



For the attention of Mrs. Irena BRCKO-KOGOJ

Government Office for Local Self-Government and Regional Policy Kotnikova 28, 1000 - Ljubljana Slovenia

Luxembourg, 23 May 2012

JASPERS//2012-123/AA/NH/ac

Subject: JASPERS Completion note for the project: 2011 27 SI WAT WAT Collection and Treatment of wastewater in the Soca river Basin (Nova Gorica CWWTP)

Dear Ms. Brcko-Kogoj,

We thank you for the good co-operation on the project Collection and Treatment of wastewater in the Soca river Basin (Nova Gorica CWWTP) – 2011 27 SI WAT WAT with our JASPERS team.

Please find enclosed the JASPERS Action Completion Note, summarising the activities of the JASPERS team, carried out for the achievement of the objectives of this assignment.

We have introduced a performance indicator schedule allowing JASPERS management to obtain feedback from beneficiaries on performance of JASPERS assignments, and build on those future improvements of JASPERS procedures. We send you attached the corresponding form (word file), on which we would highly value your feedback. JASPERS has filled in the left side of the table with a factual summary of JASPERS activities for this assignment. Please indicate the "evaluation" of the work done (range from Highly Satisfactory to Failure) in the central column, and add comments in the right hand column as you feel it necessary.

After completion, please send the word document back to Norbert Hahn (Hahn@eib.org) by email with a copy to Anca Cristescu (a.cristescu@eib.org) for further processing by JASPERS. Should you have further questions, please don't hesitate to call Norbert Hahn.

We thank you for your support and remain with best regards

A. Auria Director of JASPERS

Hahn

Head of Operations Management Division

JASPERS c/o European Investment Bank



Date: 22.05.2012

JASPERS Action Completion Note

<u>Note</u>: This JASPERS Action Completion Note has been prepared on the date indicated above. In case the grant application is submitted significantly later than this date, the reader of this Note should be aware that some of the comments and opinions expressed may no longer be valid (Pursuant to Article 7 of the Working Arrangements for JASPERS' intervention, the JASPERS Action Completion Note must be attached to each grant application submitted to the European Commission by the National Authority).

Country	Republic of Slovenia	
Project	Collection and Treatment of wastewater in the Soca river Basin (Nova Gorica CWWTP)	
Beneficiary	Municipalities of Nova Gorica, Miren-Kostanjevica, and Sempeter-Vrtojba	
Operational Programme	Operational Programme of Environmental and Transport Infrastructure Development for the Period 2007 – 2013, amended April 2011	
Priority Axis	Environmental protection – water sector	
JASPERS Project No.	2011 27 SI WAT WAT	
Date of submission to EC	n.a.	
Grant Funding Requested	EUR 27,331,635, 85% of eligible costs (Funding gap 80.91%) Total eligible investment: EUR 39,741,520	
Completion Note Prepared	May 2012	



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1 **Project Description**

The project "Collection and Treatment of Wastewater in the Soca River Basin (Nova Gorica Central Treatment Plant)" is listed in the Operational Programme of Environment and Transport Infrastructure Development (OP-ETID) for the period 2007-2013 as a non-major project with a total investment of 30M Euro.

The project was identified to provide comprehensive solutions for problems of collection and treatment of wastewater in the area of Nova Gorica and agglomerations located close to the border to Italy.



Source: Feasibility Study, March 2012

However, preparation of this project reaches back to the 1970's when the proposed site for location of the central WWTP was originally identified by the then larger Nova Gorica Municipality. Subsequently all sewer network planning, design and construction projects have aimed at delivering wastewater to this location. In 1986 and again in 1995 it was negotiated with Gorizia to construct a joint cross border treatment facility at the River Soca in Italy. The negotiations ended without results and during the past 5-6 years numerous Slovene studies have been conducted to support planning and preparation of the present project.

The integrated project contains sewer network components to be implemented in the three municipalities of Nova Gorica, Sempeter-Vrtojba, and Miren-Kostanjevica and a joint central wastewater treatment facility located at the border between the two latter.

JASPERS input to the project started with the project being introduced on the action plan 2011. All relevant recommendations were compiled in the various JASPERS guidance notes. This completion note shows a photographic picture by the end of the JASPERS assignment. The project is approvable. It has been agreed that, due to the nature of the national approval process further steps, such as environmental assessment, are followed up by Slovene Authorities. In case any further issues on the project are arising, JASPERS is ready to assist.

JASPERS Comments

Conclusions

The project seems approvable in its present stage. The Jaspers comments were taken into account. Even though the project is non-major and enters the national approval process, the JASPERS opinion was requested and treated as prerequisite for the project approval.

On request of the Slovene Managing Authority, JASPERS did not involve its environmental expert team. Environmental issues are dealt with by the competent Slovene authorities.

