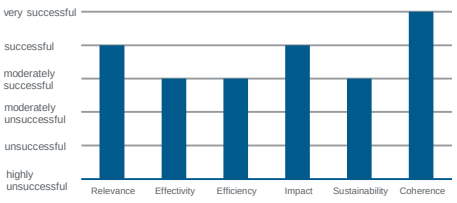
KfW Development Bank

Ex-post evaluation
Small and Medium-Sized Cities Waste Water Disposal II, Tunisia

Title	Small and Medium-Sized Cities Waste Water Disposal II		
Sector and CRS code	Water supply and sanitation – large systems (CRS Code 14020)		
Project number	1999 66 052		
Commissioned by	German Federal Ministry for Economic Cooperation and Development (BMZ)		
Recipient / Project-executing agency	Office National de l'Assainissement (ONAS); national waste water authority of Tunisia		
Project volume / Financing instrument	*EUR 23.6 million / composite financing*		
Project duration	*December 2005 – May 2019*		
Reporting year	2023	**Year of random sample**	2023

Overall rating:
moderately successful



Objectives and project outline

The objective at outcome level was the efficient, environmentally compatible and proper collection, treatment and disposal of household, commercial and industrial waste water at the programme sites. At impact level, the aim was to contribute to improving the hygiene situation in the towns and to protecting regional above- and underground water resources.

The project's approach was to achieve the objectives with investment measures to expand and rehabilitate the waste water systems at the programme sites. The design was not significantly altered during the course of the project.

Key findings

The project achieved a high level of development effectiveness. At the same time, compromises had to be made in terms of sustainability. The project was evaluated as "moderately successful" for the following reasons:

– The relevance is evaluated as successful, as the project is very well aligned with the relevant strategies and the needs of the target group. Current deficits in the executing agency's capacities could not be anticipated during the appraisal.

– The effectiveness of the project is evaluated as partially successful, as only some of the indicators are met. Although the operation of the sewage treatment plants can be improved, the overall sewage treatment is acceptable.

– Efficiency is evaluated as moderately successful. This is due to the substantial delays, some of which, however, were beyond the executing agency's sphere of influence to some extent (Tunisian Revolution). The activated sludge technology selected is suitable with regard to ONAS' strategy, but financially only somewhat efficient.

– The impact of the project is evaluated as successful, as the situation with the project represents a clear, relevant improvement in the areas of resource conservation and health situation compared to the situation without projects.

– Sustainability is evaluated as moderately successful, as some of the waste water treatment plants are run with insufficient funds and staff, but still operated in an acceptable manner.

– Coherence is evaluated as very successful, as the project fits in perfectly with other projects from ONAS, German FC and other donors.

Conclusions

– When designing projects, it is important to critically examine how well the executing agency cooperates with institutions outside the project that are relevant for certain sub-aspects (e.g. here: ANPE for water quality) and what influence can be exercised with regard to this point within the scope of the project.

– A high degree of accuracy in the choice of technology is all the more important the more limited the human and financial resources for operation and maintenance of infrastructure are.

– The reuse of sewage sludge and waste water may be subject to institutional hurdles, but should be systematically addressed in waste water projects, especially in countries affected by drought.

Ex post evaluation – rating according to OECD-DAC criteria

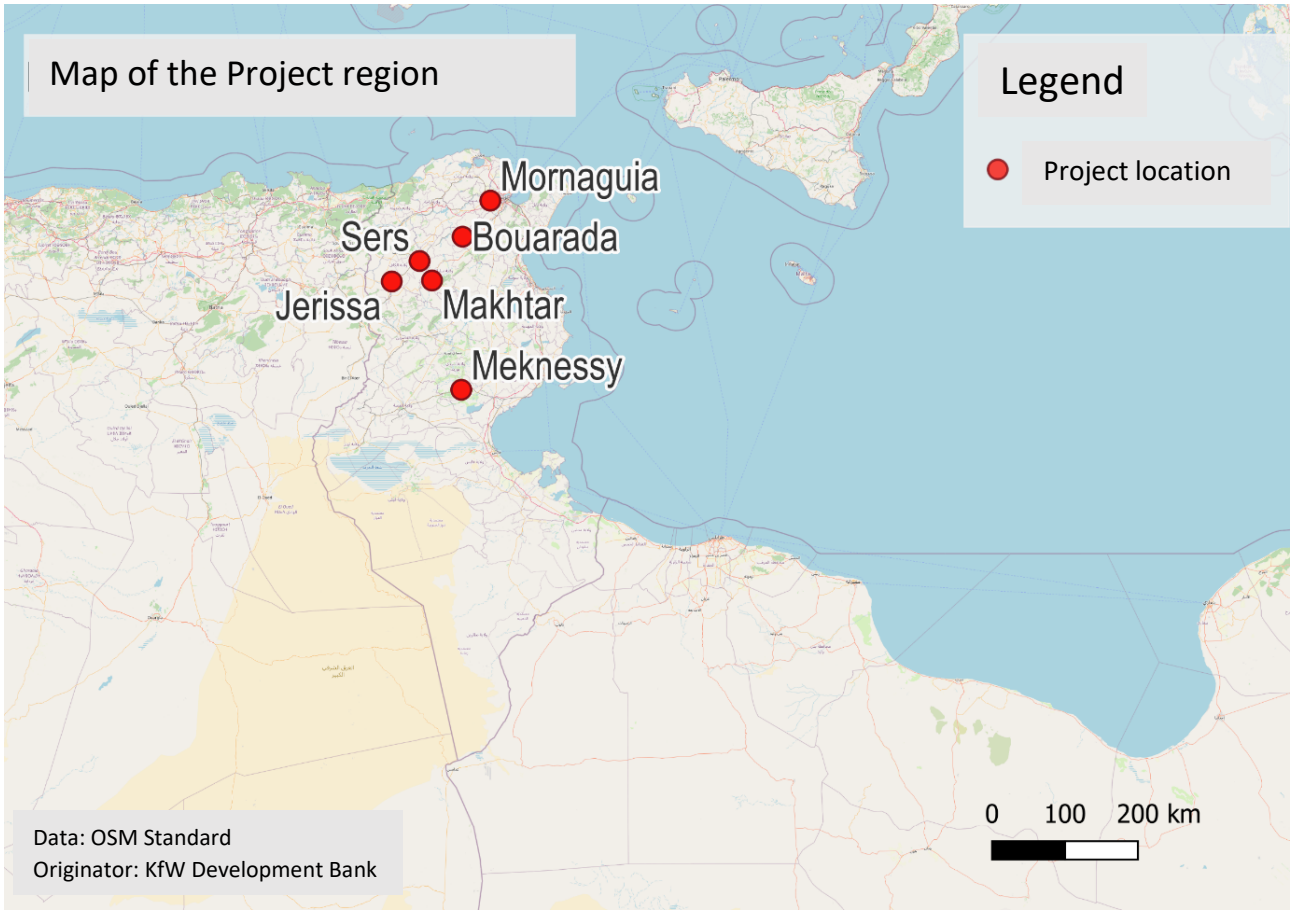
General conditions and classification of the project

The “Small and Medium-Sized Cities Waste Water Disposal II” project was audited in 2003, and the financed infrastructure was gradually put into operation from 2014 to 2018. Some of the project’s implementation therefore took place during the Tunisian revolution and the post-revolutionary years. The political, economic and social effects of the revolution for Tunisia as well as its effects on the Tunisian state apparatus must therefore be taken into account when evaluating the project.

Brief description of the project

In order to improve the environmental and hygiene situation in six small and medium-sized towns in central Tunisia, waste water disposal at the sites of Mornaguia, Bouarada, Sers, Makthar, Meknessy and Jerissa was improved by financing sewage treatment plants as well as rehabilitation and expansion investments in the existing networks. The target group was the population of the towns where the measures had been implemented.

Map of the project country incl. project locations



Breakdown of total costs

		Inv. (planned)[1]	Inv. (actual)[2]
Investment costs (total)	**EUR million**	**38.5**	**25.9**
Own contribution	EUR million[3]	14.9	2.3[4]
Debt financing	EUR million	23.6	23.6
Of which budget funds	*EUR million*	*23.6*	*23.6*

Evaluation according to OECD-DAC criteria

Relevance

Policy and priority focus

From a Tunisian perspective, the selection of the project's locations and measures aligns with the Schéma Directeur (blueprint) for the Medjerda Valley, the central strategy document of ONAS (Office National de l'Assainissement, national waste water authority) for the important Medjerda water catchment area. According to the appraisal report, the project's measures were also "in line with the priority area strategy paper on environmental protection agreed with the Tunisian government in March [2003]" at the time of the appraisal.

The programme's design corresponded to the intended division of responsibilities in the Tunisian water sector. In Tunisia, responsibility for waste water disposal lies with the municipalities, which can delegate this to ONAS, as was the case in the project at those locations where there was already (albeit qualitatively limited) waste water disposal at the start of the project. At the same time, the on-site discussions as part of the evaluation showed that the interaction between ONAS and institutions relevant to the waste water sector, such as the nature conservation authority (ANPE, responsible e.g. for the monitoring of water quality) and the Ministry of Agriculture (responsible e.g. for approving the reuse of sewage sludge or treated waste water in agriculture) does not work sufficiently. If applicable, further work could have been done on this point, as part of a complementary measure, for example; however, this was no longer desired at the time of the appraisal in view of the long-standing cooperation with ONAS and its performance. According to the appraisal report, in order to ensure adequate operation of the financed facilities, staff numbers were to be increased at the Bouarada, Makthar and Mornaguia sites, among other things. New operating units were to be set up for the sites in Meknessy, Sers and Jerissa, where ONAS was not yet active at the time of the appraisal. The question of the staffing level was therefore taken into account during the project appraisal. Although the three new operating units were established as planned, it must be noted for all sites that ONAS currently does not have sufficient capacities for operation and maintenance (anymore). This is mainly due to the fact that ONAS has not been permitted to hire staff since 2016 and does not have sufficient funds for the award of contracts to subcontractors (see also the Efficiency section).

Tunisia is currently experiencing a dry period that has lasted for around four years. Against this background, the protection of the scarce resource of water through measures to improve waste water disposal, which the evaluated project aims to achieve, is a continuing important political priority for Tunisia, both from the perspective of

[1] Figures from PA, Annex 9 (cost and financing plan)

[2] Figures from FI Report, using the exchange rate used there

[3] Exchange rates used during the course of the project in accordance with FI report:

Nov. 2003: TND 1 = EUR 0.71 (PAR)

May 2016: TND 1 = EUR 0.46

Dec. 2018: TND 1 = EUR 0.30

May 2019: TND 1 = EUR 0.28 0.2847878654649373

[4] Information from FI report: Own contribution of TND 3.75 million according to ONAS. To arrive at the total investment costs of EUR 25.91 million stated in the FI, based on FC financing totalling EUR 23.6 million, ONAS' own contribution is EUR 2.3 million. Since the TND-EUR exchange rate fluctuated greatly over the duration of the project, this approach of determining ONAS' own contribution in EUR (instead of a conversion according to the exchange rate) makes sense.

Tunisian policy and from the perspective of the German development cooperation. The ongoing relevance of the topics of resource protection and access to waste water disposal is demonstrated by the fact that the current Tunisia DC programme “Integrated Water Resource Management” identifies as a programme target indicator the number of people who benefit from new or improved waste water disposal and the number of people with strengthened resilience to the effects of climate change, including water scarcity.

