pollution from septic tanks promotes climate resilience and is therefore in line with the goals of the Paris Climate Agreement. By supporting refugees as a particularly vulnerable target group, the project contributes to the protection of human rights.

6. External coherence

The DC programme was embedded in Jordan's water strategy at the time, "Water for Life 2008-2022", which aimed to achieve sustainable water management. At that time, USAID, MCC, AFD, JICA and the EU⁶ were important donors in the sector alongside Germany. Donor activities were coordinated via various platforms. One platform was the *Donor Lender Consultation* Group, chaired by the United Nations Development Programme (UNDP), which served to coordinate between Western donors through various technical subcommittees. The EU Development Aid Round officially met every two months and designated "lead nations" for each donor's priority sectors.⁷ Germany took the lead role for the water sector. In addition, coordination meetings were held as needed between Western donors in the context of the Syrian crisis, primarily to coordinate humanitarian aid programmes. The Jordanian government played little active role in steering these meetings. This changed in September 2013

⁶ MCC = Millennium Challenge Cooperation; AFD = Agence Française de Développement; EU = European Union

⁷ Other development policy challenges were addressed by other donors in the interests of a coherent division of labour.

when the *Host Community Support Platform* was launched by the Jordanian Ministry of Planning and International Cooperation (MoPIC) and renamed the *Jordan Response Platform for the Syria Crisis* (JRPSC) in 2014. The platform was designed to ensure the connectivity of short-term emergency measures with longer-term projects. The Jordanian government uses the platform to develop an integrated plan for the care of refugees, ideally with simultaneous resilience building, in collaboration with donors, UN organisations and non-governmental organisations (NGOs), and to set this out in writing in the *Jordan Response Plan* (JRP).

At that time, donor coordination was described as "good and appropriate". However, there was only limited exchange with Arab donors such as the Arab Fund, the Kuwait Fund and the Gulf Cooperation Council, which partially implemented commitments amounting to USD 5 billion in Jordan. In addition, there is no official overview of donor commitments in the water sector. The 2013 Development Policy Report already noted that the recording of ongoing and planned interventions needed to be improved. A web-based donor atlas (*Jordan Aid Information System*, JAIMS) financed by EU funds was set up for the MoPIC, but has not been used. At the time of the evaluation, there was still no overview of all ongoing projects by all donors in the water sector in Jordan. The MoPIC's *Foreign Aid Report* breaks down annual commitments by quality of funds, sector and region. However, it does not show which projects are still ongoing and which have been completed, nor does it indicate the total portfolio value per donor. Furthermore, USAID and Germany, which have been the largest donors in the water sector for years, have not yet found a sustainable solution for the maintenance and operation of the infrastructure they have financed. It is worth noting, however, that in 2019, the *Utilities Performance Monitoring Unit* (UPMU) was established under the auspices of the Ministry of Water, with support from German development cooperation. It is currently used mainly for data exchange between operators, but is intended to become an independent regulator in the water sector in the future.

Rating summary

Internal and external coherence was and remains good. Since the project was reviewed, the Jordanian government has taken on a slightly more active role in donor coordination. In addition, the Ministry of Water has provided political and financial support for the establishment of the UPMU, which aims to improve transparency regarding the performance of water operators. However, there is still considerable potential for data exchange between donors and with the Jordanian side, primarily to ensure that the maintenance and operation of the infrastructure built is based on information.

Coherence: 2 (both projects)

Effectiveness

7. Achievement of the (intended) objectives

The module objective of the projects was to "improve the wastewater disposal situation for the local population and Syrian refugees in northern Jordan". The target definition was appropriate for a standard wastewater project and was adopted for the evaluation. At the time of the Phase IV review in 2015, indicator 1 was set as the benchmark for target achievement for both phases evaluated here, with a target value of 35,000 people as an indicator of " ". The number of people is determined on the basis of new customers (household level) who have registered with the operator since completion of the measures. An average household size of five persons was assumed. During the evaluation, the additional volume of wastewater treated since completion of the construction measures under the project in 2019 was included as a further indicator for assessing target achievement. The amount of wastewater was determined at the constructed/rehabilitated pumping stations and the Almafraaq wastewater treatment plant in order to verify the plausibility of the connection rates, including illegal connections.

For the assessment, the evaluation team had access to data from YWC on the official connection rates and information on the treated wastewater volumes from 2019 (before completion) and from 2021 (since completion) to 2023 at the pumping stations and the Almafraaq wastewater treatment plant. For indicator 2, monthly averages of the treated wastewater volumes over time were compiled, which were recorded by hand by YWC staff. Unfortunately, the figures are not consistent with those in the implementation consultant's final report or the official figures from the Jordanian government. One of the reasons for the inconsistency in the data is that the amount of rainwater that also flows into the wastewater network cannot be calculated retrospectively. Furthermore, the exact amount of wastewater per person is not known, so estimates for the actual number of users were modelled at 30, 55 and 80 litres/day/person.

The achievement of the target at the outcome level can be summarised as follows:

Table: Target achievement outcome:

Indicator	Status at PA	Target value according to PA (2020)	Actual value at PCR (2022)	Actual value at EPE ⁸ (2024)
(1) Number of additional people connected to the sewerage system.	0	35,000	14,700 people, of whom 13,000 are in Mafraq and 1,700 in Manshiyah B.H. (capacity of 48,700) ⁹	10,660 people according to official connection rates, ¹⁰ 10,318 people based on the daily wastewater volume at the Mafraq wastewater treatment plant.
(2) Additional treated wastewater volume in m ³ /day ¹¹	N/A	1,925 m ³ /day	N/A	567m ³ / day

8. Contribution to the achievement of objectives

The project was largely implemented as planned in the audit report. As part of the project, the sewage system in the city of Mafraq and neighbouring municipalities was expanded, and parts of the existing network were rehabilitated. Implementation took place in two construction lots. Specifically, sewage pipes (17 km of collection pipes, 8 km of house connections and 10 km of transport pipes) were built in the municipalities of Manshiyah Bani Hassan west of Mafraq, and the connection to the main water pipe in Mafraq was constructed (construction lot 1). In a second phase, sewage pipes in the city of Mafraq were rehabilitated and the municipal sewage system was expanded by 43.3 km of collection and transport pipes and 15.2 km of house connections. The measures were selected on the basis of a master plan for the development of wastewater disposal in the northern governorates, which was drawn up in cooperation with JICA. The construction work revealed some significant structural defects, particularly in lot 2, which were identified during the final physical inspection in early 2021 and have not been rectified since (as of October 2024). The defects caused considerable damage to the sewage treatment plant's screening system (caused by loose sealing strips that detached from the newly installed pipes). In addition, the road subsidence caused by construction defects led to a legal dispute between the WAJ and the municipality of Mafraq, which is still ongoing.