1.1 Existing Situation

1.1.1 Overview

The project area is located in the Soca River Basin and currently discharges untreated wastewater to the tributaries Koren, Vrtojbica, and Vipava. The Soca River empties into the Gulf of Trieste which is identified as an environmentally sensitive area subject to eutrification.

The present sewer service ratio within the catchment area for the proposed WWTP is on average 73% but varies widely between the individual agglomerations: Kromberk 84%, Miren 0%, Vtrojba 69%, Sempeter 57% and Grgar 95%. The overall Slovenian national target of minimum 95% sewer service level is thus not met within the project area. Further, collected wastewater is discharged without treatment.

The existing sewer networks are combined systems for collection and discharge of both sewerage and storm water. The systems generally experience a high level of infiltration. The networks are equipped with simple overflow structures for relief to local recipients. Previously Nova Gorica pumped collected wastewater to the Sempeter-Vrtojba sewer system for joint discharge to the Vrtojbica Stream downstream the inhabited areas. This solution was however stopped by the environmental authorities due to potential negative effects on the Vipava River fishing zones. Nova Gorica therefore now discharges untreated sewage into the Koren stream just before it crosses into Italy. Sempeter-Vrtojba continously use Vrtojbica as recipient and Miren partly the Vipava River.

The picture below shows the location and size of agglomerations (one inhabitant ~1.3 PE) included in the WWTP catchment area together with streams and rivers currently serving as recipients for sewage and drainage waters. The project area is seen to be a source of transborder water pollution.



Source: Feasibility Study, March 2012

By the end of 2010 the overall population of the three municipalities amounted to 43,261 inhabitants. However, only 31,559 inhabitants are settled in the catchment area for the project WWTP. Treatment services will also be provided for septic tank users and sludge produced by small decentralised treatment measures located away from the immediate catchment area.

Direct beneficiaries of the project will be the connected inhabitants, several large tourist hotels, and public institutions including one regional hospital.

1.1.2 Institutional Organisation

Project Applicant and responsible authority for project management and implementation is the municipality of Nova Gorica.

Beneficiary

The project beneficiaries are the municipalities of:

- Nova Gorica;
- Sempeter Vrtojba, and
- Miren-Konstanjevica

Upon project completion each municipality will take ownership of the assets constructed on its territory. Since the WWTP is to be located across the border between Sempeter Vrtojba and Miren-Konstanjevica municipalities it will become their shared property.

Operator

The enterprise *Vodovodi in Kanalizacija Nova Gorica d.d.* will operate project assets following completion. The company is also responsible also for preparation of the project.

The enterprise Vodovodi in Kanalizacija Nova Gorica d.d. (water supply and sewer system Nova Gorica, Joint-Stock Company) is a public enterprise for the supply of drinking water and discharge of wastewater in the area of the City Municipality of Nova Gorica and the municipalities

of Šempeter - Vrtojba, Brda, Miren - Kostanjevica and Renče - Vogrsko. The joint-stock company appear in the registry of the District Court of Nova Gorica under entry no. 1/04033/00.

The owners of the operator company shares are:

•	City Municipality of Nova Gorica	(63.6957%)
•	Municipality of Brda	(7.0663%)
•	Municipality of Miren – Kostanjevica	(4.8775%)
•	Municipality of Šempeter – Vrtojba	(22.5052%)
•	Municipality of Ajdovščina	(1.8552%)

The company Supervisory Board consists of representatives of the owner municipalities. The Supervisory Board appoints the company Board of Managers and its directors.

The activities of the company are regulated by the Public Utilities Act, the Local Self-Government Act, the Financing of Municipalities Act, the Public Procurement Act, the Public Finance Act, and the Companies Act.

Contractual Relation and Financing:

The contractual relationship between the utility company and the owner municipalities are defined by the instrument of incorporation and by the statutes of the company.

The Operator pays a rent/lease fee equivalent to the depreciation of the operated assets to the municipalities. Other than that no transfer of revenues from the operator to the project beneficiaries is foreseen. Project beneficiaries are supposed to use the collected lease fee for re-investments into and maintenance of the assets.

1.1.3 Existing Infrastructure and Service Standards in the Project Area

1.1.3.1 Sewer Systems

Nova Gorica municipality

Sewer services are currently available to 84% of the 22,368 inhabitants in the project area. The existing sewerage network in the project area of Nova Gorica and Sempeter-Vrtojba municipalities has an overall length of 137.5 km, 9.65 km hereof are main collectors and 14.3 km dedicated storm water sewers. There are 65.7 km of concrete collectors with diameters ranging from 300 mm to 500 mm, 30.7 km with diameters ranging from 600 to 1,000 mm, and 8 km with diameters above 1,000 mm. Most of the sewer network (84%) is combined.