Focus on needs and capacities of participants and stakeholders

The project addresses the need of the population to improve living conditions (protection against waterborne diseases, environmental protection, odours, pollution of residential areas) and to protect water resources. Due to the poor water quality of the receiving bodies of water, there was a problem at the sites with regard to the residents’ hygiene situation, the limited use of the receiving bodies of water as a water resource and the contamination of the ground water. The interviewed ONAS staff at the project sites confirmed the relevance of the project’s objective and the risks associated with the discharge of untreated waste water into receiving bodies of water were made clear by visiting an outlet that could not be improved as part of the project, as the residents did not want to sell the terrain for a pumping station. As a result, the untreated waste water continues to run into a ditch in the immediate vicinity of the entrance to the town. As ONAS reported, the local residents indicated their willingness to sell the property in question after the project had been completed and asked to build the pump station, which further underlines the project’s relevance with regard to the needs of the target group.

The concrete selection of the locations – and therefore the target group – was made jointly by KfW and ONAS on the basis of predefined criteria within the framework specified by the Schéma Director (blueprint) for the Medjerda basin. These included the following topics:

- Health hazard due to inadequate waste water disposal at the site
- ONAS takes over the waste water systems at the site or there is a consensus with the community that this is to take place
- No risk to the treatment process at the sewage treatment plant due to heavily contaminated industrial waste water (preliminary treatment system or commitment to install one)
- Estimated investment costs over TND 1.5 million per site

Since the present project financed measures that could not be implemented in the previous phase due to long preparation times, the selection of project locations was already made during the appraisal of the first phase. At the time of the appraisal, a sector-wide assessment of the possible reuse of the treated waste water or the possibility of converting biogas into electricity at the sites was carried out. However, due to a wide range of factors (including the need for an additional treatment stage and associated additional costs), feasibility was not guaranteed. This assessment also makes sense today with regard to the consequences of climate change. A brief documentation of the reasons why reuse was not feasible at the time would have been interesting with a view to possibly readressing the issue as part of later projects.

Based on the statements of ONAS employees and the on-site inspections, it is clear that improving waste water disposal at the project sites was a relevant need of the target group. The desired targets – improving the hygiene situation and resource protection – can only be achieved through broad-based measures at the sites. Therefore, a further differentiation of the target group, e.g. by age or gender, was not relevant. For this reason, it can also be assumed that it would not have been expedient to redesign the project implementation at the locations or to support it with a complementary measure in such a way that additional significant gender effects are achieved. From today’s perspective, it might have been possible to initiate gender equality processes on an institutional level within ONAS, for example through the development or promotion of measures for gender equality (Gender Action Plan). However, such measures, which are not directly linked to the investments, have only gained importance since the social and political change in Tunisia that came with the Arab Revolution and could therefore not be expected at the time of the appraisal.

For low-income households, ONAS provides for socially affordable payment by instalments for the connection fees, which extend the payment of the amount (TND 400) to 32 quarterly instalments, i.e. to eight years. Tariff payments are calculated on the basis of drinking water consumption, so households have an influence on the amount of their bills, with tariffs not being so high that they become a burden for low-income households.

Appropriateness of design

The core problem addressed by the project is the pollution of above- and underground water resources as well as the hygiene situation at the sites that needs improvement due to inadequate waste water disposal. The selected measures – building sewage treatment plants while simultaneously expanding and/or improving the waste water networks at the sites – are generally suitable for contributing to solving the core problem. From a technical perspective, the project's strategy is largely appropriate and realistic. The locations of the plants visited and the places of discharge into the receiving bodies of water are appropriately chosen. This also applied to the dimensioning of the plants at the time of the appraisal, but the planned utilisation rates were not actually achieved at several locations for various reasons (see Efficiency section). In financial terms, the project benefited from a sharp decline in the dinar during the implementation period, as this meant that all planned measures as well as some additional measures (expansion of the networks at the Mornaguia site) could be financed without any problems. The costs per inhabitant assumed at the appraisal were also reasonable. The high cost increase in TND is due to the long implementation time as well as inflation over time and could not be foreseen at the time of the appraisal. The organisational appropriateness of the strategy is called into question by the staff shortage at ONAS. However, this was also not foreseeable at the time of the appraisal, as the hiring stop at ONAS only took place later (see above). In principle, the strategy was therefore suitable at the time of the appraisal to contribute to solving the core problem, although this is only true from today's perspective with the aforementioned limitations.

From an impact perspective, the design of the programme is generally plausible; the traceability of the target system and the underlying measures is fully ensured: All stages of the results chain, from building the planned waste water infrastructure (output level) to improving waste water disposal (outcome) and thereby improving the hygiene situation and environmental protection (impact), are completely plausible. At the same time, there are deficiencies in the precision and verifiability of the target system at some points. For example, no indicator for improving the hygiene situation and resource protection was defined at impact level and, consequently, no baseline studies were carried out[5] to record the situation before the start of the project's implementation. This means that the plausible impact assumptions cannot be verified quantitatively. At outcome level, the indicators are coherent and expedient in terms of content but are only partially meaningful due to the choice of target corridors instead of threshold values. It would have been possible to choose a relative point in time ("x years after commissioning") for a review instead of an absolute date ("beginning of 2011"). In addition, some indicators are redundant (e.g. Indicators 1 (connection level of households), 2 (treated volume of waste water) and 4 (utilisation level of the sewage treatment plant)): the capacity of the individual plants was determined at the time of appraisal and not changed afterwards. It is therefore a fixed variable. Therefore, for example, 80% capacity utilisation always equates to a specific wastewater volume in m^3. The waste water volume also allows conclusions to be drawn about the connected households, as no significant change in consumption was expected during the appraisal, and no larger individual dischargers were taken into account. With regard to the design of the target system, an indicator for the specific energy requirement (guideline value: 1 KWh/m^3) or for the specific CO_2 emissions (guideline value: 0.8kg CO_2/m^3) would be advisable from the current perspective. As a result, overall, the target system is appropriate in terms of content, but is compromised in terms of precision and verifiability/quantitative significance.

The programme's design essentially takes into account a holistic approach to sustainable development (interplay of the social, environmental and economic dimensions of sustainability). This is reflected in the impact level objective, which, in addition to the ecological objective of environmental protection, mentions the social dimension of improving the hygiene situation as an equally important objective.

With regard to the social dimension of the project, the question arises as to whether measures to raise public awareness could have been implemented as part of a complementary measure that could have contributed to faster implementation of the project. It should be noted that consulting with the population – as well as residents' protests – were hardly conceivable before the revolution in Tunisia. Therefore, it probably would not have been feasible to carry out awareness-raising measures at the time of the project appraisal, even if they could probably have contributed to a faster implementation of the project from the revolution onwards at the latest.

[5] Possible indicator for improving the hygiene situation, e.g. recording of the number of diarrhoea cases via local healthcare providers (doctors, hospital wards, hospitals), even if this only covers some of the actual disease cases; for resource protection, e.g. survey of water quality in receiving bodies of water and/or ground water.

Response to changes/adaptability

The only major adjustment to the project concept was made at the Meknessy site. Due to the protests by local residents, it was not possible to discharge the treated waste water into a wadi as originally intended. After this dispute had led to major delays, the problem was solved by means of ground water infiltration, so that the treated waste water on the site of the sewage treatment plant evaporates via retention basins or infiltrates into the ground water.

Summary of the rating:

In summary, it can be stated that, due to its concept, the project was very well aligned with the relevant policies and priorities, as well as with the needs and capacities of those involved and affected. Certain, currently identifiable restrictions with regard to the ONAS staffing level were not foreseeable at the time of the appraisal and could therefore not be anticipated. The project's overall design was appropriate but was compromised in terms of the target system's precision and verifiability. The project was adaptable. The "Relevance" criterion is evaluated as "successful" overall.

Relevance: 2

Coherence

Internal coherence:

According to the appraisal report, the "Small and Medium-Sized Cities Waste Water Disposal II" project is directly related to several other German Financial Cooperation projects in Tunisia, as part of which sewage treatment plants and waste water collection systems were also renovated and expanded. This includes in particular the first phase of the project, in which the locations were identified. At the time of the appraisal, there was also a connection to the "Industrial Environmental Fund I – III" projects, which promoted the construction of industrial preliminary sewage treatment systems, among other things, as well as to waste disposal projects, which included the construction of landfills for household and hazardous waste.

The project was integrated into the DC programme "Integrated Water Resource Management in Tunisia" with the programme reporting dated 6 December 2019, i.e. in the year of its final inspection. Previously, there was no joint DC programme proposal for the water and waste water sector projects in Tunisia. Rather, the projects were based on a priority area strategy paper adopted jointly with the Tunisian government. During the implementation phase, there was no cooperation with German TC (GIZ, PTB or BGR) as part of the project.

According to the appraisal report and from today's perspective, the project is in line with Millennium Development Goal No. 7 (Ensure Environmental Sustainability), in particular with its sub-goal "Improve basic sanitation". There are no discernible inconsistencies between the project and international norms and standards.

External coherence

The project's measures align with ONAS' strategic direction. On the one hand, the measures are embedded in the overarching Schéma Director (blueprint) for the Medjerda basin according to ONAS. On the other hand, they fit into ONAS' general strategy to improve nationwide waste water disposal by building sewage treatment plants (2003: 61 sewage treatment plants under the responsibility of ONAS, 2023: 125 sewage treatment plants). There is also coherence with ONAS' other activities in the Tunisian waste water sector with regard to the choice of technology (activated sludge treatment as standard procedure at all ONAS waste water treatment plants). In addition, the operating model selected by the project aligns with ONAS' general procedure; most of its systems are operated by private subcontractors due to staff shortages, while it operates a few plants itself.

The project is also coherent with the activities of other donors in the waste water sector and supplements or is supplemented by these. One example is the AFD (Agence française de développement), which is currently conducting a study on the reuse of treated waste water with ONAS. Their results should also be relevant for the present project. According to the appraisal report, regular consultations with the World Bank and the EIB (European Investment Bank) took place at the time. German Financial Cooperation is also in regular dialogue with other donors for activities in the sector, mainly with the World Bank, the AFD and the African Development Bank ADB.

The project's design was based on the use of ONAS' existing structures (e.g. in terms of disbursements, invitations to tender, accounting, operation). There is no evidence of the use or existence of common systems for follow-up, evaluation, institutional learning or accounting by partners, other donors or international organisations.

Summary of the rating:

The project exhibits a very high level of internal coherence with regard to German development cooperation projects, as well as a very high level of external coherence with projects of other donors working with ONAS in the waste water sector.

Coherence: 1

Effectiveness

Achievement of (intended) targets

The objective defined in the module proposal at impact level was to contribute to improving the hygiene situation at the project locations as well as to protecting regional above- and underground water resources. Subordinate to this was the module objective[6] of ensuring efficient, environmentally compatible and proper collection, treatment and disposal of household, commercial and industrial waste water at the project sites.

Since the measures could essentially be implemented as planned, the module objective did not have to be adjusted as part of the EPE. The achievement of the objective at outcome level can be summarised as follows (for the formulation and selection of indicators, see the section on "Relevance"):

Nr.	Indicator	Unit	Status at PP	Target value PP	Actual Value at final inspection	Actual value at EPE						Comments
			11-2003	11-2003	06-2021	05-2023						
						Momaguia	Bou Arada	Makthar	Sers	Jerissa	Meknessy	
1	Degree of connection of households and industrial enterprises to the sewage network	%	0	HH: 70-95	On average 60%	65	52	60	81	47	59	individual economic operators (olive oil mill) are not connected
				Industry: 70-100		80	100	100	-	-	-	
2	Purified sewage	m³/d	0	4.000 bis 5.800	6.900	5.800	1.200	900	200	210	1262	Total 9.572 without Jerissa
3	Effluent values at the sewage treatment plants	mg/l	-	BSB 30 mg/l CSB 90 mg/l SS 30 mg/l	BSB 20-30 mg/l CSB 60-90 mg/l SS 10-20 mg/l	10 48 13	136 306 50	49 186 81	29 86 30	22 44 18	27 86 30	
4	Load factor of sewage treatment plants	% at peak load	-	> 70 %		C. 6.000 Q 5.800 96%	C.1.450 Q.1.200 83%	C.1.100 Q. 900 82%	C.1.520 Q. 200 13%	C. 700 Q. 210 30%	C.1.360 Q.1.262 93%	C = Capacity; Q = Peak day flow
5	Proper disposal of sewage sludge / use in agriculture	%	-	complete disposal		Sufficiently dried sewage sludge is properly stored in all plants, but no recycling takes place						Quantities according to ONAS at 10-17t/month with 40-80% dry

Contribution to achieving targets

Only two of the five project indicators can be considered to be fully achieved. These are the total amount of treated waste water (Indicator 2) and the proper disposal of the sewage sludge (Indicator 5). Factors that influence the achievement of the individual indicators can be summarised as follows:

Indicator 1 (degree of connection of households and industrial enterprises to the waste water network):

For this indicator, the appraisal report does not clearly show whether the required connection rate relates to the total population of a city or only to the districts supplied. In order to achieve the objective at impact level, however, only the connection rate in relation to the total population after completion of the project implementation plays a role. This value was therefore used as the basis for the evaluation of the indicator.