Despite structural deficiencies, rehabilitation and expansion measures have restored the capacity of the local wastewater infrastructure in Manshiyah Bani Hassan and expanded it in Mafraq. According to estimates by the implementation consultant, approximately 48,700 people can now be connected to the sewerage network. The gross newly created capacity (output) is thus around 40% above the target of 35,000 people. Despite the significant expansion of capacity and low connection rates, the operator Yarmouk Water stated at the time of the evaluation that the wastewater treatment plant in Mafraq was operating at full capacity. No technical evidence was provided to support this statement, which contradicts the consultant's estimates. The two FC-financed pumping stations had technical limitations, as only one pump was still operational at one station and the screening system at the other had been removed for lengthy maintenance. The limited pump capacity and increased risk of damage to the pumps from coarse material restrict or jeopardise the hydraulic performance of the system. However, as long as connection rates remain low, this limitation in pumping capacity is not noticeable. According to the operator, the impairments are also a consequence of damage to the sewage treatment plant caused by construction defects in Lot 2. During the evaluation trip, only one of the two fine screens was still in operation.

The actual connection rates – measured by the number of officially registered new customers – remain significantly below expectations at 2,850 households or approximately 14,700 people at the time of the PCR (December 2020). In the year of the evaluation, the figure was 2,132 households or 10,660 people according to official information from YWC, which corresponds to a target achievement rate of 31% (42% at PCR). The discrepancy

⁸ Based on an estimated value of 55 litres per person per day discharged into the sewage system.

⁹ Source: Estimates by the implementation consultant in his final report.

¹⁰ Estimates based on official figures from YWC for 2023. According to these figures, the number of official wastewater connections for the network sections financed by FC funds was 1,874 in Mafraq and 258 in MBH. Multiplying this by an average household size of 5 gives 9,370 people connected in Mafraq and 1,290 in MBH, or 10,660 people in total.

¹¹ The indicator was added at the time of the evaluation.

between the target value in the module proposal and the actual value from the PCR is partly due to the operator's failure to record both legal and illegal house connections. According to the implementation consultant, 67% of the house connection shafts built in Mafraq and 82% in Manshiyah Bani Hassan are not officially in use. YWC and WAJ see the main reason for the low connection rate as being the lack of enforcement of the formal connection and fee requirements by the responsible authorities. The one-time connection costs are too high for many households and are a decisive factor in their decision not to connect (formally) to the central sewerage network. Another incentive problem is that connection fees have to be paid by the owners of the residential buildings and not by the tenants, who make up the majority of households. In some cases, the owners had just invested in a new septic tank and were therefore unwilling to pay for connection to the sewerage network.

In order to estimate the number of illegal household connections, a second indicator, "additionally treated wastewater volume," was recorded for the evaluation. For this purpose, YWC provided data on the daily volume of wastewater treated at the pumping stations and the wastewater treatment plant in Mafraq since 2019. Between 2021 and 2023, an average of 5,398 m³ of wastewater was treated per day at the Almafraq wastewater treatment plant, compared to 4,831 m³ in 2019, the year before the completion of the construction measures financed by the project funds. This represents an increase in the amount of water treated of 567 m³/d or 12% compared to the reference year. The increase in the volume of wastewater can be used to estimate the number of additional wastewater users, whereby assumptions must be made regarding the average volume of wastewater produced per person per day. In this case, the number of users was modelled assuming an average wastewater volume of 30, 55 and 80 litres/day/person (l/d/p). This results in a range from 7,087 people assuming 80 l/d/p to 18,900 people assuming 30 l/d/p, with 10,309 people assuming 55 l/d/p. This means that even if a low wastewater volume of only 30 l/d/p is assumed, only about 40% of the newly created capacity will be utilised.

A slightly different picture emerges when wastewater data collected at the pumping stations in Mafraq and Manshiyah Bani Hassan is used. In Manshiyah Bani Hassan, an average of 235 m³ of wastewater was transferred per day in 2019. In 2023, the figure was 422 m³/d, representing an increase of 80% and an estimated number of users of 7,719 (assuming consumption of 55 l/d/p). This figure is six times higher than the number of officially registered users in Manshiyah Bani Hassan reported by the agency and would correspond to an illegal connection rate of approximately 80%. For Mafraq, on the other hand, the same analyses based on the wastewater volumes at the pumping stations show only minor deviations from the number of officially registered users. The phenomenon of a high level of illegal connections therefore seems to be concentrated mainly in Manshiyah Bani Hassan.

The very high proportion of illegal connections in Manshiyah Bani Hassan is consistent with the impressions gained during the evaluation. Many residents interviewed at random had domestic connections that they had not installed through the operator via. Illegal connections were also evident in randomly inspected domestic shafts. Nevertheless, many households are still not connected to the existing wastewater infrastructure. According to estimates by the evaluation team based on wastewater volumes, only 50% of registered drinking water users in the project region are connected to the wastewater disposal system, either illegally or legally. According to the UPMU report from 2022, only 47% of all households in the northern governorates are connected to the wastewater network.

The project did not examine in advance which urban areas or parts of the project region have a particularly high proportion of poor households or refugees. Instead, it was argued that Mafraq and Manshiyah Bani Hassan are home to a disproportionately high number of poor Jordanians and have also taken in many Syrian refugees. More detailed information on the composition of the beneficiary population was not available at the time of the evaluation. It is therefore not possible to make any reliable statements about the suitability of the measures.