About 32 km smaller collectors with diameters in the range 100 mm to 250 mm are made from Asbestos Cement. PVC/PE/PP pipe materials are used for in total 1.1 km only.

About 15% of the main collectors have been renovated. The same is the case for only 4% of the sewerage collection pipelines. In June 2009 the rate of infiltration was measured to 117% of the average daily sewerage flow.

The network is equipped with storm water retention basins with a combined capacity of 1,911 m³. The network has more than 20 relief structures discharging to the Koren and Vrtojbica streams. Relief generally starts at too low hydraulic loads and there few provisions to prevent floating or screening materials from discharge to the recipients.

The network includes one main pumping station with a capacity of 565 m^3 /h and 10 smaller ones with a combined capacity of 440 m^3 /h. Except for a small one all pumping stations have been built in the last 10 years and are assessed as being of good to average mechanical and civil

engineering conditions. The main pumping station will be used for transmission of wastewater to the proposed WWTP.

Sempeter- Vrtojba municipality

Sewer services are currently available to 62% of the 6,162 inhabitants in the project area. The existing sewer system is combined except in a couple of areas. One the systems designed as separate no longer functions as such due to wrong connections.

The system includes one retention basin and five relief structures. In addition two smaller sewage pumping stations exist in the network.

Miren-Kostanjevica municipality

Only the Miren agglomeration of this municipality is geographically located in the project catchment area. Currently there are no piped sewerage services available for the 2,329 inhabitants.

1.1.3.2 Sewage treatment

There are no wastewater treatment facilities available for the inhabitants of the project catchment area. All wastewater is discharged to recipients without treatment.

1.2 The Project

1.2.1 Main Objectives

The proposed works have as their main goal to improve wastewater infrastructure in the municipalities of Nova Gorica, Sempeter-Vrtojba and Miren-Kostanjevica municipalities in accordance with Slovenian Operational Programme for discharge and treatment of urban wastewater and the Urban Waste Water Treatment Directive (UWWD). The main goals of the project are to:

- Provide wastewater collection and treatment services for a minimum of 95% of the inhabitants in the project area agglomerations;
- Provide wastewater collection and treatment services for institutions and the commercial sector in the project area.
- Provide wastewater treatment to achieve good environmental quality of receiving surface waters;
- Prevent eutrophication of surface waters in sensitive areas;
- Meeting prescribed standards for bathing waters;
- Provide nationally compliant sludge management and disposal.

The proposed project meets objectives of the OP ETID and the EC UWWD.

1.2.2 Project Elements

The project has a total cost of approximately Euro 46.35 million including VAT at price level May 2012. The eligible costs amount to about Euro 38.63 million as VAT is recoverable. The project includes three components:

<u>Wastewater treatment:</u> Tertiary wastewater treatment, effluent disinfection, and sludge drying for 50,500 p.e.

<u>Sewer network</u>: Sewer rehabilitation, network extension and establishment of transmission pipelines to the WWTP. Network rehabilitation measures include elimination of hydraulic constraints and reconstruction of overflow structures to reduce frequencies of off-loading and enabling retention of more polluting matter. Extension of sewer services to 10,263 additional p.e.

<u>Technical assistance</u>: Training and operational assistance at the WWTP during a 1-year defects notification period.

Approximate investments in constant prices for each of the three municipalities are outlined below:

Nova Gorica	Total [Euro]
Investment	
Nova Gorica treatment plant share	15,266,185
Technical assistance	618,770
Collector through Vrtojba	1,342,250
Sewer system	2,780,000
Other costs	787,060
Investment total	20,794,265

Šempeter - Vrtojba	Total [Euro]
Investment	
Nova Gorica treatment plant share	4,398,444
Technical assistance	178,278
Collector through Vrtojba	1,342,250
Sewer system	2,930,000
Other costs	436,515
Investment total	9,285,487

Miren - Kostanjevica	Total [Euro]
Investment	
Nova Gorica treatment plant share	1,553,140
Technical assistance	62,952
Sewer system	6,440,000
Other costs	489,474
Investment total	8,898,929

2 JASPERS Input to the Project

2.1 Summary of JASPERS tasks from the Project Fiche

JASPERS was requested to assess the available project documentation namely Feasibility Study and Cost Benefit Analysis and to support the development of a complete project application to be approved as non-major project within the national approval process.