[6] At the time of appraisal: "Project purpose"

There is a connection requirement in Tunisia, i.e. households within 50m of the sewage pipe must pay the sewage fee, regardless of whether they are connected and how much they discharge. The waste water fee is calculated according to the consumption of drinking water. This leads to a comparatively high actual connection rate of over 85–90% in the districts where a waste water network is available. The homeowners therefore benefit if they get connected to the network, as costs to empty the septic tanks are no longer incurred and they have to pay the waste water fee with the water bill anyway.

In most project locations, the network also covered the existing development at the time of implementation, and the connection level therefore meets the specifications from the module proposal. The city of Sers is an exception to this. Here, the network does not cover the entire residential area and therefore a connection rate of only 50% is achieved. A cause (e.g. poor planning, extremely strong development growth straight after the project) could no longer be determined as part of the EPE in view of the long period since the appraisal. Due to land issues, it was not possible to build all the planned pumping stations in Makthar, which means that five districts with a population share of approximately 20% are not connected to the sewage treatment plant.

Furthermore, there is no connection obligation for commercial and industrial companies. Although the larger industrial plants explicitly mentioned in the module proposal were connected to the respective sewage treatment plant and have some preliminary treatment facilities, no reliable information was available at the time of the EPE about all industrial and commercial plants in the respective catchment areas. It is also known that an olive oil mill in Meknessy is not connected, that the slaughterhouse in Makthar does not have any preliminary treatment facilities and that not all businesses in Mornaguia have a waste water connection. Based on the available data, no clear statement can be made as to whether an industrial connection rate of 70% is achieved overall.

Despite the undoubtedly high connection rates in the areas with a waste water network, we consider this indicator to not be fully achieved due to the described problems in Sers and Makthar as well as due to the fact that commercial and industrial companies are clearly not connected.

Indicator 2 (treated volume of waste water):

A total of 9,572m³ of waste water is currently treated per day. The value is therefore well above the specifications from the appraisal, so that the indicator is achieved. With a total installed capacity of 12,190 m³/d across all plants, the amount of treated waste water corresponds to around 75% – an acceptable value for the period of five to eight years after commissioning of the plants.

Indicator 3 (effluent values at the sewage treatment plants):

Three out of five sewage treatment plants (Mornaguia, Makthar and Meknessy) comply with the effluent values. The Bouarada and Sers sewage treatment plants sometimes exceed the limit values. The reason for the non-compliance is the inadequate supply of oxygen to the activated sludge tanks. The oxygen measuring probes in the tanks, which are meant to automatically regulate the oxygen supply, are defective at most plants. The oxygen supply is therefore controlled by a timer. This procedure does not allow for reaction to the current biological load in the tank, which inevitably leads to the limit values being exceeded for a period.

When asked about the sludge concentration in the tanks and the sludge age, the operating staff were usually unable to give a satisfactory answer. However, both parameters are of substantial importance for properly managing the treatment process and complying with the effluent values.

ONAS analyses the quality of the inlet and outlet only once a week as a composite sample (multiple sampling over a longer period; sample is then analysed as a composite). Normally, sampling should be done daily, but for smaller plants this can be done at least two to three times a week. It can therefore be assumed that the presented analysis data does not always reflect the actual purification capacity of the plants.

Indicator 4 (utilisation rate of the sewage treatment plants):

With the exception of the Sers sewage treatment plant, all plants meet the requirement of 70% utilisation at peak load.

Hydraulic overload of the sewage treatment plants has not yet occurred, as not all cities have yet reached the projected household connection rate and the associated waste water volume. Furthermore, due to the apparently

well laid network, there does not appear to be any excessive infiltration of rain water in the catchment areas of the sewage treatment plants.

Biological overload only occurs (intermittently) at the Bouarada sewage treatment plant when untreated waste water from a battery production facility arrives at the plant. This is also reflected in the poor effluent values of this waste water treatment plant.

Indicator 5 (proper disposal of sewage sludge/use in agriculture):

At all plants, the sludge produced (approx. 10t to 17t per month) is pumped onto the dry beds (in Mornaguia, mechanical dewatering is also carried out by means of a belt filter press) and dried for approximately two to four months. The sludge therefore achieves a drying degree of approximately 50–80%. It can therefore be assumed that the sludge is sufficiently stabilised. Sludge analyses carried out by an independent laboratory consistently demonstrate compliance with Tunisian standards. Until now, no heavy metal contamination has been detected.

Since there are no customers for the sludge yet and the Tunisian regulations do not provide for use in agriculture or only provide for this under very strict conditions, sludge disposal is currently carried out on the premises of the individual sewage treatment plants, usually on a concrete storage area provided for this purpose (equipped with a drainage system in Makthar). However, neither the amount of sludge generated, nor the quality of the sludge pose any threat to the environment. We therefore consider the indicator to be achieved, even though the sludge is not disposed of at a disposal site.

Farmers who cultivate the fields adjacent to the sewage treatment plants are very interested in using the sludge as fertiliser. However, there is no corresponding legislation, but it is under discussion. It therefore makes sense to leave the sludge at the plants, close to future customers, and not to dispose of it at a disposal site. The amounts of sludge found during the visits also suggest that sludge from some sewage treatment plants has already been transported and reused by farmers despite the lack of official permission.

Quality of implementation

The sewage treatment plants and waste water networks at the five locations visited appeared to be in good condition. No leaks in the tanks could be detected. The electromechanical machinery was operational except for the oxygen probes. There were problems with the mechanical rakes, which, according to the local ONAS employees, often tilt, depending on the manufacturer. At the sewage treatment plant in Makthar, the control panel that controls the treatment processes fails quite frequently.

The sewage networks, which were randomly inspected by opening manholes, appear to be well laid; no signs of blockage could be identified. According to the operators, these only occur occasionally and are presumably due to solid waste getting into the system.

The pumping stations visited in the waste water networks were usually simple in design, functional and adequately maintained. However, all of the installed air filters no longer work. This is due to the filter material (peat), which should be replaced regularly but which is not available in Tunisia. ONAS has no funds to order this from Europe. However, the odour pollution at the pumping stations was not significant, so the impact of this planning deficit can be assessed as small.

The operators did not complain of major planning errors or incorrect dimensioning of plant parts, nor were they observed.

During the course of the project, several international engineering firms were involved. This was due to the fact that the designs and tender documents were already produced in the first phase of the project (separate FC financing), within the framework of which they were originally also to be implemented, but a new invitation to tender for the consulting services had to be carried out for the supervision of work.

The planned implementation period of 27 months could not be adhered to. The plant in Mornaguia was the first to be commissioned at the end of 2015. The plants at the Jerissa, Sers and Bouarada sites were put into operation in 2017. Due to land issues in Makthar and resistance to the planned discharge point by the population in Meknessy, these two sewage treatment plants were not completed until the end of 2018. The project's

implementation period was therefore a total of 161 months from the signing of the loan agreement in December 2005 to the final inspection in May 2019.

Apart from the delay, the executing agency ONAS proved to be able to implement the measures as planned. ONAS, supported by the implementation consultants, was able to respond to the changes that were necessary due to resistance from the population and land issues. However, the administrative processes required for this were very time consuming.

Unintended consequences (positive or negative)

Due to the protests of the residents against the plans for a sewage treatment plant to feed into a wadi, infiltration basins were built at the sewage treatment plant in Meknessy, through which the treated waste water infiltrates into the ground and/or evaporates. A third treatment stage with sand filtration and UV disinfection was also installed for this. The tanks are functioning well; so far there has been no overflow and no excessive sludge. The operator loads the tanks properly and carries out the necessary cleaning work. According to the analyses submitted, the microbial contamination of the waste water still present after disinfection complies with Tunisian standards.

There is no experience in Tunisia with ground water enrichment with treated waste water, but there is interest in using this procedure to fill the ground water pipes in water-poor regions. In Meknessy, this would have presented the opportunity to gain initial experience from this pilot project. Unfortunately, no control measurements with regard to the rise of the acquifer and the quality of the ground water have been carried out so far. There is also a lack of measuring points required for this. The retrofitting of a monitoring system is possible with limited effort and could be initiated soon.

Unlike the reuse of sewage sludge, the reuse of waste water in agriculture was not explicitly planned in the project design as this was not feasible at the time of the appraisal. This was due in particular to the additional costs of a third treatment stage, which would have been required for recycling. However, due to the ongoing and increasing water shortage in Tunisia, the use of waste water for irrigation is currently an important topic on the political agenda. As a result, there is growing social pressure on ONAS to make effective use of the waste water it treats. The possibility of using the waste water below the sewage treatment plants on controlled irrigation perimeters exists for each of the sewage treatment plants built, so from today's perspective it appears advisable to re-examine possible reuse options if necessary. In addition to clarification of the technical and economic feasibility, coordination with the Ministry of Agriculture would be necessary for this, as would awareness-raising measures with the farmers' associations concerned, with which purchase agreements would have to be concluded.

Summary of the rating:

Overall, only two of the five indicators could be regarded as fully achieved. However, the choice of indicators appears redundant, especially with regard to the utilisation rate of the sewage treatment plant, as this information can already be derived from the waste water volume indicator. In summary, it can be stated that the project measures have significantly improved the hygiene situation and living conditions of the population concerned. This objective is also achieved if not all city districts and industrial enterprises are connected yet. There is no doubt that the operation of the sewage treatment plants can be improved. However, acceptable waste water treatment according to Tunisian standards takes place on an annual average across all plants.

Effectiveness: 3

Efficiency

Production efficiency

As a result of the project, six sewage treatment plants with a total treatment capacity of 12,190 m³/d were built for a population of an estimated 176,000 inhabitants, as well as a 260km pipeline network including 18 pumping stations and 8,000 house connections. The total costs for all measures amount to close to TND 91 million. At the current exchange rates, this equates to EUR 25.9 million. This results in calculated specific costs of around EUR 137 per inhabitant according to the selected degree of expansion (175,000 inhabitant equivalents). Taking the actual number of inhabitants currently connected as a basis, specific costs amount to around EUR 240 per

inhabitant (100,000 inhabitants connected). For a waste water project including a sewage treatment plant and network, this is a low figure (taking into account a comparable project in the greater Amman area (Jordan, Nexus programme, BMZ no. 2013 66 848): EUR 400/inhabitant). However, it must be taken into account that some locations already had a partial waste water network and only the connections to the sewage treatment plant had to be built. The settlement structure is also comparatively dense, and the supply rate per kilometre of network is therefore high.

In Bouarada and in Sers, the concrete structures for a second treatment line (aeration tank) were erected during implementation, but not equipped with the electromechanical aeration devices. While the retrofitting of machinery in Bouarada is now necessary due to the increased waste water volume, in the case of Sers, the question has now arisen as to whether it would have been more expedient and cost-effective to build the concrete structures at a later date due to the current low utilisation rate.