Due to the inconsistent data available, it is not possible to determine the exact number of users of the financed infrastructure. According to official connection rates, the target of 35,000 inhabitants was clearly missed. The data collected during the evaluation mission and anecdotal evidence suggest that the number of actual users is higher than the official figures but still far from the target. Even with an estimated wastewater inflow of 30 litres per day per inhabitant, only just under 19,000 additional people would have been connected to the sewerage network. The lack of enforcement of the connection obligation is certainly one of the main reasons for this. In retrospect, it can also be said that the issue of illegal house connections was not examined thoroughly enough, even if this is understandable given the urgency of the situation. According to the audit report, illegal house connections were identified as a risk, but only in the context of the delayed "approval" of house connections due to construction delays at the Wadi Shalala sewage treatment plant. External factors already identified in the audit report also contribute to the low connection rate, above all the institutional weakness of the operator YWC. For example,

after completing the wastewater infrastructure, YWC failed to publish in newspapers and other media that households could now connect to the system. During the evaluation trip, it also became apparent that the responsible employees at YWC could no longer locate the infrastructure that had been built and that possible measures to identify illegal household connections had not been implemented.

9. Quality of implementation

The implementation on site was carried out by the project promoter, the WAJ project management unit, supported by a project team from an international implementation consultant. Overall, the consultant closely accompanied the revision of the tender documents, the tendering process and the construction supervision of the measures. The construction measures were divided into two lots, of which Lot 2 had to be adjusted and the scope of services reduced due to significant cost overruns. Lot 2 was then put out to tender again. Both lots were delayed by six months (from the planned 18 months to 24 months) due to delays in approvals by the Jordanian cabinet and bad weather. The completion of the work, especially under lot 2, coincided exactly with the start of the COVID pandemic in early 2020. This made monitoring difficult for both the consultant and KfW. In addition to the severe restrictions imposed by the COVID pandemic, the rather low budget for the consultant may also have been a reason for the inadequate construction supervision.

The physical final inspection took place in early 2021 and, due to the COVID pandemic, was carried out by an external expert without KfW support. It was only at this point that the extent of the construction defects, especially under Lot 2, became apparent. The coarse screen at the pumping station in Manshiyah Bani Hassan was already out of order at the beginning of 2021. Road subsidence along the sewer network and the pumping stations caused significant damage to the roads. In principle, the road damage is technically easy to repair. At the same time, the subsidence damage indicates inadequate compaction of the trench backfill, which in turn raises doubts about the proper laying of the pipes, supported by the loosening of the sealing membranes.

In addition, large black streaks had been washed up at the Almafraq wastewater treatment plant for 12 months, which had not been reported to either the WAJ or KfW to date. The structural defects had not been remedied at the time of the evaluation, i.e. around six years after acceptance and commissioning (lot 1: March 2018, lot 2: January 2019). The final report had already described the implementation of the construction work under Lot 2 as inadequate. Although the WAJ withdrew the construction company's performance guarantee, an ongoing legal dispute with the municipality of Mafrq is currently preventing the defects from being rectified.

During the evaluation mission, the WAJ's PMU assessed the project as "successful". It sees its main task as the final implementation of the projects. Since the infrastructure built is functional, the project is considered successful. The construction defects do not impair the functionality of the sewage network. During the on-site discussions, the evaluation team gained the impression that the WAJ's assessment of the construction company's performance and the project's success is primarily political and not based on objective criteria. As long as the basic function of collecting wastewater and conveying it to a treatment plant is not impaired, those responsible see little cause for concern. The WAJ attributes the poor enforcement of the connection obligation to the operator's weak capacities, which have been known for some time. However, the WAJ has not shown any efforts to present a solution.

10. Unintended effects (positive or negative)

There are two negative unintended effects under the project. Firstly, the legal dispute between the WAJ and the city administration is leading to delays in repairing the defects in the road surface in the area of roads and footpaths. The road damage was caused by insufficient compaction of the backfill of the road subgrade after the sewer pipes were installed. Originally, WAJ was to commission a company for this purpose, which was to be paid from the performance guarantee funds. However, the costs exceeded the available funds from the liquidated guarantee. As the city administration and WAJ were unable to agree on a mutually acceptable cost sharing arrangement for this settlement work, the court proceedings must be awaited in order to find a solution.

On the other hand, existing infrastructure at the Almafraq sewage treatment plant was damaged by the plastic rings coming loose. The plastic rings are part of the inner coating of the sewer pipes financed by the FC. A technical report has already established that the missing inner lining has little impact on the functionality and service life of the sewer pipes, but can become caught in the coarse screens of the sewage treatment plant, causing them to bend and become damaged. The FC has already proposed installing a catchment device at the inlet to the sewage treatment plant, but this could not be located at the time of the evaluation.

Rating summary

The capacity of the wastewater system has been significantly expanded. The actual intensity of use and thus the achievement of the target cannot be determined precisely due to missing or inconsistent data and a high number of illegal connections to the sewer system in Manshiyah Bani Hassan. However, both the information on officially registered connection rates and estimates based on the additional wastewater volume indicate that capacity utilisation falls far short of expectations. Deficiencies in the quality of implementation and structural defects, which have not yet been remedied and have caused significant damage to the existing infrastructure, significantly reduce effectiveness. Overall, the effectiveness is assessed as moderately unsuccessful.

Effectiveness: 4 (both projects)

Efficiency

11. Production efficiency

The project measures were implemented in two construction lots, which were put out to international tender. In both lots, lengthy approval procedures for contract changes by the Jordanian cabinet led to delays during the construction phase. In construction lot 2 – rehabilitation and expansion of the sewage network in Mafraq – there were also delays due to a repeated tender. The construction of the measures was completed within 24 months and thus took six months longer than originally planned. The total duration of the project from the signing of the financing agreement to the physical final inspection in February 2021 was 76 months, significantly exceeding the estimated duration of 48 months at the time of the audit. However, this delay did not lead to a significant increase in project costs. At 7% of the total costs, the share of consulting costs is low. However, due to the relatively large number of construction defects, it can be assumed that construction supervision was not carried out properly in some cases or could not be carried out properly. It can be assumed that the location of the project area made continuous construction supervision difficult. Nevertheless, this situation has a negative impact on production efficiency.

The specific production and construction costs per resident actually connected are very high at approximately EUR 1,500, far exceeding the original target of EUR 430 per resident. If the construction costs are set in relation to the maximum number of inhabitants that can be connected, the costs amount to EUR 530 per inhabitant (source: final inspection), which is still high for a standard sewerage network project but can be explained by the local market conditions. Specific costs of approximately EUR 750 per inhabitant can be determined from other current FC projects in the Irbid Governorate.

The very high specific construction costs can be explained by the low connection rate. The lack of willingness to formally connect to the sewerage network and thus finance it through fees has a negative impact on production efficiency.