2.2 Summary of Actual JASPERS Input to the Project

The actual JASPERS inputs covered the following aspects:

- General assessment of wastewater collection and treatment needs in the Nova Gorica region;
- Assessment of the overall approach in regard to the Urban Waste Water Treatment Directive and other relevant directives;
- Review of various versions of Feasibility Studies and supporting documentation including assessment of the appropriateness of the project scope and its presentation in the project documentation; drafting comments and recommendations for further clarifications;
- Review of regional aspects for design of project measures;
- Review of the proposed technological solutions for treatment, disinfection and sludge management;
- Advice on Cost Benefit Analysis methodology to be followed;
- Meetings with Consultants, the Applicant, and the Managing Authority to clarify and resolve issues raised;
- Active participation in appraisal missions upon request of the Managing Authority.

2.3 List of JASPERS Experts Involved

Task Manager	Ralf Aymar
-	Water Sector Specialist
	r.aymar@eib.org
Team Member	Fernando Maldonado
	Engineer
	maldonadf@gmail.com

2.4 Documents Reviewed

ID	Subject	Date Received
1	Project Presentation	30-3-2011
2	Comparative study of the manner of the discharge and treatment of wastewater of the municipalities Nova Gorica, Sempeter-Vtrojba, and Miren-Kostanjevica.	25-05-2011
3	 Option analysis for the project "Collection and Treatment of wastewater in the basin of Soca (WWTP Nova Gorica), July 2011. Annex 1 – Current sewer network state and wastewater disposal facilities, Drwg G.1.0 Annex 2 – Option 1 – Common WWTP for Nova Gorica, Sempeter Vrtojba and Miren, Drwg G.1.1 	22-7-2011
	Annex 3 – Cost estimate Option 1 network and 65,000 p.e. WWTP	

ID	Subject	Date Received
	Annex 4 – Option 2 – Separate WWTPs for Nova Gorica, Sempeter	
	Annex 5 – Cost estimate Option 2 networks and 3 WWTPs	
	Annex 6 – Option 3 – common WWTP for Gorica, Nova Gorica,	
	Sempeter Vrtojba and Miren, Drwg G.1.3	
4	Annex 7 – Cost estimate Option 3 networks and 113,500 p.e WWTP	22 11 2011
4	Basin (WWTP Nova Gorica), June 2011, version 5 – 21-11-2011.	23-11-2011
5	Option analysis for the project "Collection and Treatment of	23-11-2011
	(Version 21-11-2011)	
6	CBA analysis – Excel File (FEA FS wwtpNG-SVLR.XLSX)	05-12-2011
7	Feasibility Study- Collection and treatment of wastewater in SOČA	31-01-2012
	Basin (WWTP Nova Gorica), June 2011, version 6 – January 2012.	
8	CBA analysis January 2012– Excel File	07-02-2012
9	Feasibility Study- Collection and treatment of wastewater in SOČA	27-03-2012
Ũ	Basin (WWTP Nova Gorica), June 2011, version 7 – March 2012	
	2012.	
	Anney 1. Ourset sever network state and westswater dispessel	
	facilities Drwg G 1 0	
	Annex 2 – Financial analysis table	
	Annex 3 – Financial sustainability analysis table	
	Annex 4 – Economic analysis table	
	Annex 5 – Pollution load on recipients "without" and "with" project	
	Annex 7 – Cost estimate for proposed project	
	Annex 8 – Maps of bathing areas and environmentally sensitive areas	
	(maps G.1-22, G.2-32, G.3-34, G.4-58, G.5-66)	
10	CDA analysis Marsh 2042 - Event File	07 00 0040
10	CBA analysis March 2012 – Excel File Eessibility Study – Collection and treatment of wastewater in SOČA	27-03-2012
' '	Basin (WWTP Nova Gorica), June 2011, version 7 rev. – March 2012	00-04-2012
	2012.	
	Annex 1 – Balance sheets for three municipalities	
	Annex 2 – Financial analysis table Annex 3 – Financial sustainability analysis table	
	Annex 4 – Economic analysis table	
	Annex 5 - Pollution load on recipients "without" and "with" project	
	Annex 6 – Catchment area overview G.0 and sewer network drwg's	
	existing (G.1.0) and proposed (G.1.1, G.1.2, G.1.3)	
	Annex 8 – Maps of bathing areas and environmentally sensitive areas	
	(maps G.1-22, G.2-32, G.3-34, G.4-58, G.5-66)	
12	CBA analysis April 2012 – Excel File	03-04-2012
		00 07 2012

2.5 Schedule of Key Activities and Meetings

2.5.1 Missions and Meetings

Date	Subject	Purpose
30 March 2011	Project Presentation at Ministry of Environment	First Project Overview
31 March 2011	Mission to Nova Gorica	Gain firsthand knowledge of the project baseline and to discuss issues concerning preparation the project Feasibility Study.
24 May 2011	Meeting at Managing Authority	Project Update
6 October 2011	Project Meeting at Managing Authority with project beneficiary	Discussion on Status of Project Documentation, advice to beneficiary
8 November	Meeting at Managing Authority	Project Update
15 December 2011	Project Meeting at Ministry of Environment with project beneficiary	Discussion on Status of Project Documentation, advice to beneficiary
2 February	Meeting at Managing Authority	Project Update
5-9 March 2012	Mission to Nova Gorica	Provision of guidance to the Project Applicant and consultants on finalisation of the FS and CBA documentation