A total of EUR 1.2 million was spent on consulting services. The planning and construction monitoring share is therefore only 5% of the total costs. The low share can be attributed to the fact that designs and tender documents from the first phase were already available for the project sites.

The module proposal envisaged an implementation period from 2002 to 2007. Due to delays in awarding contracts for consulting and construction services as well as delays due to necessary changes because of land issues, the implementation period was extended during the course of the project until 2011. Nevertheless, the first waste water network in Mornaguia was not commissioned until the end of 2015. Due to the change of location, the plant in Makthar was not even connected to the network until the end of 2018. As a result, there was a significant delay of eleven years compared to the project appraisal. This is also due to the time-consuming approval processes on the part of the Tunisian administration for the award of contracts for almost 50 different building and delivery lots. Although this small-scale structuring has additionally enabled smaller, local companies to participate in tenders, in retrospect, consolidating lots appears to be more expedient and time-saving.

Allocation efficiency

Given the low waste water volumes at the project sites, another treatment technology, such as trickling filters or plant-based treatment plants with similar and acceptable treatment values would have been possible options. These technologies entail lower operating costs and would have also made a later expansion (trickling filters) or conversion (plant-based sewage treatment plant) possible. For a waste water volume of less than 2,000 m³/d, the activated sludge technology chosen appears comparatively expensive, especially when considering the low biological load of the waste water with only 350 mg/l BOD. However, ONAS insisted on this type of treatment, as it uses only this technology nationwide in Tunisia and expects synergy effects from it.

With the selected procedure, it is generally possible to achieve good nitrogen elimination through targeted and time-variable oxygen supply management. However, this is not yet practised at the sewage treatment plants. The effluent values for nitrogen and, to a limited extent, also for phosphorus are usually above the limit values. Here, greater efficiency could have been achieved with the resources used and additional training.

At present, ONAS is unable to cover the operating costs (on average EUR 0.20 per m³ of treated waste water) with revenue from the waste water fee. The cost recovery ratio for ONAS overall (and therefore at country level) was 66% in 2021. Due to the most recently implemented annual tariff increases (2022: 8%, planned for 2023: 11%), coverage of 75% is forecast for 2023. It is expected to reach 100% by 2026. As part of the Contrat programme, the Tunisian state undertakes to compensate for the lack of covering of the costs by means of subsidies.

Summary of the rating:

Although a consolidation of the lots would have resulted in a lower number of contracts and permit processes and thereby a shorter implementation period, the implementation of waste water infrastructure in rural areas is often associated with resistance from the local population, and delays are often inevitable throughout the implementation period.

The activated sludge processing technology used is not the most efficient from an economic point of view. Nevertheless, the fact that ONAS is familiar with this technology, combined with experience and synergy effects with

other plants, must be taken into account when evaluating efficiency. We therefore rate the criterion of efficiency as moderately successful.

Efficiency: 3

Impact

Overarching developmental changes (intended)

The objective confirmed at impact level as part of the EPE was to contribute to improving the hygiene situation at the project sites as well as to protecting regional above- and underground water resources. No indicators were defined for the objective, as it was assumed that achieving the module objective would make a plausible contribution to achieving the impact. Since no baselines have therefore been established, the question of overarching development policy changes can only be answered qualitatively here. The discussions with local ONAS representatives and with the local population during the evaluation trip clearly showed that there are identifiable improvements with regard to the hygiene situation and resource protection that are attributable to the project. Even if current data is not available, e.g. on diarrhoea cases, the comparison of the situation in the districts connected to waste water disposal with the site visited in Makthar, where a pumping station could not be built due to land disputes, alone shows the clear difference in terms of environmental pollution and health hazards between where the project's measures have and have not been implemented. As intended during the project appraisal, the local population at the sites benefits from these improvements. This also applies to poorer sections of the population, which can be considered a vulnerable part of the target group. At the same time, not all districts were connected to the waste water network at all locations. For the reasons and effects, see the Effectiveness section (effect at output level). However, the inhabitants of the non-connected districts also benefit from the effects achieved by the project in the area of resource and environmental protection, as they also benefit from the long-term securing of ground water resources as a source for the drinking water supply.

Contribution to overarching developmental changes (intended)

The intended development policy changes that were achieved in the areas of hygiene conditions and resource protection according to the local discussion partners are clearly attributable to the project. The expansion of the waste water networks and the building of the sewage treatment plants financed by the project have improved waste water disposal at the project locations, which has led to the described positive effects. No other relevant reasons for the improvement in the situation have been determined. Therefore, the measures contributed fully to the development policy changes and largely achieved their intended development policy objectives, with the exception of the districts in which planned measures could not be implemented. According to the local discussion partners' statements, the effects at output level (increase in connection rates to the waste water network and the treated waste water volumes, etc.) are noticeable. In addition, the intended overarching effects with regard to the improvement of the hygiene situation and the protection of resources are sufficient for the intended beneficiaries, including the vulnerable parts of the target group (here: poorer sections of the population). This point could not be confirmed quantitatively because, on the one hand, no indicator was formulated / no baseline was collected for the associated programme objective and, on the other hand, KfW does not have any current statistics on the water quality of the receiving bodies of water and disease figures that allow conclusions to be drawn about the hygiene situation. In addition, according to the discussions on site, it can be assumed that women in particular benefit from an improved hygiene situation, as the treatment of sick family members often becomes the responsibility of women, who are then kept from participating in educational or economic activities. However, this point also cannot be quantitatively verified.

The fact that not all of the planned sub-measures of the project could be implemented is primarily due to resistance from the local population (external factor; see, for example, land disputes that prevented the construction of some of the pumping stations in Makthar). It is questionable whether this could have been avoided through greater involvement of the local population, e.g. as part of a complementary measure.

The project did not lead to structural or institutional changes at ONAS. However, this was also not to be expected due to its nature, as it was designed to fit into existing structures and concepts with regard to the choice of technology and operating model. For this reason, the project can be regarded as replicable within ONAS structures. From the point of view of economic sustainability, it would have been desirable if an increase in tariffs or an improvement in the number of employees could have taken place alongside the project. However, this could not be

expected due to the politicisation of these two issues. This was all the more true after the Tunisian revolution began and in light of the structural and institutional challenges it posed for the country.

The presented improvements in the hygiene situation and resource protection would not have occurred without the project's investments, so that this has a high degree of developmental additionality.

Contribution to (unintended) overarching developmental changes

During the evaluation, no unintended development policy changes, e.g. in the areas of environment, climate, biodiversity, alleviating poverty, etc. could be identified.

Summary of the rating:

In view of the improvements in the areas of hygiene conditions and resource protection, which were described by the local discussion partners and could be checked for plausibility through site visits, we rate the "impact" dimension as successful. This is all the more the case since the majority of the planned measures of the project could be implemented, despite the fact that there was a (much smaller) part of the project that could not be implemented and despite the fact that some areas of the locations are not connected to the waste water network. As described in the "Efficiency" section, this situation has also come about as a result of growth in the towns that took place after the project was designed and implementation began.

Impact: 2

Sustainability

Capacities of participants and stakeholders

The lack of trained staff is a problem for ONAS, which affects not only the six project locations. Due to the hiring freeze imposed by the government, all technical and administrative departments are understaffed, and the solution of outsourcing services to private subcontractors can only partially compensate for this. Even though simpler work on the sewage treatment plants is carried out by subcontractors, there is a lack of sufficiently experienced operating staff who can permanently monitor and control the treatment processes and therefore also contribute to a reduction in operating costs. Nevertheless, although not optimised, operation is carried out in such a way that a significant improvement in the hygiene and environmental situation can be determined. The fact that ONAS has national experience with the treatment technology used (live sludge process) and that ONAS plants are similar to each other is helpful for this and therefore also decisive for the long-term sustainability of the improvement.

Because of the limited funds due to the non-cost-covering tariff income, there is a lack of spare parts, or these are only provided with a considerable delay. So far, the Tunisian state has compensated for the deficit with subsidies via the Contrat programmes, although only the most necessary maintenance measures are included in the budget. This guarantees the required minimum level of maintenance, even if it is not always possible to manage the waste water infrastructure in an anticipatory and cost-effective manner.

A World Bank-funded approach envisages the complete outsourcing of the operation of several sewage treatment plants in different governorates to a private concessionaire. This approach will solve the problem of the current capacity and funding bottlenecks, and it can also be applied to the locations of the present project in the medium term. However, it remains to be seen whether the Tunisian state is able to bear the associated higher costs (compared to the status quo) in the long term.

Since the current tariffs for waste water are socially acceptable and also acceptable to poorer sections of the population, and tariff increases only take place gradually in small steps, there is currently no risk that the tariffs could result in excessive financial burdens on the target group. The same applies to the connection fees. Nevertheless, large(r) tariff increases would in fact be necessary with regard to the economic sustainability of ONAS.

At the same time, it is important to emphasise that central aspects of economic sustainability are not within ONAS' decision-making scope. Tariffs are set at political level and, as experience from other FC projects shows, must be addressed at this level, for example – as has also been the case in the past – within the scope of PBLs. The issue of tariffs is regularly addressed as part of the donor dialogue with the Tunisian government. Since the

fees for ONAS are collected through SONEDE, no other adjustments that would result in an increase in revenue, such as the optimisation of customer registers or accounting, can be made. As a result, ONAS remains the only direct starting point for reducing operating costs in order to improve the coverage of operating costs. The reforms that would be necessary for this, such as changes in the procurement and provision of spare parts or optimisations in staff policy are so fundamental that they go beyond the scope of a complementary measure, especially since there are external hurdles here too (e.g. the hiring freeze, which has been applicable to ONAS since 2016).

Contribution to supporting sustainable capacities

The building of waste water networks and the connection to sewage treatment plants at the project locations enabled ONAS to expand its customer base and increase its revenues via the waste water fee. The existing possibility of using treated sewage (and in fact, despite the lack of official approval, probably also sewage sludge at certain locations) in agriculture also strengthens ONAS' reputation in society and therefore increases acceptance of the annual tariff increases. In addition, the provision of treated waste water for agriculture (insofar as the legal framework conditions required for this are created) increases the resilience of the rural and small-town target group to droughts in the long term. Due to these dynamics, there is an incentive for ONAS to ensure that the programme's positive effects continue.

Although the sewage treatment plant staff have basic knowledge of the activated sludge process, they should receive further training in order to optimise the sewage treatment process. In practice, this means that, although the plants have been operated continuously and without failures and that the waste water is treated, with the current staff, there is no way of optimising the process and permanently complying with the limit values at reduced energy costs due to their training level. Nevertheless, ONAS' and the subcontractor's staff gain operational experience that benefits the sector as a whole.

Durability of impacts over time

The construction quality of the built waste water infrastructure is good. The electromechanical equipment of the sewage treatment plants and pumping stations is largely provided by renowned manufacturers. With proper operation and regular maintenance, it can be assumed that the sewage treatment plants will have a useful life of at least 30 years, the networks even a little longer. However, this requires that some of the electromechanical equipment be replaced at 10 to 15 year intervals. However, this is not guaranteed, as the available evaluation results of other projects in Tunisia show[7]. The locations selected by ONAS also permit the expansion of the plants over the design year. However, this requires the provision of sufficient funds, whether through subsidies or ongoing tariff increases.

Overall, the population accepts waste water facilities and is willing to pay for connection to the waste water network. This is reflected in the high connection rate, even though this is influenced by the connection obligation. People's willingness to pay creates a basis for a functioning waste water sector in Tunisia, and the programme increased this willingness at the project locations. ***Summary of the rating:***

Despite limited funds and staff shortages, the waste water facilities are operated in an acceptable manner, which achieves positive developmental impacts. With regard to economic sustainability, even though the project has not yet contributed to full coverage of operating costs, the pronounced willingness of the target group to pay for sewage treatment, the gradual tariff increase being implemented in conjunction with the promised state subsidies, the quality of the infrastructure constructed and Tunisia's opening up to private concessions justify the evaluation of sustainability as moderately successful.