12. Allocation efficiency

Due to the low connection rates, the outcomes and impact targets were only partially achieved and with restrictions, which detracts from allocation efficiency.

From an allocation efficiency perspective, the question arises as to whether a higher impact could have been achieved with an alternative technical or construction solution. In the present context, this question seems particularly relevant, as no feasibility study was carried out due to the urgency of the matter and therefore no alternative scenarios were tested. At the very least, a brief feasibility study comparing the technical options and their costs based on facts would have been useful. In retrospect, it is impossible to say whether an alternative allocation of funds would have been more effective.

Due to a lack of available data, it is also impossible to determine with any certainty how far-reaching the allocation of the measure is for the refugees taken in by the municipalities, nor can any reliable statements be made about the proportion of particularly needy households among the total beneficiaries.

Rating summary

The very high connection costs have a negative impact on production efficiency, which is further impaired by structural deficiencies and the resulting follow-up costs. The low connection rates indicate that, despite its positive environmental impacts, the expansion of the wastewater infrastructure was apparently not one of the target group's most pressing needs. It is not possible to assess whether alternative measures could have achieved greater impact. Overall, efficiency is rated as moderately unsuccessful due to the very low production efficiency.

Efficiency: 4 (both projects)

Overarching developmental effects

13. Overarching (intended) developmental changes

The overarching development objective (impact) defined during project appraisal was to contribute to the efficient and sustainable management of the country's scarce water resources. The project assumed that improving pipe-based wastewater disposal would bring more wastewater to treatment plants, where it would be treated and made available for purposes such as irrigation. This, in turn, would contribute to more efficient and sustainable water resource management. When designing the project, no impact-level indicators were formulated because it was assumed that the impact-level objectives would automatically be achieved when the outcome-level objectives were achieved. It would have been possible to introduce an additional indicator at the impact level, e.g. the proportion of households using modern toilets instead of cesspits. However, this is not considered absolutely necessary, as the impact logic described in the relevance section is comprehensible and the measures contribute plausibly to the impact objective.

For the evaluation, the wording of the impact objective was slightly adjusted to "Scarce groundwater resources are protected and local living conditions are improved" to take into account the context of the project immediately after the outbreak of the Syrian war. Since a large number of Syrian refugees sought shelter with friends and relatives in host communities in the northern governorates within a very short period of time, the short-term improvement in wastewater disposal implemented by this project should at least maintain local living conditions for all people in these communities.

14. Contribution to overarching (intended) developmental changes

The project has made a measurable contribution to the overall objective. Since 2019, the volume of wastewater arriving at the pumping stations and the Mafrq wastewater treatment plant has increased by approximately 12%.¹² Since completion of the construction work in 2019, an average of 567 m³ of additional wastewater has been arriving at the treatment plant every day. Based on an estimated 55 litres of wastewater per person per day, this corresponds to approximately 10,000 additional residents of Manshiyah Bani Hassan who are now connected to the Mafrq treatment plant. According to figures collected during the evaluation at the pumping station, more than 6,000 residents in Manshiyah Bani Hassan are illegally connected to the sewage network.¹³ The additional capacity available at the wastewater treatment plant for wastewater treatment was made possible by the construction and rehabilitation measures carried out as part of the project.

Discussions with residents in the project region revealed that people generally prefer pipe-based sewage disposal to septic tanks, as it is more pleasant to use and more practical to manage, as they no longer have to worry about emptying them, among other things.¹⁴ The project has thus made a plausible contribution to improving the living conditions and satisfaction of the population in Mafrq and Manshiyah Bani Hassan. The provision of water sanitation is generally an essential element of basic services and has the potential to contribute to stability and prevent potential conflicts between Syrian refugees and the local population. However, this potential is significantly lower than in the case of drinking water supply. There are currently no indications that the project will have a broad impact. In addition to the social effects, the project is expected to contribute to a reduction in

¹² Calculation: 567 (m³ additional wastewater per day) * 1,000 / 55 (litres per inhabitant per day).

¹³ The assumption is that all wastewater from the new wastewater network in MBH arrives at the MBH pumping station. This assumption cannot be made for the pumping station in Mafrq, as wastewater is also likely to arrive from the old network, which is why the plausibility check is only carried out for MBH.

¹⁴ All respondents stated this directly. It is possible that the answers are partially distorted by social desirability effects. Overall, however, we consider the reliability and representativeness of the information to be high.

environmental pollution through reduced use of septic tanks, which may also have a positive impact on the health situation. However, there is no data available to substantiate this causal link in the project context.

It can be assumed that the project has had positive environmental impacts. Due to the porous subsoil in Jordan, there is a high probability that the wastewater from septic tanks seeps into the groundwater, which is essential for drinking water supply, without being purified. The expansion of the sewerage network and new connections to it will reduce the use of septic tanks and thus reduce groundwater pollution.

The project did not pursue any gender-specific objectives. Accordingly, no gender-specific data was monitored. Since women are more likely to care for relatives in the event of illness, wastewater projects can have a fundamental gender impact by improving the health situation. However, the evaluation team does not have any health data for the project region for the period before and after project implementation. As a rule, people cared for by their families do not appear in official statistics. It is therefore not possible to make any statements about a possible improvement in the health situation and the gender impacts that this might entail.

15. Contribution to overarching (unintended) developmental changes

The high proportion of illegal connections places an additional burden on the operator's already scarce financial resources. The operator does not receive any sewage charges from illegal users, but still has to dispose of the additional sewage. The cost recovery ratio for ongoing operations is 56.3% in 2019 and 60.8% in 2022. While wastewater volumes have increased by 12% since 2019, the cost recovery rate has only risen by 4.5%. It remains to be seen whether the amendment to the law introducing a flat-rate wastewater charge based on drinking water costs and requiring households in the immediate vicinity of a house connection to pay will remedy this situation. During the evaluation, those responsible at the operator did not give the impression that they intended to reduce the high proportion of illegal connections or take other measures to carry out routine maintenance in future or increase the cost recovery ratio for operation and maintenance to a level that would allow for a reasonable and economically feasible level of service. As long as the functionality of the wastewater network is guaranteed at the present time, neither the WAJ nor the operator are concerned.