2.5.2 Notes Issued

Date	Note	Purpose	
20-06-2011	Guidance Note 1	Recommendations and comments on documents received 25 May 2011.	
16-08-2011	Expert Opinion Note	Comments on Option Analysis	
28-02-2012	Guidance Note 3	Recommendations related to FS report and financial model received on January 31 st and February 7 th , 2012.	
	Completion Note	Based on FS and CBA received on 3 rd April 2012	

3 Key Issues

3.1 **Project Objectives**

The overall objectives of the project are provision of wastewater services for the project area in accordance with national requirements and EU wastewater directives by end 2015. These are to be achieved by:

- Establishment of regional tertiary wastewater treatment facility with disinfection and provisions for sludge drying.
- Improving the purity of recipients in compliance with the EC Water Framework directive;
- Reducing nutrient emissions to environmentally sensitive recipients;
- Provide adequate sewer services to the inhabitants of the regional catchment area.

More specifically the project objectives are:

For sewer services:

- Construction of sewer system infrastructure for connection of additional about 7,900 inhabitants, institutions and commerce with a combined pollution load 10,263 p.e.
- Construction of sewer system infrastructure for connection of 41,832 p.e. to wastewater treatment facilities;
- Ensure at least 95% sewerage collection and treatment for agglomerations above 2,000 p.e.

Wastewater treatment:

- Establishment of 50,500 p.e. tertiary wastewater treatment facility;
- Disinfection of treatment plant effluent;
- Mechanical dewatering and drying of sludge to 92% dry solids;
- Provision of facilities for treatment and reception of sludge and septic tank contents from agglomerations outside the WWTP catchment area.

In principal three key objectives have been selected for the proposed project. These have all been evaluated and assessed in detail by JASPERS:

<u>Nutrient removal</u>: The treatment facility is proposed with a capacity of 50,500 p.e. and nutrient removal is compliant with EC requirements. It is further justified by discharge to recipients of limited size and ultimately to the Gulf of Trieste which is classified as sensitive to eutrophication.

<u>Effluent disinfection</u>: There is no Slovenian legal requirement for provision of effluent disinfection for the proposed treatment facility. The Applicant however, proposes disinfection for a number of reasons:

- Discharge takes place within the basin of River Soca which empties into the Gulf of Trieste with large recreational bathing areas;
- Vipava river immediately downstream from the WWTP is classified as Natura 2000 and features both bathing areas (not registered) and fishing grounds;
- The ecological status of the Vrtojba Stream is currently very poor but not covered by the current WFD planning document. The Habitat Directive thus prescribes efficient treatment of wastewater to restore its quality.
- Vrtojba stream has low flows during dry periods and will in periods provide a limited degree of dilution only.
- The local municipalities want to protect the recipients to ensure high quality recreational areas for bathing and fishing.
- The WWTP will receive wastewater from a regional hospital with nearly 500 beds.

<u>Sludge drying</u>: Wastewater sludge disposal options in Slovenia are environmentally limited. The main available options are incineration or disposal by a licensed contractor. These two possibilities are considered by the option analysis for defining the most favourable solution for the project .

JAPSERS Comments

Conclusions

The key objectives of the project are well defined and the solutions supported by an option analysis in principal three key objectives have been selected for the proposed project. These have all been evaluated and assessed in detail by JASPERS.

JASPERS recognises that there is no legal requirement for disinfection of the WWTP effluent. The Applicant's justifications for adoption of this objective appear reasonable and JASPERS is able to endorse it.

3.2 Engineering Issues

3.2.1 Options analysis

The option analysis in the FS follows the required procedure starting with a screening process and selecting the resulting options using a least-cost analysis. The option analysis adopts a staged approach. The option trees considered for the individual stages are set out below.

3.2.1.1 Catchment area/no of WWTPs

The considered option tree for size and locations of catchment areas and recipients are shown in the following table:

Recipient	Cross border	Centralised Slovenian	Decentralised
	Slovenia - Italy	WWTP	Slovenian WWTPs
	Option B	Option 1	Option 2
Sorca River	113,500 p.e		Goriza Italy
Vrtobica Stream			16,750 p.e.
Koren Stream		50,500 p.e.	42,200 p.e.
Vipava River			3,000 p.e
25-year NPV	Euro 45,198,616	Euro 44,417.852	Euro 51,753,476

The catchment area option analysis includes a detailed assessment of the costs of construction for the sewer transmission system required to deliver the wastewater to the considered place of treatment.