Sustainability: 3

Overall rating: moderately successful (level 3)

The project has a very high level of coherence, relevance and development effectiveness. Although the evaluation of the effectiveness and efficiency criteria was relatively poor, despite the fact that two out of five sewage treatment plants fail to meet the specified utilisation rate and effluent values, and that the implementation period was delayed, the overall hygiene situation in the project area is to be assessed as improved for the foreseeable

[7] Project "Tunisia: waste water disposal in four cities", BMZ no. 1996 65 472, 2018 with an overall rating of 4.

future. Despite revenues that do not cover costs, we are reassured by the granted government subsidies and the specific operating costs that are quite acceptable for the region, even if the sustainability criterion has to be compromised. The latter is also linked to aspects that could only be influenced to a limited extent by the project: (hesitant tariff policy, also against the backdrop of the events of the Tunisian revolution, hiring freeze at ONAS). As a result, we evaluate the project as moderately successful overall.

Contributions to the 2030 Agenda

The project contributes to the achievement of Sustainable Development Goal (SDG) 6, “Ensure availability and sustainable management of water and sanitation for all”. Specifically, it contributes to sub-goal SDG 6.3: “By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.” In doing so, it takes into account – with the limitations presented, in particular in the area of economic sustainability – the principle of the 2030 Agenda to take into account the interaction of economic, ecological and social development, as it achieves effects in environmental and resource protection that also have social impacts as these effects improve living conditions, specifically: the hygiene situation. At the same time, protecting ground water resources strengthens the population’s resilience to the effects of climate change. The principle of inclusiveness is also guaranteed in general, as the target group includes the total population of the locations as planned. Since the project implements the universal objective of SDG 6.1 locally in cooperation with public institutions (ONAS as executing agency) as well as using their existing structures and strategies, the universal applicability of the SDGs is also taken into account in addition to the requirement for joint responsibility and accountability. It is directly linked to the activities of other donors in the sector, although there are no common systems for follow-up, learning and accountability.

Project-specific strengths and weaknesses as well as cross-project conclusions and lessons learned

The project had the following strengths and weaknesses in particular[8]:

Strengths:

- High coherence with regard to ONAS' technology choice with positive impacts on operations (e.g. through faster procurement of spare parts, better knowledge management, etc.), which is becoming increasingly important against the backdrop of scarcer financial and human resources. A disadvantage of using possibly cheaper technology (e.g. trickling filter method) would be that staff lack experience with it, with possible negative effects on industrial safety. Furthermore, ONAS could not rely on the existing stock of spare parts.

- Despite the very long implementation time and major (political) challenges, the project was largely implemented technically/content-wise as planned, also by adapting the concept (cf. e.g. infiltration of the treated wastewater in Meknessy) to external requirements.

Weaknesses:

- Potential was not completely exploited with regard to the training and education of ONAS staff and the long-term anchoring of operational knowledge due to a tendency towards private operator models.

- Potential for the use of sewage sludge in agriculture has not yet been leveraged despite interest expressed by local farmers.

- The opportunity to gain further insights into the technology from the ground water enrichment in Meknessy through measurements in order to make it usable for other sites, if applicable, has not yet been seized.

Conclusions and lessons learned:

- By taking greater account of the actual interaction between the institutions and stakeholders of a project as early as the project design stage, target systems and thereby the measurability of impacts can be improved. Objectives must be formulated in such a way that the data required for their measurement is not only accessible to the project participants on paper, but also in real life in the actual existing institutional context (cf. necessary but not existing cooperation with ANPE regarding water quality follow-up). Such an analysis allows baselines to be established, indicators to be determined that meet the SMART criteria and thereby the achieved impacts to be measurable.

- A realistic definition of the project's scope of influence can prevent the set objectives from not being achieved by limiting the achievable impacts as part of the main measure from the outset (see sub-aspect of Indicator 5, use of sewage sludge in agriculture vs. licencing for the use of sewage sludge and treated waste water by the Ministry of Agriculture, which does not take place). Alternatively, supportive measures can be set within the framework of complementary measures in order to also achieve more demanding indicators that go beyond the main measure's immediate area of influence (possible in this case, e.g. measures to improve cooperation between ONAS and the Ministry of Agriculture). In this case, no complementary measures were approved for Tunisia by the Federal Ministry for Economic Cooperation and Development (BMZ) at the time of the appraisal. In such cases, it seems advisable to examine which other forms of sectoral policy support could be effective, for example: the establishment of sectoral policy formats such as round tables or steering committees under the main measure.

- Even though the reuse of waste water could not be included in the project strategy in the present project as this was not feasible at the time of the appraisal, the issue is highly topical in view of climate change. For waste water projects, with regard to climate change adaptation, the aspect of reuse – both of treated waste water and sewage sludge – should therefore be systematically included in the design, at least in

regions that are affected by climate change (drought) such as North Africa. By extending the strategy of adaptation to climate change beyond the aspect of pure resource protection and examining the needs and opportunities in the concrete context when designing projects, additional positive effects can be achieved for the local population, and the resilience of people and the environment can be strengthened.

Evaluation approach and methods

Methodology of the ex-post evaluation

The ex-post evaluation follows the methodology of a rapid appraisal, which is a data-supported qualitative contribution analysis and constitutes an expert judgement. This approach ascribes impacts to the project through plausibility considerations which are based on a careful analysis of documents, data, facts and impressions. This also includes – when possible – the use of digital data sources and the use of modern technologies (e.g. satellite data, online surveys, geocoding). The reasons for any contradicting information are investigated and attempts are made to clarify such issues and base the evaluation on statements that can be confirmed by several sources of information wherever possible (triangulation).

Documents:

1) Internal project documents
   - Project appraisal report “Small and Medium-Sized Cities Waste Water Disposal II” (20 November 2003)
   - Project appraisal report “Small and Medium-Sized Cities Waste Water Disposal I” (18 December 1998)
   - Final inspection “Small and Medium-Sized Cities Waste Water Disposal I” (May 2019)
   - Module reports on the “Small and Medium-Sized Cities Waste Water Disposal II” project to the German Federal Ministry for Economic Cooperation and Development (BMZ)
   - Focus reports “Water Tunisia” from the years of implementation
   - Reporting on the DC programme “Integrated Water Resource Management in Tunisia” dated 6 December 2019
   - Comparable evaluations, e.g. “Waste water disposal four cities”, BMZ no. 1996 65 472
2) Executing agency documents:
   - Access to monitoring and financial documents during visits to the individual sewage treatment plants

Data sources and analysis tools:

- Questionnaires to ONAS on (technical) data of the individual locations
- Data collection on site during inspections (e.g. on the functionality of system parts)
- Monitoring data from the project-executing agency

Interview partners:

- Representative of the project-executing agency at central and local level
- Representatives of private operators
- Representatives of the target group
- Representatives of other donors (AFD)

The analysis of impacts is based on assumed causal relationships, documented in the results matrix developed during the project appraisal and, if necessary, updated during the ex-post evaluation. The evaluation report sets out arguments as to why the influencing factors in question were identified for the experienced effects and why the project under investigation was likely to make the contribution that it did (contribution analysis). The context of the development measure and its influence on results is taken into account. The conclusions are reported

in relation to the availability and quality of the data. An evaluation concept is the frame of reference for the evaluation.

On average, the methods offer a balanced cost-benefit ratio for project evaluations that maintains a balance between the knowledge gained and the evaluation costs, and allows an assessment of the effectiveness of FC projects across all project evaluations. The individual ex-post evaluation therefore does not meet the requirements of a scientific assessment in line with a clear causal analysis.

The following aspects limit the evaluation:
Insufficient data, visit to the sixth location not carried out for logistical reasons

Methods used to evaluate project success

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

Level 1 very successful: result that clearly exceeds expectations

Level 2 successful: fully in line with expectations and without any significant shortcomings

Level 3 moderately successful: project falls short of expectations but the positive results dominate

Level 4 moderately unsuccessful: significantly below expectations, with negative results dominating despite discernible positive results

Level 5 unsuccessful: despite some positive partial results, the negative results clearly dominate

Level 6 highly unsuccessful: the project has no impact or the situation has actually deteriorated

The overall rating on the six-point scale is compiled from a weighting of all six individual criteria as appropriate to the project in question. Rating levels 1-3 of the overall rating denote a “successful” project while rating levels 4-6 denote an “unsuccessful” project. It should be noted that a project can generally be considered developmentally “successful” only if the achievement of the project objective (“effectiveness”), the impact on the overall objective (“impact”) and the sustainability are rated at least “moderately successful” (level 3).

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List of annexes:

Target system and indicators annex

Risk analysis annex

Project measures and results annex

Recommendations for operation annex

Target system and indicators annex

Project objective at impact level	Rating of appropriateness (former and current view)
During project appraisal: ensure efficient, environmentally compatible and proper collection, treatment and disposal of domestic, commercial and industrial waste water at the project sites.	The collection and treatment of the accumulating waste water makes a significant contribution to achieving the overall objective. Therefore, it appears that the project purpose was appropriate at the time and continues to be appropriate today.
During EPE (if target modified):	In view of the project-executing agency's shortage of funds, it would have been expedient to include a cost-relevant indicator for sewage treatment plant operation. The associated energy optimisation also contributes to reducing the causes of climate change. We therefore propose to evaluate an additional indicator in the EPE (energy requirement per m^3 of treated waste water; see Indicator 6 below).

Nr.	Indicator	Unit	Status at PP	Target value PP	Actual Value at final inspection	Actual value at EPE						Comments
			11-2003	11-2003	06-2021	05-2023						
						Mornaguia	Bou Arada	Makthar	Sers	Jerissa	Meknessy	
1	Degree of connection of households and industrial enterprises to the sewage network	%	0	HH: 70-95 Industry: 70-100	On average 60%	65 80	52 100	60 100	81 -	47 -	59 -	individual economic operators (olive oil mill) are not connected
2	Purified sewage	m³/d	0	4.000 bis 5.800	6.900	5.800	1.200	900	200	210	1262	Total 9.572 without Jerissa
3	Effluent values at the sewage treatment plants	mg/l	-	BSB 30 mg/l CSB 90 mg/l SS 30 mg/l	BSB 20-30 mg/l CSB 60-90 mg/l SS 10-20 mg/l	10 48 13	136 306 50	49 186 81	29 86 30	22 44 18	27 86 30	
4	Load factor of sewage treatment plants	% at peak load	-	> 70 %		C. 6.000 Q 5.800 96%	C.1.450 Q.1.200 83%	C.1.100 Q. 900 82%	C.1.520 Q. 200 13%	C. 700 Q. 210 30%	C.1.360 Q.1.262 93%	C = Capacity; Q = Peak day flow
5	Proper disposal of sewage sludge / use in agriculture	%	-	complete disposal		Sufficiently dried sewage sludge is properly stored in all plants, but no recycling takes place						Quantities according to ONAS at 10-17t/month with 40-80% dry
6	Specific energy requirements to wastewater treatment	KWh/m³	new indicator for EPE	A value of < 1,0 KWh/m³ can be considered acceptable and sufficient for comparable		0,31	0,55	0,81	1,92	1,79	0,86	Partially met; not reached for Sers and Jerissa due to low utilisation rate

Planning at PPB 2003			At final inspection 2019						At EPE 2023				
City	Inhabitants	connected Inhabitants with 70%	Inhabitants	Inhabitants connected	Level of connection %	KA Capacity m³/d	Sewage Amount m³	Sewage plant Utilization %	Inhabitants	Inhabitants connected	Level of connection %	Sewage Amount m³/d	Sewage plant Utilization %
Sers	12.300	8.610	17.603	11.706	67%	Kapazität	1.250	82%	17.463	14.200	81%	200	13%
Bou Arada	12.900	9.030	21.076	13.931	66%	1.520	1.450	95%	30.000	15.500	52%	1.200	79%
Meknessy	16.900	11.830	24.853	15.061	61%	1.450	840	58%	24.853	14.773	59%	1.262	87%
Jerissa	10.500	7.350	9.498	4.189	44%	1.360	490	36%	9.352	4.424	47%	210	15%
Makthar	18.000	12.600	29.168	14.176	49%	700	670	96%	22.500	13.542	60%	900	129%
Mornaguia	14.300	10.010	33.710	24.136	72%	1.100	2.200	200%	58.192	37.674	65%	5.800	527%
TOTAL	**84.900**	**59.430**	**135.908**	**83.199**		**6.130**	**6.900**		**162.360**	**100.113**		**9.572**	

37.674 The higher proportion of the connected population and the increase in the total population is due to the extension of the network to Borj Al Amri, El Basatine and Karhadid. This also inevitably led to a reduction in the degree of connection.