Rating summary

The project has contributed to improving living conditions and better protection of groundwater resources. The household connections were accepted by the population and are being used readily, as indicated by the increase in the connection rate. However, even taking illegal connections into account, the connection rate fell far short of expectations at the time of the project review and therefore does not exploit the social and environmental potential of the capacity created. Accordingly, the overall development policy impacts are also lower than expected. It cannot be assessed whether particularly vulnerable people have benefited disproportionately from the measure. The evaluation team also has no information on whether the treated wastewater is used for irrigation purposes.

Overall development policy impacts: 3 (both projects)

Sustainability

Evaluating the sustainability of financial cooperation poses a particular challenge in the context of fragility and crises. Since crises require rapid action and, above all, aim to achieve quick results, sustainability in a crisis context is interpreted in terms of the ability to link up with follow-up projects, whereby measures do not necessarily have to have structural effects per se. If structural effects cannot be achieved for projects in a fragile context, it should be possible to link longer-term measures in a less fragile target state. As already indicated in the section on relevance, the evaluation team does not consider the project to meet the requirement of limited sustainability for two reasons: Firstly, at the time of the review, improving wastewater disposal was not a high priority for the target group and therefore contributed only marginally to conflict prevention and stabilisation in the project region. Secondly, long-term wastewater infrastructure was built with a long-term objective, whereas other emergency aid projects would tend to install short-term temporary facilities in containers or similar. Sustainability is therefore evaluated as in a standardised wastewater project, which was implemented in a fragile context but is not considered an emergency aid measure.

16. Capacities of the beneficiaries and stakeholders

Both the WAJ and the operator have significant weaknesses. The WAJ has mainly financial and organisational weaknesses. Against the backdrop of the complex institutional framework, the responsibilities between the WAJ, PMU and the utility companies are often not clearly defined at the working level. Communication and reporting between the individual units in particular show weaknesses. Since the end of 2017, measures to improve financial management have been defined as part of sector budget financing. In the organisational and operational areas, the WAJ has shortcomings in its decision-making structures and human resources management (due to a lack of capacity and, in some cases, unqualified staff). For example, there were coordination problems between the WAJ in Amman and the regional operating units (in this case YWC) during the transition from the implementation phase to the operational phase, which were partly due to the fact that the operating staff were not involved in the preparation and implementation of the investment measures. The WAJ is aware of the challenges, but places little responsibility on the operators and acts primarily at the political level.

The operator also has personnel weaknesses. For years, the YWC has been struggling with accusations of nepotism from both the WAJ and international donors, where political influence and untapped potential for increasing employee motivation have led to a reduction in personnel performance. The YWC is a wholly owned subsidiary of the WAJ. Since its establishment, it has been responsible for operating the water and wastewater infrastructure in the northern governorates of Irbid, Jerash, Ajloun and Mafrqa (with a total population of approximately 2.73 million). It remains unlikely that YWC will be able to ensure the sustainable operation and maintenance of the financed infrastructure. It is not in a position to operate its networks, either institutionally, in terms of personnel or financially, and showed little ownership during discussions during the evaluation trip. The impression was gained that there are no clear management structures and little sense of responsibility. There was no database of the existing water and sewage network, and at the same time, the YWC team had difficulty locating the infrastructure built under the project during the evaluation visit. Inspection and flushing schedules were also not available. There was little interest or willingness to consider possible suggestions on how maintenance and repair could be improved using simple methods. The people we talked to seemed pretty happy with their operating concept of corrective maintenance ("firefighting"). Against this background, the ease of maintenance of technical equipment such as screens and pumps should play a more important role in future projects. At the same time, this observation raises the question of whether the knowledge or certainty of the continued commitment of international donors undermines the incentive to invest in maintenance from their own budget. The YWC is also in a poor financial position: its liabilities significantly exceed its fixed assets, and its solvency is only maintained by the WAJ. However, physical and administrative water losses remained significantly too high at over 51.1% in 2022, given the scarce renewable water resources and the high energy requirements of drinking water supply¹⁵.

The budget constraints faced by WAJ and YWC are primarily due to Jordanian tariff structures, over which neither WAJ nor the operators have any direct influence. However, it should be emphasised that the FC is in ongoing discussions with the Jordanian government on this matter and that a gradual tariff adjustment was agreed in September 2023. The WAJ's operating cost coverage was only 72% in 2019. This figure was lower than in previous years due to a disproportionate increase in electricity costs. As a result, the WAJ and its subsidiaries remain dependent on funding from the state budget to maintain drinking water supply and wastewater disposal services. Since 2022, YWC has been the only operator unable to cover its operating costs from current revenues. The cost recovery ratio was 60.8% in 2022. Electricity costs accounted for 40% of operating costs. In principle, the budgets requested by WAJ and the utility companies do not take into account the full amount of the operating and maintenance costs actually required. This is due, on the one hand, to insufficient data from all institutions and, on the other hand, to the fact that a significant portion of electricity costs and raw water purchase prices are subsidised by the government. The insufficient financial resources, combined with a lack of technical and human resources, pose a major problem for the sustainable operation of the water and wastewater infrastructure.

As far as the target group is concerned, the population has grown rapidly in recent years, partly due to the large number of refugees who have entered the country. According to current figures, Jordan's total population now stands at over 10 million, up from 9.5 million according to the national census at the end of 2015. The UNHCR currently counts around 670,000 officially registered Syrian refugees, around 80 per cent of whom live outside refugee camps in Jordanian towns. However, the influx of refugees has stabilised since 2016 and the total number now stands at around 1.3 million Syrian refugees. Even though the number of refugees has not risen further,

¹⁵ By way of comparison, the water loss rate in 2022 was 42.8% at Miyahuna and 33.1% at Aquba Water.

the situation in the northern governorates has worsened significantly, as this is already an underserved region and is disadvantaged by the strong concentration of Jordan's water sector in the Amman metropolitan area.

Population growth and increasing water consumption are leading to a continuous rise in the volume of wastewater. According to official figures, around 53% of the population in the northern governorates are not yet connected to the sewerage system. Most unconnected households use septic tanks for their wastewater. They have comparatively high wastewater disposal costs, as the wastewater charge is heavily subsidised by the state, unlike the cost of pump trucks. The proportion of poor households is particularly high in smaller towns and suburbs without connection to the central sewage system. Infiltration is often not possible due to the density of the settlement or the soil conditions. Many households therefore have to have their septic tanks emptied by pump trucks once or twice a month at a cost of 25-30 JOD (in some cases even up to 50 JOD, equivalent to 67 EUR). Prices are not regulated by the state and are many times higher than normal sewage charges. This results in annual costs of around 300 JOD, i.e. around 7% of the income of an average poor household. Septic tanks often overflow because families cannot afford regular emptying, which poses significant health risks due to contact with faecal matter and pathogens. Other tanks are directly connected to adjacent valleys, which poses an environmental risk due to the intrusion of groundwater.