Further it is for simplicity assumed that the type and level of treatment to be achieved is the same for all options since all recipients are considered equally sensitive.

<u>Option B:</u> This option assumes that the existing WWTP in Goriza is extended from its current capacity of 60,000 p.e to be able to treat also wastewater collected at the Slovenian side of the border. However, only 50% of the involved costs are assumed to be carried by the Slovenian municipalities and included in the calculated NPV.

Option B is rejected for a number of reasons. The existing Goriza WWTP is located in an industrial zone on a plot of limited size. It is not considered possible to establish a facility of twice the existing capacity at the site. Ten years of cross border negotiations on joint wastewater management ended without result in 1995. Wastewater treatment demands and design requirements are different for Slovenia and Italy. It is not considered possible to achieve a cross border solution within the time limit of the Slovenian accession agreement. Finally the cross border solution is found to be more expensive than Option 1.

<u>Option 1:</u> This option is selected as it is the economically most favourable and meets the project objectives.

<u>Option 2:</u> This option is discarded since it is found to be the most expensive solution. Also it does not comply with the policy of regionalisation of wastewater treatment.

The following comments are appropriate:

- The assumed design capacities for the non-preferred options are larger than for the preferred solution.
- The cross border solution would result in a large scale treatment facility feasible for sludge digestion and energy recovery. This aspect has not been included in the considerations.
- The operational costs for Option B are considered to be too high compared to Option 1.
- In total it would have been expected that Option B is the most economically favourable solution of the considered options.
- The available plot in Goriza is insufficient for a regional facility with double the capacity of the existing works. The plot must be extended or the entire WWTP moved to a different location.
- It is fully recognised that there exist severe legal and institutional constraints in regard to establishment of a cross border solution.

-

3.2.1.2 WWTP Technology

The CWWTP will be located on a site where, for flood protection purposes, it is necessary to raise the overall level by about 5 m. The surface areas of the treatment facilities considered therefore have a significant influence on the costs of construction.

The option tree considered for WWTP technology is set out in the following table:

	Treatment Technology				
	Membrane reactor	Sequential batch	Conventional		
Disinfection	(MBR)	reactor (SBR)	Activated sludge		
			(CAS)		
Chlorination	na	(X)	(X)		
UV-treatment	na	Х	Х		
25-year NPV	Euro 26,499,456	Euro 26,449,958	Euro 27,134,344		

Three options for effluent disinfection have been considered:

- Membrane filtration (0.4-0.04 µm)
- Chlorination, and
- UV treatment:

Membrane filtration automatically provides disinfection due to an average pore size of <0.4 µm.

The considered option for chlorination includes filtration for removal of organic particles, chlorination, and de-chlorination. The NPV of the solution amounts to between about Euro 2.4 and 2.8 million depending on the selected source of chlorine.

UV disinfection also includes filtration as pre-treatment. The NPV for UV amounts to about Euro 2.25 million. UV is the preferred alternative to membrane filtration.

The option analysis results in MBR as the preferred treatment technology as it is results in lower overall cost than other options, provides for a higher effluent quality, and has less suspended solids in the effluent. Further it is assumed to generate less sludge due to a higher sludge age. Technological solutions for MBR have been assessed based on technical specifications and price levels from relevant potential suppliers.

Further, alternatives for the point of discharge for the WWTP have been considered: Vrtojbica stream just next to the WWTP or the Vipava river through a 2,36 km effluent pipeline. The Vipava solution includes a crossing of the river and was rejected by the environmental authorities responsible for monitoring Natura 2000 areas.

In this light the following comments are appropriate:

- Chlorination is a commonly applied method for disinfection of WWTP effluents. The negative aspects of this method and also the costs thereof are overstated.
- Chlorination and UV treatment processes can be bypassed and are feasible for seasonal usage only to save operational costs.
- MBR treatment is an advanced, relatively young and expensive technology. The technology is rather energy consuming and requires good operational skills and understanding to ensure cost efficient operation of the facilities. Although the superior effluent quality is undisputed certain advantages may be overrated. The benefits of a high sludge age, low sludge yield, and aerobic stabilisation have a corresponding cost in the form of the additional energy consumed and anyway are of questionable value given that the sludge will be dried for burning.
- The prepared SBR and CAS cost estimates do not appear to have been subject to the same cost optimisation as the MBR facility. It is therefore not fully convincing that the selected option is actually also the cheapest.

JASPERS cannot completely verify that the extra costs of the selected option are outweighed by its claimed benefits. It is however expected that the chosen technology will be able to consistently deliver an effluent quality capable of meeting the defined objectives.