Operational data:

City	Sewage Accumulation	Energy	Energy specific	CO2 emission 0,47 kg/KWh	CO2 emission 0,47 kg/KWh	Cost Electricity	Cost Electricity	Personnel	Total	Total	Total	BSB Drain	BSB Purification	CSB Drain	CSB Purification	SS Drain	SS Purification	N-NO3 Drain	N-NO3 Purification	P Drain	P Purification	Ecoli Drain
										Limit value (mg/l)		30		90		30		50		2		2.000
	l/cd	KWh/a	KWh/m³	t CO2/a	kg CO2/m³	DT/a	EUR/m³	DT/a	DT/a	EUR/a	EUR/m²	mg/l	%	mg/l	%	mg/l	%	mg/l	%	mg/l	%	UFC/100ml
Sers	14	140.000	1,92	66	0,90	70.000	0,28	99.806	164.531	48.701	0,67	29	90	86	88	30	95	85	87	5	46	100
Bou Arada	77	240.590	0,55	113	0,26	62.312	0,04	137.802	214.990	63.637	0,15	136	96	309	96	50	99	85	87	9	58	4*10^6
Meknessy	85	396.101	0,86	186	0,40	149.074	0,10	26.996	304.071	90.005	0,20	27	92	86	88	30	91	45	64	5	62	2,1*10^8
Jerissa	47	137.000	1,79	64	0,84	55.800	0,22	46.648	140.340	41.541	0,54	22	96	44	95	18	96	42	61	3	61	200
Makthar	66	267.285	0,81	126	0,38	120.272	0,11	57.794	178.066	52.708	0,16	49	93	186	91	81	94	67	58	1	92	2,4*10^5
Mornaguia	154	655.938	0,31	308	0,15	239.933	0,03	487.902	727.835	215.439	0,10	10	97	48	95	13	98	8	86	2	78	3.800
TOTAL		**1.836.914**		**863**		**697.391**		**856.948**	**1.729.833**	**512.031**												
Average	*74*	*306.152*	*1,04*		*0,49*	*116.232*	*0,13*	*142.825*	*288.306*													

1DT = 0,296 EUR

Operating costs: 0,203

Risk analysis annex

All risks should be included in the following table as described above:

Risk	Relevant OECD-DAC criterion
Risks of delay due to expropriation procedures (identified ex-ante)	Efficiency
Risk of waste water systems being operated inefficiently (identified ex ante)	Sustainability Impact
Risk to ONAS' financial equilibrium due to cost increases and tariffs not being increased (identified ex ante)	Sustainability
Risk of industrial companies discharging their contaminated waste water untreated into the municipal waste water network (identified ex ante)	Sustainability
Risk of delay due to protests by local residents (identified ex post)	Efficiency Impact

Project measures and their results annex

	Planning at PPB 2003					Sewage plant and Sewage network build					Costs
	Sewage plant		Sewage network			Sewage plant		Sewage network build			
City	Capacity m³/d	EWG -	Length ml	House connec-tion	Pumping station	Capacity m³/d	EWG -	Length ml	House conncetion	Pumping station	DHT
Sers	1.500	29.600	2.700	k.A.	2	1.520	30.000	73.320	1.996	2	7.212.866
Bou Arada	1.450	30.000	7.900	k.A.	0	1.450	30.000	19.980	430	1	5.004.278
Meknessy	2.200	32.400	13.200	k.A.	2	1.360	20.058	15.600	330	1	7.276.093
Jerissa	950	14.000	19.200	k.A.	6	700	10.260	38.390	1.884	9	7.181.118
Makthar	2.500	35.300	42.200	k.A.	8	1.100	15.570	71.260	2.296	3	10.914.081
Mornaguia	10.200	118.000	15.000	k.A.	2	6.060	70.000	39.900	1.090	2	49.633.210
TOTAL	18.800	259.300	**100.200**	**0**	**20**	12.190	175.888	**258.450**	**8.026**	**18**	**87.221.646**
ACTE Consultant											4.673.409
Grand Total											**91.895.055**

1.228.328 EUR

24.153.090 EUR

Explanatory note:

The project appraisal assumed average growth of 2.5% p.a. in the centres. However, this proved to be too optimistic at the time of planning and revision. Forecast population figures and therefore also the sewage treatment plant capacities were corrected downwards.

special costs	354	DHT/ Inhabitant	Share Consultant	5%
	137	EUR/ Inhabitant	Share Construction costs	95%

	Planning at PPB 2003		At final inspection 2019						At EPE 2023				
City	Inhabitants	connected Inhabitants with 70%	Inhabitants	Inhabitants connected	Level of connection %	KA Capacity m³/d	Sewage Amount m³	Sewage plant Utilization %	Inhabitants	Inhabitants connected	Level of connection %	Sewage Amount m³/d	Sewage plant Utilization %
Sers	12.300	8.610	17.603	11.706	67%	1.520	1.250	82%	17.463	14.200	81%	200	13%
Bou Arada	12.900	9.030	21.076	13.931	66%	1.450	1.450	100%	30.000	15.500	52%	1.200	83%
Meknessy	16.900	11.830	24.853	15.061	61%	1.360	840	62%	24.853	14.773	59%	1.262	93%
Jerissa	10.500	7.350	9.498	4.189	44%	700	490	70%	9.352	4.424	47%	210	30%
Makthar	18.000	12.600	29.168	14.176	49%	1.100	670	61%	22.500	13.542	60%	900	82%
Mornaguia	14.300	10.010	33.710	24.136	72%	6.060	2.200	36%	58.192	37.674	65%	5.800	96%
TOTAL	**84.900**	**59.430**	**135.908**	**83.199**		**12.190**	**6.900**		**162.360**	**100.113**		**9.572**	

Explanatory note:

ONAS only has limited ability to provide ad hoc reliable figures for the population. The figures for connection level and capacity utilisation also often differ between the commercial and technical departments. This results in the deviations between the PCR and the EPE (especially for Sers).

The values determined during the EPE appear reliable, and a mean connection rate of close to 80% as well as a capacity utilisation rate of 73% are therefore achieved.

Recommendations for operation annex

During the FI in June 2021, the executing agency was strongly recommended to provide adequate staff in terms of quantity and quality for the operation of the sewage treatment plants and networks. ONAS was unable to comply with this request due to the state-imposed hiring freeze. Although half of the wastewater treatment plants use subcontractors, these are only responsible for cleaning and minor repair works. Management of treatment processes and the performance of analyses as well as major maintenance and repair works remain the responsibility of ONAS. However, the staff at the plants with whom contact was made (except Meknessy) are still unable to properly control or optimise the treatment processes.

Better trained staff in the respective regional directorates are overburdened, with each employee having to supervise up to ten treatment plants. Although plans are in place to delegate all operational responsibility to a single private operator via a concession agreement for several governorates with 10–15 sewage treatment plants and although these plans are already being implemented in the north of the country, this is limited to only 50% of all ONAS plants. There is therefore still an urgent need to deploy an adequate number of sufficiently trained staff at the project sites soon.

During the EPE, further recommendations for operation were made. However, these can only be implemented sustainably if appropriate staff are available:

- To better control the aeration process, the oxygen probes in the aeration tanks must be repaired or replaced.
- The analyses for inlet and outlet should be carried out at least two to three times a week for plants up to 1,500 m^3/d, and daily for systems > 1,500 m^3/d.
- An attempt should be made to increase nitrogen elimination based on the analysis data and the improved control capability via the then functioning oxygen measuring probes. Tests with different aeration intervals and subsequent measurements must be carried out for this purpose.
- Up to now, maintenance has only been carried out in accordance with the manufacturer's specifications for electromechanical machinery. Here, a switch should be made to preventive maintenance, i.e. a visual check is carried out regularly and independently of the specifications in order to be able to detect any damage that may have occurred earlier and to reduce its extent.
- In Meknessy, a measuring point should be set up in the near future to control how much treated waste water is being infiltrated and with which the ground water rise and quality can also be controlled.
- A mandatory annual training programme for the sewage treatment plant operators, combined with a technical exchange of operators at national level, should be set up.
- Since the air filters did not work at all the visited pumping stations and this problem probably also exists at other sites, it seems expedient to develop a nationwide concept for the repair of the systems (procurement of filter material in larger quantities, replacement of the material with local products, improvement of the mechanical equipment).

Evaluation questions in line with OECD-DAC criteria/ex post evaluation matrix annex

Relevance

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension: Policy and priority focus			1	o	
Are the objectives of the programme aligned with the (global, regional and country-specific) policies and priorities, in particular those of the (development policy) partners involved and affected and the BMZ?	1. Which relevant current guidelines and strategy documents are there a) on the part of TUN and ONAS (in questionnaire) and b) on the part of the German Federal Ministry for Economic Cooperation and Development (BMZ)? 2. Are the **objectives** of the project aligned with these strategies? 3. Are the following dimensions taken into account in the target system? i) Human rights, gender equality and inclusion ii) Anti-corruption and integrity iii) Alleviating poverty and reducing inequality iv) Environmental and climate impact assessment v) Conflict sensitivity (do no harm) vi) Digitalisation (digital as standard) Further clarification: Which of the dimensions mentioned were de facto adequately taken into account in the project's design, even if they were not mapped in the results matrix?	- PAR on the question of the strategic embedding of the project at the time (e.g. SD/MDG sector strategies for Tunisia, German Federal Ministry for Economic Cooperation and Development (BMZ) strategies at the time) If nothing is mentioned there: - B'Reg strategies at the time/currently o (e.g. priority area strategy paper on environmental protection from March 2003; others?) o Partner country strategies: Ask (questionnaire) - Reporting on the project Ask ONAS: - Gender impacts of the project? Are the needs of women adequately taken into account? - How did the project fit into the Tunisian development strategy for the waste water sector at the time?			