17. Contribution to supporting sustainable capacities

The FC project comprised construction measures only. Accompanying measures to support the operator were not financed within the project. At the time, TC supported ministries, utilities and regulators in the water sector with the project " " (Water Management in Jordan). The project itself did not contribute to strengthening the sustainable capacities of the YWC. The *Capital Investment Unit* proposed during the review was never implemented. Equipment originally planned for the operation of the wastewater infrastructure, such as tools for lifting manhole covers, inspection mirrors and gas detectors, was removed from the scope of services for cost reasons. However, flushing vehicles had already been procured for the YWC in previous phases.

The project has increased wastewater capacity in the project region through the financed construction measures, thereby creating the basis for many households to connect to the sewerage network and abandon septic tanks, which are detrimental from an environmental and health perspective. So far, only part of the capacity is being used, even though connecting to the central sewage system is both cheaper and more convenient than maintaining a septic tank. Incorrect incentives are a major reason for this. For example, the one-off connection fees to the sewer network have to be paid by the owners of a house, even if it is rented out. The cost of pumping out the septic tanks, on the other hand, is paid directly by the tenants. This means that there is no financial incentive for owners to connect to the sewage network, especially in houses where a new septic tank has recently been installed. In addition, there are a significant number of households with illegal connections, which means they avoid paying water charges. This is possible because the operator does not sufficiently monitor official registration and there are few sanctions in place. In summary, it can be said that a significant proportion of the population does not pay any fees, despite or precisely because of the poor supply and disposal situation, and therefore does not contribute to maintaining the positive effects. There are no known conflicts between the local population and Syrian refugees regarding wastewater disposal.

Those responsible for the FC project are aware of this challenge and are currently considering whether it would make sense to use project funds to co-finance the connection of residential buildings to the house shaft in future projects. However, a peace and conflict analysis and a target group and stakeholder analysis could be carried out in future to determine where population density is highest in the project regions. Distinguishing between Syrian refugees living in small, rented flats in confined spaces and those staying with friends and relatives in larger houses can help to decide where connection fees should be covered by project funds. At the same time, care must be taken not to give Syrian refugees too much preferential treatment, as this could lead to distribution conflicts with the local population.

As numerous house connections have been built under the project and the physical sewage infrastructure is not yet fully utilised, the connection rate of households could be increased within a short period of time in the future, for example if a connection obligation is enforced. However, a sudden increase in the volume of wastewater could quickly overwhelm the pumping stations and screens at the treatment plant, which are only partially functional, and paralyse the entire wastewater disposal system in the region.

18. Durability of impacts over time

Poor maintenance affects the service life of the infrastructure built. In addition, the construction defects already described have damaged the existing infrastructure at the wastewater treatment plant. At the time of the evaluation (five years after the infrastructure was handed over), essential mechanical equipment (screens and pumps) had already been out of operation for over a year, leading to operational risks due to a lack of standby capacity and jeopardising the hydraulic performance of the entire system. As a result, any improvement in the situation may only be short-lived and increased sewage overflows due to pipe blockages may soon occur. The situation would be even worse if the sewage treatment plant did not have any functioning screens to remove coarse waste from the sewage before the treatment process.

The infrastructure built is not systematically maintained by the YWC; there is no register of the existing network and no inspection or flushing schedules. Regular inspections and maintenance measures are generally not carried out, except in Irbid, which is financed by Dutch development cooperation. Due to a lack of intermediate cleaning stages (including broken screens at a pumping station), waste and grease are only finally disposed of at the Mafrq sewage treatment plant, which overloads and damages the facilities there. Without a flushing schedule, organic material in the sewage network is not prevented from depositing and settling inside the sewage pipes, which can lead to the formation of gases and subsequent corrosion of the sewage pipes. At the same time, there is a lack of spare parts for pump and rake systems, which leads to long downtimes for the mechanical equipment. During the evaluation, the rake and crane system and the standby pump at the pumping station in Manshiyah Bani Hassan were already defective. At the second pumping station in Mafrq, the rake system was also out of operation and had already been removed for repair, as was the automatic level control for the pumps, meaning that the pumps had to be operated manually. The above-mentioned aspects lead to low load capacity of the sewage network and a significant reduction in the service life of the mechanical infrastructure in particular. The (economic) depreciation period is 50 years for the pipes, 15-20 years for the mechanical equipment and up to 12 years for the electrical equipment. The periods for mechanical and electrical engineering are expected to be shorter in this project because these service lives require proper maintenance. A reduction in the service life to approximately one third of the useful life of the machinery has been observed. The maintenance aspect was not sufficiently taken into account in the planning of the project, as can be seen, among other things, from the deep structures, which restrict access for easy maintenance. How long the wastewater disposal system in the region will remain functional also depends on the amount of wastewater expected in the future. In particular, an upcoming legal amendment that will require all households in the immediate vicinity of a house shaft to pay wastewater fees could increase the connection rate and lead to additional wastewater entering the existing network.

Due to YWC's consistently unsatisfactory performance, a management contract is once again under discussion, led by USAID. The GIZ *Water Governance Programme* is also working on necessary sector reforms and improving YWC's operational performance. The introduction of new digital applications should also improve operations in YWC's service area. However, due to multiple changes in YWC's CEO in 2023 and personnel changes in middle management, the planned long-term, sustainable anchoring is difficult to achieve. Due to the decline in USAID's commitment after US President Donald Trump took office in 2025, it is generally unclear how the planned measures for YWC and other wastewater measures will proceed.