3.2.1.3 Sludge management

The option tree considered for sludge management appears in the following table. Sludge management includes sludge from remote smaller WWTPs and septic tanks.

Ultimate disposal	Contractor	Cement Plant
Mechanical Dewatering	20% DS	20%
Drying		92% DS
25-year NPV	Euro 8,559,779	Euro 7,301,252

The option with drying and disposal of the sludge to a cement factory licensed for sludge incineration is selected. The solution includes mechanical dewatering and gas fired drying with environmental remediation measures for odour control. The sludge drying option was investigated by obtaining technical specifications and price indications from potential suppliers.

3.2.1.4 Sewer network

Two strategic options are assessed: maintenance and rehabilitation of the existing combined sewer network or replacing it with a new separate system to minimise wastewater flows and treatment plant capacity. Replacement of the existing network with a new separate sewer system was rejected for financial reasons, since the additional costs would be almost 50 mill Euro.

The sewer network rehabilitation and extension activities include fourteen works components. Options are documented for four of these. Micro tunnelling is rejected in two cases due to additional costs.

Continued use of an existing combined main collector in Vrtojba together with a new main transmission pipeline is rejected because of insufficient hydraulic capacity. The proposed option is to establish two new combined sewer lines.

An option for implementation of wastewater separation in the border area MPP and use of an existing sewer channel for storm water only is rejected due to its \in 250 000 of additional costs. The preferred option is to convert the existing large channel to a combined sewer and retention basin.

An option for omission of the proposed 900 m³ storm water retention facility known as STRFF AB was rejected since it would require increased capacity of the transmission pipelins through Vrtojba and increasing the inlet reservoir at the WWTP with the same capacity.

JASPERS Comments

Conclusions

<u>Catchment area:</u> The options developed and assessed represent feasible options. The options reviewed by JASPERS are compliant with the objectives of OP ETID and the Urban Waste Water Treatment Directive.

From the documentation reviewed it seems valid to select the proposed option with a centralised WWTP for the Slovenian municipalities.

<u>Treatment Technology</u>: The developed options are considered feasible for the purpose.

<u>Thermal sludge drying</u>: The two considered sludge management options are feasible and relevant for the current situation in Slovenia. The Slovenian regulations are likely in a few years to result in establishment of one or more dedicated sludge treatment facilities to reduce the overall national costs. Economies of scale work against the establishment of own drying facilities at WWTPs the size of Nova Gorica. However, at present the selected choice seems reasonable for achieving the overall objectives of the project as there is no large scale centralised sludge incineration facility available in Slovenia.

<u>Sewer network components</u>: Options for the sewer network components appear to be feasible and relevant for their purposes. They have generally been developed and assessed during preparation of the relevant design documentation for the works.

The option analysis is considered to be comprehensive, relevant and to have covered all relevant aspects of the project. Financial comparison of the options is based on the net present value of their costs but not benefits. Based on the information provided it is however not possible to assess whether the alternative options have been priced on an entirely comparable basis, nor to capture the slightly different benefits of the options considered.

3.2.2 Engineering feasibility

3.2.2.1 Wastewater Treatment Facility

The design horizon for the scheme is 2038 when in total 32,980 inhabitants are expected to be connected. The adopted design capacity for the WWTP is 50,500 p.e. with an initial estimated loading of about 87%.

The proposed WWTP includes the below unit processes and functions:

Mechanical Treatment

- Inlet pump stations (Q_{dw}24 ~201 l/s, Q_{max} ~536 l/s)
- 2 mechanical screens, mesh size 5mm
- Sand and grit chamber
- 2 mechanical fine screens, mesh size 2mm
- Washing and bagging facilities for sand and screen residues
- Reception facilities for septic tank sludge

Biological treatment (MBR)

- Anoxic reactor for denitrification (recirculation)
- Aerobic reactor for nitrification and aerobic sludge stabilisation
- Chemical precipitation of Phosphorous
- Membrane filtration

Sludge thickening and storage

- Excess sludge from biological treatment
- Sludge from external small WWTPs
- Septic tank sludge

Sludge treatment

- Mechanical dewatering
- Cake storage and buffer tank.
- Thermal drying to 92% DS

Others

- Auxilliary facilities
- Buildings and infrastructure.
- ٠

Thermal drying of sludge to 92% dry solids is also an unusual choice for a plant of this size. After mechanical dewatering to 20% 6,480 m³ (~ton) the sludge shall be dried to 92%. This will involve evaporation of above 5,000 ton of water annually. A high level of energy efficiency and recovery is therefore essential to ensure sustainability of the selected solution and should be a condition for grant provision. Energy efficiency will depend on the number of starts and stops, continuous 24-hr operation would thus be most efficient but difficult to ensure with the limited sludge quantities produced at the Nova Gorica CWWTP. The documentation does not specify the size of the sludge cake storage and possible lengths of periods with 24-hour continuous operation cannot be estimated. The proposed staffing of the facility apparently does not consider 24-hour supervision of sludge drying operations.