Do the objectives of the programme take into account the relevant political and institutional framework conditions (e.g. legislation, administrative capacity, actual power structures (including those related to ethnicity, gender, etc.))?	Did the project's implementation and operation by ONAS align with the intended division of tasks in the Tunisian water sector? (Responsibility for waste water disposal lies with municipalities, which can delegate this to ONAS. Did this delegation work here? How and when was responsibility delegated to the individual sites? Before or after the appraisal?) According to the information available at the time, did ONAS have sufficient staffing and financial capacities for the implementation and operation of the project, and if not: have appropriate measures been taken?	Project appraisal report Inquire about operation at ONAS. (How is it running? What are the biggest challenges?) At which site are there problems in the operation and what are the reasons for them? How high is the operating cost coverage? What subsidies or other government support does ONAS receive, if any? Is this adequate and is it regularly made available in good time? What support was already planned within the project and externally, and was/will this be provided at the time of the appraisal?			
Evaluation dimension: Focus on needs and capacities of participants and stakeholders			1	o	
Are the programme objectives focused on the developmental needs and capacities of the target group? Was the core problem identified correctly?	How were the sites selected, specifically? What criteria has been established? (Questions to ONAS) Has, for example, the degree of environmental pollution from the discharged waste water been taken into account? Why did intervention take place at locations that already had waste water disposal infrastructure? Would the need not have been greater elsewhere (locations without waste water systems)? Or in rural areas, for example? Was improving waste water disposal in the project area a relevant need of the target group? Why focus on central Tunisia? What has become of the pilot phase in rural areas? Does ONAS now handle waste water in rural areas?	PAR Phase I appraisal report (1998 65 502) on the selection of the sites moved to Phase II at the time ONAS AFD			

Were the needs and capacities of particularly disadvantaged or vulnerable parts of the target group taken into account (possible differentiation according to age, income, gender, ethnicity, etc.)? How was the target group selected?	Were the needs of women and particularly poor people adequately taken into account? Are there other particularly vulnerable parts of the target group and, if so, have their needs been taken into account in particular? Was the entire population connected to the sites or was it possible to connect them, or were there parts that were excluded (also de facto, e.g. due to financial bottlenecks, development outside approved development plans, etc.)? What financial relief was provided for people with particularly low incomes?	Programme appraisal report ONAS			
Would the programme (from an ex post perspective) have had other significant gender impact potentials if the strategy had been designed differently? (FC-E-specific question)	No specification necessary.	ONAS			
Evaluation dimension: Appropriateness of design			2	–	Factors that led to evaluation of the concept with 2 instead of 1 were not foreseeable during the project appraisal
Was the design of the programme appropriate and realistic (technically, organisationally and financially) and in principle suitable for contributing to solving the core problem?	Would there have been technological alternatives that would have been more suitable? Are the locations of the plants, in particular the receiving bodies of water, appropriately selected? Was the dimensioning of the plants appropriate at the time? Was adequate sludge disposal planned? Was phosphorus precipitation and	Final inspection report Phosphorus/nitrate: ONAS			

	denitrification planned in the respective sewage treatment plants and if not: would this have been expedient?	
Is the programme design sufficiently precise and plausible (transparency and verifiability of the target system and the underlying impact assumptions)?	See indicators section above.	
Please describe the results chain, incl. complementary measures, if necessary in the form of a graphical representation. Is this plausible? As well as specifying the original and, if necessary, adjusted target system, taking into account the impact levels (outcome and impact). The (adjusted) target system can also be displayed graphically. (FC-E-specific question)	No specification necessary.	Original target system: PAR Adjusted: See indicators section above
To what extent is the design of the programme based on a holistic approach to sustainable development (interplay of the social, environmental and economic dimensions of sustainability)?	Were social, environmental and economic aspects adequately taken into account in the design? Focus on taking into account the holistic sustainability of the programme with regard to these aspects. Are there aspects in the target system that compete with each other, e.g. social and economic (subsidisation of connection fees, tariff increases, etc.) or environmental and economic sustainability (e.g. costs for the disposal of sewage sludge)?	- PAR - If applicable: additional interim reports - ONAS on selection of target group (see above), tariff situation, subsidies
For projects within the scope of DC programmes: is the programme, based on its design, suitable for achieving the objectives of the DC	Is the programme, as designed, able to contribute to improving the hygiene situation at the project sites and to protecting	PAR Final inspection report

programme? To what extent is the impact level of the FC module meaningfully linked to the DC programme (e.g. outcome impact or output outcome)? (FC-E-specific question)	regional above- and underground water resources?				
Evaluation dimension: Response to changes/adaptability			3	o	
Has the programme been adapted in the course of its implementation due to changed framework conditions (risks and potential)?	Did the originally planned measures, locations and target groups remain the same or were they adjusted e.g. due to changed framework conditions such as deviating population development, low willingness to participate among industry and private households, etc.? Were there any changes in the indicators? Were there any financial changes (increases or significant reductions) to external framework conditions? Requirements for industrial waste water treatment were a condition. Clarify to what extent these have been complied with or, if necessary, compensated for by changes to plant design	ONAS Final inspection report			

Coherence

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension: Internal coherence (division of tasks and synergies within German development cooperation):			1	o	

To what extent is the programme designed in a complementary and collaborative manner within the German development cooperation (e.g. integration into DC programme, country/sector strategy)?	No specification required.	Reporting modules 2018, 2019			
Do the instruments of the German development cooperation dovetail in a conceptually meaningful way as well as in implementation, and are synergies put to use?	Were there TC measures with ONAS and, if so, were the synergy potentials with FC exploited?	Question to ONAS (if necessary, additional reports whose format already contains this point (e.g. 2018, 2019)			
Is the programme consistent with international norms and standards to which German development cooperation is committed (e.g. human rights, Paris Climate Agreement, etc.)?	No specification necessary.	PAR Reporting			
Evaluation dimension: External coherence (complementarity and coordination with actors external to German DC):			1	o	
To what extent does the programme complement and support the partner's own efforts (subsidiarity principle)?	Are the implemented measures suitable for ONAS' strategic design? (Selection of locations consistent with ONAS priorities, does the choice of technology correspond to ONAS' development objectives?)	ONAS			
Is the design of the programme and its implementation coordinated with the activities of other donors?	Are there interventions by other donors at the financing locations/with ONAS and if so: has there been adequate coordination between FC and the other donors? (Example: also in relation to road construction projects	ONAS For the water/waste water sector in general: Reporting Question for AFD			

	in areas where pipes have been laid, etc.) Since when has there been regular coordination of activities with AFD (not mentioned in PAR).	
Was the programme designed to use the existing systems and structures (of partners/other donors/international organisations) for the implementation of its activities and to what extent are these used?	Ask which systems and processes for project design and preparation, disbursement systems, systems and processes for monitoring environmental impacts as well as assistance for the target group existed at the time of project design and implementation, and whether these were used.	Discussions with ONAS
Are common systems (of partners/other donors/international organisations) used for monitoring/evaluation, learning and accountability?	See above (if any)	Discussions with ONAS

Effectiveness

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension: Achievement of (intended) targets			3	o	
Were the (if necessary, adjusted) objectives of the programme (incl. capacity development measures) achieved? (Target/actual comparison indicator table)	See indicators With regard to connection levels: To which areas do the values of the PCR refer: to the catchment area of the networks or to the city as a whole? Have there been network expansions since	PCR Questionnaire and discussions ONAS			

	the project (e.g. in new construction areas/incorporated areas/etc.?) -> Should have been mapped in indicators.				
Other evaluation question 1	To what extent is sewage sludge and waste water recycled in agriculture? How economical is the transfer of sewage sludge and waste water for ONAS?				
Evaluation dimension: Contribution to achieving objectives:			2	+	Despite certain constraints in terms of connection rates and operating situation, the project's measures significantly contributed to improving the hygiene situation and living conditions of the population.
To what extent were the outputs of the programme delivered as planned (or adapted to new developments)? *(Learning/help question)*	No specification required.	FI report.			
Are the outputs provided and the capacities created used?	Were the outputs defined in the impact matrix delivered during the appraisal? What are the connection levels and utilisation rates of the plants??	PCR Indicators: ONAS			
To what extent is equal access to the outputs provided and the capacities created guaranteed (e.g. non-discriminatory, physically accessible, financially affordable, qualitatively, socially and culturally acceptable)?	Are the tariffs and connection fees affordable for all households, especially vulnerable households (e.g. households without regular income, women-run households (if available and relevant), etc.)? What financial support measures are there, if any? Has ONAS taken	Questionnaire and discussions ONAS			

	appropriate measures to raise awareness among the population? See also above, question on definition of target group.	
To what extent did the programme contribute to achieving the objectives?	No specification required.	PCR Updating indicator values as part of the EPE
To what extent did the programme contribute to achieving the objectives at the level of the intended beneficiaries?	Has the project improved the settlement hygiene for the population at the project sites and the hygiene situation at the lower reaches of the respective receiving bodies of water? Are there (additional) beneficiaries who may benefit from being able to use sewage sludge and waste water in agriculture?	ONAS survey, target group discussions on site if applicable
Did the programme contribute to the achievement of objectives at the level of the particularly disadvantaged or vulnerable groups involved and affected (potential differentiation according to age, income, gender, ethnicity, etc.)?	(Note: In the objectives, no distinction was made between particularly disadvantaged/vulnerable groups.) Were low-income/disadvantaged districts given special attention? Can the local residents afford the connections and tariffs? Were tariffs socially adjusted in connection with the project or were certain support measures introduced in connection with the project (financial support, consultancy services, etc.)?	Ask about the social structure of the districts and to what extent they were taken into consideration in the project during site visits Information on tariffs and social subsidies from ONAS
Were there measures that specifically addressed gender impact potential (e.g. through the involvement	No specification necessary.	ONAS (questionnaire and on-site discussions)

of women in project committees, water committees, use of social workers for women, etc.)? (FC-E-specific question)		
Which project-internal factors (technical, organisational or financial) were decisive for the achievement or non-achievement of the intended objectives of the programme? *(Learning/help question)*	Could the project could have benefited from a complementary measure, and if so: in which areas? (Strengthening of the executing agency, support for the population, etc.) Was the basic and advanced training measure envisaged in the PAR to support ONAS in the rationalisation of sewage treatment plant operation carried out by means of two-year-long operational assistance?	FI report for determining the relevant unachieved targets ONAS survey BE
Which external factors were decisive for the achievement or non-achievement of the intended objectives of the programme (also taking into account the risks anticipated beforehand)? *(Learning/help question)*	How well does monitoring of the effluent values of the sewage treatment plants by ONAS / the effluent values of the industrial sewage treatment plants by ANPE and ONAS (in cases where water is discharged into ONAS' waste water network) / the water quality by the respective health authority work (cf. PAR section 3.20)? How is the cooperation between the two institutions going? How well does sewage sludge disposal work and what problems (project-external factors) are there, if any? How regularly have tariffs been increased in recent years; is the contract programme being adhered to? Were the tariff increases sufficient? If not: what were the concrete consequences? How well does sewage sludge disposal work and what problems (project-	Ask for current population figures from ONAS Population forecast in PAR table

	external factors) are there, if any? Has a disposal concept been developed and implemented as provided for in the PAR, and if not: why not? Were the population growth rates assumed at the appraisal roughly correct, so that the plants are correctly dimensioned?	
Other evaluation question 1	Is there (applicable at the time and currently) water quality data (situation for those located downstream) or statistics from hospitals/health stations on diarrhoea cases at the locations?	ONAS (questionnaire)
Other evaluation question 2	To understand the existing situation: Where were the receiving water bodies in relation to the settlements before the project? Where are they now? How is the project expected to improve the hygeine situation in cities even though waste water disposal systems are already in place and connection rates are high in places? Were the networks in such poor condition that the waste water spilled out onto roads? Were the entry points so poorly chosen that this happened? Other? How and at which points was the pollution caused by the untreated discharged waste water most evident before the project was completed?	