To date, the potential impact of the projects has only been partially realised due to low connection rates. Compared to other water operators in Jordan, YWC, as the responsible utility for the northern governorates, has by far the lowest wastewater connection rates in the country (compared to Aquaba Water – 91%, Miyahuna – 82%). The low connection rate and the resulting low cost recovery continue to strain the financial sustainability of network operations. Formally, there is a connection and fee obligation in Jordan, but for political reasons it is not adequately enforced. At the time of the evaluation, a legal amendment was pending in Jordan that would require all households in the immediate vicinity of a domestic sewer to pay 30% of their drinking water bill for wastewater. It remains to be seen whether these measures will increase the connection rate in future projects. However, it is still unclear to what extent these changes will be implemented and enforced by the operator. In September 2023, a cabinet draft was passed to gradually increase the tariff blocks for water and wastewater charges over the next six years. The first increase, which is expected to generate a total revenue increase of around 5%, was implemented on 1 December 2023. In addition, increases are to be implemented in December of each of the next five years, but not equally for all income groups in order to keep costs socially acceptable. So far, criticism from the population has been very muted. However, even with the legal and tariff adjustments, YWC is not expected to fully cover its operating costs by 2030. Full coverage of operating costs can only be achieved through the implementation of more comprehensive reforms in the tariff structure, which the Jordanian government is currently not prepared to do.

At the same time, the Jordanian government has little fiscal leeway to increase subsidies due to its high public debt (102% of GDP according to the EIU, May 2024). Jordan has had a high current account deficit for years, which stood at 5% of GDP in May 2024. This leads to high foreign debt and debt service ratios, but exchange rate risks remain manageable due to the fixed exchange rate to the US dollar. Rising tourism and export revenues have recently had a positive impact on the deficit, but could be dampened by the war between Israel and Hamas. However, further reforms to increase revenues are urgently needed. Structural obstacles, including high unemployment and low human capital, are also weighing on the economy.

Rating summary

Given that, according to current estimates, only 45% of national drinking water demand can be met from groundwater resources by 2040, greater attention to the sustainable operation of existing facilities by key players in the water sector would have been expected. However, according to UNDP, even after decades of commitment by Western donors, the sustainability of water resource management is not guaranteed. Wastewater treatment plays a central role in Jordan's National Water Strategy 2023-2040. At present, the sustainability of the project can be assessed as rather unsuccessful. Neither the human nor the financial capacities of the actors involved are sufficient to ensure the sustainable operation of the infrastructure that has been built. The additional operating costs, which are only inadequately covered by tariff revenues, also burden the economic viability of the operator. The sponsor and operator do not seem to have the necessary political will – or the will – to change this. Operation and planning are carried out on an ad hoc basis, even though the problems are well known, ranging from daily maintenance and low legal connection rates to an inadequate tariff structure.

Sustainability: 4 (both projects)

Overall rating: 4 (both projects)

The project was reviewed and implemented as an urgent project against the backdrop of a rapidly growing number of Syrian refugees and fears of an overload of the social and economic infrastructure in northern Jordan. The targeted improvement of the wastewater situation and the protection of groundwater resources are highly relevant to development policy in the country context and are in line with national strategies. However, this goal was not and is not an urgent need for the target group consisting of Syrian refugees and host communities. Discussions with the Jordanian authorities and the local population conducted during the evaluation also made it clear that wastewater did not pose a demonstrable potential for conflict between refugees and local residents and therefore made little contribution to stabilising the situation in Jordan. This, together with other conceptual weaknesses, reduces the relevance of the project in retrospect.

The project succeeded in substantially expanding sewage capacity in the target region. However, even when illegal household connections are taken into account, capacity is far from being fully utilised. In fact, even optimistic estimates put the utilisation rate well below the target value. In addition, construction defects have damaged existing infrastructure at the sewage treatment plant, increasing the vulnerability of the entire sewage network in the project region. Poor road conditions have also led to a legal dispute between the municipality of Mafraq and the WAJ, which has not yet been resolved. The effectiveness of the project can therefore no longer be considered successful, and its overall impact can only be assessed as limited.

In retrospect, the evaluation team sees no compelling reason for the limited sustainability claim made during the review. Since the project was designed from the outset as a long-term wastewater infrastructure and indicators were defined that did not focus on the emergency nature of the project, the evaluation also assesses sustainability against the backdrop of a standard wastewater project. Since the infrastructure that has been built is not being maintained, the operator does not have the human and financial resources to do so, and, above all, none of the relevant stakeholders (WAJ and YWC) have any intention of changing this in the foreseeable future, sustainability is unlikely to be successful.

Contributions to the 2030 Agenda *Universal applicability, shared responsibility and accountability*

The project aims to ensure the efficient and sustainable management of scarce water resources, thereby contributing to the achievement of SDG 6 (clean water and sanitation) and SDG 13 (Climate action). It is in line with the development policy priorities of the German Federal Government and the partner country, where the project supports the Jordanian Water Strategy 2023-2040. Increased water recycling allows for more efficient use of scarce groundwater resources in Jordan. This in turn is intended to strengthen the country's resilience to the effects of climate change. The measure was implemented in close coordination with other donors and was synergistic with them.

Interaction between economic, ecological and social development: The project was designed to promote all three dimensions of sustainable development. Improved, piped wastewater disposal promotes ecological development by reducing groundwater contamination and water scarcity. In the medium and long term, connection to the sewerage system is more cost-effective and convenient for users than emptying septic tanks and is therefore economically viable. A regulated wastewater disposal system can have a positive impact on health and overall quality of life, thereby contributing to social development.

Inclusiveness, leaving no one behind: The project aimed to support refugees in a region that is disproportionately affected by poverty in the national context. In principle, the project measures were accessible to all people in the catchment area. However, no attempts were made to promote particularly disadvantaged groups. Nevertheless, the project meets the overall requirement of inclusiveness.

Project specific strengths/weaknesses and general conclusions/lessons learned

The strengths and weaknesses of the project include in particular:

- High relevance of the project for Jordan in terms of water recovery and reuse
- Rapid commitment of funds due to established German development cooperation structures in the water sector
- Increased connection capacity to the central sewage network and simplified connection in the future through the provision of numerous house connections
- Successful division of labour between various international donors.
- Persistent construction defects, which have mainly damaged existing infrastructure at the sewage treatment plant.
- Low willingness of the population to connect legally to the sewage network, especially among owners of rental properties, where many particularly poor people and Syrian refugees live.
- The sustainability and regularity of operation and maintenance are not sufficiently guaranteed. There is a lack of operating capacity and financial resources for sustainable operation.
- Without external financing, sustainable water management is currently hardly conceivable. Given the serious water situation, ownership on the part of Jordanian stakeholders (WAJ, YWC) and the population appears to be weak.