Evaluation dimension: Quality of implementation			3	o	
How is the quality of the management and implementation of the programme (e.g. project-executing agency, consultant, taking into account ethnicity and gender in decision-making committees) evaluated with regard to the achievement of objectives?	No specification necessary.	ONAS survey for experiences with consultant			
How is the quality of the management, implementation and participation in the programme by the partners/sponsors evaluated?	No specification necessary.	AFD survey for general impression of working with ONAS Executing agency analyses of recent module proposals			
Were gender results and relevant risks in/through the project (gender-based violence, e.g. in the context of infrastructure or empowerment projects) regularly monitored or otherwise taken into account during implementation? Have corresponding measures (e.g. as part of a CM) been implemented in a timely manner? (FC-E-specific question)	Gender-specific results: The impacts of the project are not gender-specific (building large infrastructure), therefore question not relevant.	Discussion with ONAS, reporting			
Evaluation dimension: Unintended effects (positive or negative)			3	o	
Can unintended positive/negative direct effects (social, economic, environmental and, where applicable, those affecting vulnerable groups) be seen (or are they foreseeable)?	Were there any problematic environmental or social impacts during the construction work, such as complaints about the location / construction work per se / noise pollution, etc.?	Questionnaire and ONAS discussion (central and local) Discussions with local residents and operating staff			

	Have these impacts materialised since the completion of the individual projects?	
What potential/risks arise from the positive/negative unintended effects and how should they be evaluated?	To be answered depending on the actual unintended effects that have occurred.	
How did the programme respond to the potential/risks of the positive/negative unintended effects?	To be answered depending on the actual unintended effects that have occurred.	

Efficiency

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension: Production efficiency			3	o	
How are the inputs (financial and material resources) of the programme distributed (e.g. by instruments, sectors, sub-measures, also taking into account the cost contributions of the partners/executing agency/other participants and affected parties, etc.)? (Learning and help question)	Cf. Cost and financing table	Final inspection report (PAR Annex 9) Question to ONAS, how high is the actual own contribution in Dinar			
To what extent were the inputs of the programme used sparingly in relation to the outputs produced (products, capital goods and services) (if possible in a comparison with data from other evaluations of	What are the specific costs per inhabitant and how do they compare?	Final inspection report For suitable comparative figures: other FI report from the region, e.g. Jordan (or TUN/ONAS itself, if applicable)			

a region, sector, etc.)? For example, comparison of specific costs.					
If necessary, as a complementary perspective: To what extent could the outputs of the programme have been increased by an alternative use of inputs (if possible in a comparison with data from other evaluations of a region, sector, etc.)?	See consideration of allocation efficiency.				
Were the outputs produced on time and within the planned period?	Were the cost and time schedules adhered to (total and breakdown by location)? ((What caused the huge cost increases in TND? What were the reasons for the delays?))	Final inspection report BE Question to ONAS			
Were the coordination and management costs reasonable (e.g. implementation consultant's cost component)? (FC-E-specific question)	No specification necessary.	Project documentation			
Evaluation dimension: Allocation efficiency			3	–	Even if more cost-effective technologies could have been chosen, the choice of technology for the project is justified due to the coherence with ONAS' existing sewage treatment plants and is (ultimately also financially) expedient

In what other ways could the effects achieved (outcome/impact) have been attained, and what would the costs have been? *(Learning/help question)*	Could alternative technologies (e.g. cheaper/easier to operate) have been considered for the sewage treatment plants? Could other solutions for sewage sludge disposal have been used?	Questionnaire ONAS Discussion ONAS
To what extent could the effects achieved have been attained in a more cost-effective manner, compared with an alternatively designed programme?	See above, question can only be answered if there were alternative solutions.	
If necessary, as a complementary perspective: To what extent could the positive effects have been increased with the resources available, compared to an alternatively designed programme?	See above	
Note: If the internal identifier PSP (Private Sector Participation; see Inpro under 1.11) was issued for the project or there is generally cooperation with private actors (commercial banks, companies, professional NGOs) in the implementation of FC (private sector as an instrument), the following evaluation question must be taken into account:		
In what respect was the use of public funds financially complementary?	Question not relevant, as no private sector participation.	

Impact

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension: Overarching developmental changes (intended)			3	–	Although not all planned districts and businesses

					were connected, even the non-connected parts of the population benefit from positive effects in the target dimensions “Improvement of the hygiene situation” and “Resource protection”
Is it possible to identify overarching developmental changes to which the programme should contribute? (Or if foreseeable, please be as specific as possible in terms of time.)	Can improvements in the hygiene situation and resource protection be identified?	Survey of local population and community representatives ONAS questionnaire: Data on the water quality of the receiving bodies of water at the time and now FI?			
Is it possible to identify overarching developmental changes (social, economic, environmental and their interactions) at the level of the intended beneficiaries? (Or if foreseeable, please be as specific as possible in terms of time)	Has the hygiene situation in the project locations improved for the target group? (And if yes: is this attributable to the programme; see follow-up question below?)	ONAS local representative survey Local population survey, community Reports, if applicable Back to office reports ONAS questionnaire: Is there data on the local health situation?			
To what extent can overarching developmental changes be identified at the level of particularly disadvantaged or vulnerable parts of the target group to which the programme should contribute? (Or, if	If the hygiene situation at the project locations has improved: Was this also the case for poorer sections of the population? (And if yes: is this attributable to the programme; see follow-up question below?)	See above Additionally: Ask ONAS about connection rates by district			

foreseeable, please be as specific as possible in terms of time)					
Evaluation dimension: Contribution to overarching developmental changes (intended)			2	+	The identified results are clearly attributable to the project, even if this is not quantitatively measurable.
To what extent did the programme actually contribute to the identified or foreseeable overarching developmental changes (also taking into account the political stability) to which the programme should contribute?	Has the programme contributed to improving the hygiene situation? (Or are there any other causes for any improvement in the hygeine situation apart from the programme?) Has the programme improved the water quality in the receiving bodies of water? (Or if new discharge point: is the water quality in the new receiving body of water acceptable?) (Or are there any other reasons apart from the programme for any improvement in resource protection?)	Questionnaire ONAS			
To what extent did the programme achieve its intended (possibly adjusted) developmental objectives? In other words, are the project impacts sufficiently tangible not only at outcome level, but at impact level? (e.g. drinking water supply/health effects)	See previous question and first question in the block.				
Did the programme contribute to achieving its (possibly adjusted) developmental objectives at the level of the intended beneficiaries?	If, in the first question in the block, improvement of the health situation and protection of resources can be identified: did the programme contribute to this? (Proxy:	Discussion ONAS (local) Discussion with the community			

	Improvement of connection rates in combination with effluent values)	
Has the programme contributed to overarching developmental changes or changes in life situations at the level of particularly disadvantaged or vulnerable parts of the target group (potential differentiation according to age, income, gender, ethnicity, etc.) to which the programme was meant to contribute?	Can any improvement in the hygiene situation for the target group in the project locations be attributed to the project? (Proxy: Connection rates by district: are there districts in which the connection rates are conspicuously low, and if so, what is the reason for this?)	ONAS local representative survey Local population survey, community Reports, if applicable Back to office reports ONAS questionnaire: Is there data on the local health situation?
Which project-internal factors (technical, organisational or financial) were decisive for the achievement or non-achievement of the intended developmental objectives of the programme? *(Learning/help question)*	In the case that a direct influence of the module objectives on the development policy objectives is assumed, this question is already covered by the corresponding question on the programme's (module) objectives.	
Which external factors were decisive for the achievement or non-achievement of the intended developmental objectives of the programme? *(Learning/help question)*	Have there been external factors that had a relevant positive or negative impact on the hygiene situation for the population at the locations and/or on the protection of water resources at the locations?	Discussion with ONAS (local) Discussions with communities
Does the project have a broad-based impact? - To what extent has the programme led to structural or institutional changes (e.g.in organisations, systems and regulations)? (Structure formation)	No specification necessary.	Question 1: Discussion with ONAS (centrally and locally if applicable) Question 2: Discussion with ONAS (centrally)

- Was the programme exemplary and/or broadly effective and is it reproducible? (Model character)					
How would the development have gone without the programme (developmental additionality)?	No specification necessary.	Discussions with ONAS (locally) Discussions with communities			
Other evaluation question 1	Would there have been other sources of financing for the programme other than FC? (e.g. other donors, Tunisian institutions)				
Evaluation dimension: Contribution to (unintended) overarching developmental changes			2	o	
To what extent can unintended overarching developmental changes (also taking into account political stability) be identified (or, if foreseeable, please be as specific as possible in terms of time)?	?				
Did the programme noticeably or foreseeably contribute to unintended (positive and/or negative) overarching developmental impacts?	Over the course of the programme, was there any resistance to the locations? Were there any unintended environmental impacts directly attributable to the project (positive and negative)? Development of biodiversity in bodies of water, for example? Other? Were there social disruptions, for example due to the selection of the quarters to be connected / costs associated with the project (tariff increases, enforcement of tariff	Discussions with ONAS (locally) Discussions with communities Discussions with target group			

	payments, connection requirement in conjunction with connection fees, etc.)?	
Did the programme noticeably (or foreseeably) contribute to unintended (positive or negative) overarching developmental changes at the level of particularly disadvantaged or vulnerable groups (within or outside the target group) (do no harm, e.g. no strengthening of inequality (gender/ethnicity))?	See above	

Sustainability

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Rationale for weighting
Evaluation dimension: Capacities of participants and stakeholders			3	o	
Are the target group, executing agencies and partners institutionally, personally and financially able and willing (ownership) to maintain the positive effects of the programme over time (after the end of the promotion)?	Is ONAS able to continue operation, maintenance and invoicing for the financed infrastructure on an institutional, financial and staffing level?	Questionnaire ONAS ONAS annual financial statements			
To what extent do the target group, executing agencies and partners demonstrate resilience to future risks that could jeopardise the impact of the programme?	How is the resilience against rising costs for operation and maintenance to be assessed (taking into account possible subsidy payments and the possibly changed payment morale of	Discussions ONAS			

	customers in times of general price increases)?				
Evaluation dimension: Contribution to supporting sustainable capacities:			3	o	
Did the programme contribute to the target group, executing agencies and partners being institutionally, personally and financially able and willing (ownership) to maintain the positive effects of the programme over time and, where necessary, to curb negative effects?	Has the programme adequately taken into account ONAS' financial and staffing capacities in the choice of technology so that the financed infrastructure can be operated sustainably?	Final inspection report If applicable, Back-to-office reports Discussions with ONAS			
Did the programme contribute to strengthening the resilience of the target group, executing agencies and partners to risks that could jeopardise the effects of the programme?	Has the programme sufficiently taken into account the information needs of the local population, which are necessary, for example, to implement sewerage connection (is this a problem if connection is compulsory?)? Was sufficient information provided about the project to guarantee acceptance (in particular for the choice of location and costs incurred in connection with the project)?	Discussions with ONAS Project documentation			
Did the programme contribute to strengthening the resilience of particularly disadvantaged groups to risks that could jeopardise the effects of the programme?	See above with a focus on poor parts of the population. Did the programme also include sufficient measures to provide financial support to poor population groups with regard to the costs of connection and tariffs?	Discussions with ONAS (centrally and locally) Discussions with communities Discussions with target group			

Other evaluation question 1	According to ONAS' assessment, would a complementary measure to strengthen capacity have been necessary? If yes: with which components?				
Evaluation dimension: Durability of impacts over time			3	o	
How stable is the context of the programme (e.g. social justice, economic performance, political stability, environmental balance)? (*Learning/help question*)	Is there a risk of declining acceptance of tariff payments among the population or other negative influencing factors on the financial situation (willingness of the state to provide subsidies / comply with obligations from the contract programme)? Is there a risk that any connected industrial companies will stop disposing of their water properly?	Discussions with ONAS (locally)			
To what extent is the durability of the positive effects of the programme influenced by the context? *(Learning/help question)*	To what extent is there a risk of cost increases for operation and maintenance? To what extent is there a risk of a drop in collection rate?	Discussions with ONAS (locally and centrally) Discussions with local communities and ONAS locally ONAS questionnaire (development of collection rate at the project locations)			
To what extent are the positive and, where applicable, the negative effects of the programme likely to be long-lasting?	Evaluation possible based on previous questions.				
To what extent are the gender results of the measure to be considered permanent (ownership, capacities, etc.)? (FC-E-specific question)	Are there gender-specific results? Answer the question accordingly.	Discussion with ONAS (locally and centrally) Discussions with communities			