Conclusions and lessons learned:

- In contexts where the designated operators of the facilities to be financed are not expected to have sufficient resources for adequate maintenance, care should be taken during the project design phase to ensure that the installed facilities are easy to maintain and that spare parts are available locally/in the region.
- Experience from this and other wastewater projects shows that sometimes a significant proportion of the target group (e.g. landlords who would have to bear the connection costs but would not benefit from the lower running costs) have little interest in paying for a connection to the sewerage system. In such contexts, an analysis of the existing incentive systems can identify measures to increase connection rates. Examples include direct financing of the one-off connection fee, the payment of connection premiums or the raffling of attractive prizes for newly connected customers.
- In order to increase the chances of at least temporary maintenance of the financed infrastructure, the signing of maintenance contracts can be anchored in the contracts between the FC and the project partner as an implementation agreement.

Evaluation approach and methods

Methodology of the ex-post evaluation

The ex-post evaluation follows the methodology of a rapid appraisal, i.e. a data-based, qualitative contribution analysis, and represents an expert judgement. This involves attributing impacts of the project through plausibility considerations based on a careful analysis of documents, data, facts and impressions. Where possible, this also includes the use of digital data sources and modern techniques (e.g. satellite data, online surveys, geocoding). Causes of any contradictory information are investigated, attempts are made to eliminate them and the assessment is based on statements that are – if possible – confirmed by several sources of information (triangulation).

Documents:

- Internal project documents: Final monitoring report, reports Part A and Part B to the BMZ from various years, target group and stakeholder analysis, as well as agency analyses from subsequent phases, comparable evaluations, final reports from the implementation consultant, module proposals and contracts.
- Analyses from the German development cooperation context: Development policy report, brief political economy analysis (PÖK), strategy paper for the water sector between German-Jordanian development cooperation (2011-2015)
- Information from the Jordanian side: Annual reports of the operator YWC, Jordan Water Utilities Monitoring Report 2022, National Water Strategy 2008-2022 and 2023-2040
- Other: "Influx of Syrian Refugees in Jordan – Effects on the Water Sector", Helmholtz Centre for Environmental Research (UFZ) on behalf of the MWI, February 2021

Data sources and analysis tools:

Data collection on site, primarily wastewater inflow figures at pumping stations (Manshiyah Bani Hassan and Mafrag) and the Almafrag wastewater treatment plant, data from the implementation consultant, on-site visits to selected structures, monitoring data from the operator, online databases of ministries and other donors, population figures from the Department of Statistics, statistics on refugee numbers from UNHCR.

Interview partners:

Project promoter WAJ, operator YWC, random survey of residents in the project region (four in total), other donors (AFD, USAID, UNICEF), implementation consultant, GIZ, WZ officer

The analysis of impacts is based on assumed interdependencies, documented in the impact matrix developed during the project appraisal and, if necessary, updated during the ex-post evaluation. The evaluation report presents arguments as to why certain influencing factors were identified for the identified impacts and why the analysed project presumably made which particular contribution (contribution analysis). The context of the development project is taken into account with regard to its influence on the results. The conclusions are set into relation to the availability and quality of the data basis. An evaluation design is the reference framework for the evaluation.

For project evaluation, the method offers a – on average – balanced cost-benefit ratio, in which the knowledge gained and the evaluation effort are in equilibrium, and allows for a systematic assessment of the effectiveness of FC projects across all project evaluations. The individual ex-post evaluations can therefore not fulfil the requirements of a scientific assessment in the sense of a clear causal analysis.

The following aspects limited the evaluation:

Insufficient data, contradictory figures. It is always challenging to evaluate a project for which there is no uniform and comprehensive data. In fragile contexts in particular, socio-economic data broken down by project region is not available for all population groups. Most refugees are not registered and many of them are staying with friends and relatives. It was therefore generally not possible to distinguish between local residents and refugees in terms of household connections.

Even the current number of household connections differed between the implementation consultant's figures and those provided by the operator. During the evaluation, the wastewater volume was requested from both pumping stations and the Almafrag wastewater treatment plant, but this did not provide a consistent or coherent picture. There had been many staff changes among all those involved, from the implementation consultant to the WAJ and the operator, between the start of implementation and the time of the evaluation. As a result, it was not possible to reconstruct the project details in full. Unfortunately, the YWC team that accompanied the evaluation was also unable to locate all the structures (house connections and manholes, as well as sewage pipes) that were

financed under the project. This reveals that there is no adequate knowledge management system in place and that the transfer of project information, especially at the operator level, is deficient. This appears to be a fundamental institutional problem at the governance level of the YWC, as there is no land registry or similar data management system in place, nor is there any indication that management intends to establish one. As the construction work was completed during the COVID-19 pandemic, the final inspection by the implementation consultant was carried out by people who were not part of the actual project team. Nevertheless, they had the most comprehensive knowledge of the project.

Methodology for evaluating success

A six-point scale is used to assess the project according to the OECD DAC criteria. The scale values are as follows:

- Level 1** Very successful: results significantly above expectations
- Level 2** Successful: results fully in line with expectations, without significant deficiencies
- Level 3** Moderately successful: below expectations, but positive results dominate
- Level 4** Moderately unsuccessful: is significantly below expectations and negative results dominate despite recognisable positive results
- Level 5** Unsuccessful: despite some positive partial results, the negative results clearly dominate.
- Level 6** Highly unsuccessful: the project is useless or the situation has deteriorated

The overall rating on the six-point scale is based on a project-specific weighting of the six individual criteria. Levels 1–3 of the overall rating indicate a “successful” project, while levels 4–6 indicate an “unsuccessful” project. It should be noted that a project can generally only be classified as “successful” in terms of development policy if the achievement of the project objectives (“effectiveness”) and the impacts at the overall objective level (“over-arching developmental impacts”) as well as the sustainability are rated at least as “Moderately successful” (rating 3).

The annex to this report is available upon request (German only).

Imprint

Responsible
FC E
Evaluation Department of KfW Development Bank
FZ-Evaluierung@kfw.de

Cartographic representations are for informational purposes only and do not imply recognition of borders or territories under international law. KfW accepts no responsibility for the currency, accuracy or completeness of the map material provided. Any liability for damages arising directly or indirectly from its use is excluded.

KfW Bank Group
Palmengartenstraße 5-9
60325 Frankfurt am Main, Germany