Wastewater Networks

A dynamic hydrologic-hydraulic model has been built with the US EPA SWMM 5.0 software to establish design criteria for capacity of the combined network, retention and overflow structures. The sum of works appears in the below table.

	Unit	quantity	diameter
Nova Gorica			
Faecal sewage *)	m	1,753	up to DN 1,000
Pump stations	piece	1	
Overflow structures	piece	19	
Retention basin	piece	3	
Storm water sewers - Not specified	m	0	
Utilities - Not specified	m	0	
Šempeter - Vrtojba			
Faecal sewage	m	6,013	Up to DN 1,400
Pump stations	piece	1	
Overflow structures	piece	6	
Retention basin	piece	1	
Storm water sewers	m	570	
Utilities	m	6,747	
Miren - Kostanjevica			
Faecal sewage	m	10,216	up to DN 250
Pump stations	piece	9	
Overflow structures	piece	0	
Retention basin	piece	0	
Storm water sewers	m	4,421	
Utilities	m	2,322	
The project - three municipalities			
Faecal sewage	m	17,982	
Pump stations	piece	11	
Overflow structures	piece	25	
Retention basin	piece	4	
Storm water sewers	m	4,991	
Utilities	m	9,069	

*) Exclusive of works for the storm water system and utilities.

The reviewed documentation does not clearly specify foreseen works on storm water sewers and utilities (gas, water, phone lines etc.). For Miren it is mentioned that Storm water sewer installations do not form part of the project. For Miren-Kostanjevica the project includes sewer pipelines to a connection well at the border of the individual properties. Necessary works on private land are not included in the project.

A more detailed specification of the works is prepared from Appendix 7 to the FS which shows also pipe dimensions. It should be noted that some differences exist between the above table and the content of Appendix 7.

No.	Investment Description	Dimension	Quantity	Units
1	New combined sewer in street "UI. Milojke "trukelj"	Ø300-1000	480	m
2	New combined sewer in the area of Grcna	Ø 300-600	990	m
3	New sewer channels in the area of "Kurja vas":			
	- Gravitational wastewater channels DN 200 mm	Ø200	923	m
	 Pressurized wastewater channel DN 80 mm 	Ø80	350	m
	 Pumping station "Kurja vas" 	Pst	1	рс
4	New pressure sewer in the area of Streliska ul.			
	 Pressurized wastewater channel DN 80 mm 	Ø80	120	m
	- Pumping station "Streliska"	Pst	1	рс
5	New stormwater sewers area in the hospital "F.	Ø300-600	320	m

No	Investment Description	Dimension	Quantity	Unito
INO.	Degrapes" area	Dimension	Quantity	Units
	New combined cower channels. "Ill Padlib bereav"			
6	"Stionkova ul " and "Egiplova	Ø100-1100	671	m
7	New sewer in the area of "Pristava"	0400-1400	0/1	111
- 1	- Combined channels	Ø400-1400	725	m
	- Wastewater channel	Ø250	38	m
	New combined sewers and water main replacement	0230		
8	area of "Vrtoiba"			
	- Channel V1: DN 300 - 700 mm	Ø300-700	395	m
	- Channel V2: DN 600 - 1400 mm	Ø600-1400	1,150	m
	- Upgrade of the water supply main pipe DN 200 mm	Ø200	1,984	m
9	New combined sewer channels in "Krozna cesta" street	Ø200-900	818	m
	New pressure and gravitational sewer in the area of			
10	"spodnja Vrtojba" and "Gramozna cesta"			
	- Gravitational wastewater channels DN 250 mm	Ø250	965	m
	- Pressurized wastewater channel DN 80 mm	Ø80	75	m
	- Pumping station "Spodnja Vrtojba"	Pst	1	рс
11	New wastewater sewers in the area of "Na hribu"	Ø250	1,082	m
12	Conversion of combined sewer line to retention facility			рс
		Ø1000-		
13	Extension of the main wastewater sewer collector:	1100	505	m
14	Sewer system Miren – new			
	-Secondary sewer network DN 250 mm	Ø250	11,400	m
	- Gravitational collectors DN 250 - 300 mm	Ø250-300	1,750	m
	- Pressure sewers DN 50 - 250 mm	Ø50-250	2,775	m
	- Pumping stations "no.1", "no.2", "no3", "no.4", "no.5"	Pst	5	рс
	Upgrading of overflow structure with screening devices	no	16	рс
	New overflow structures	no	9	рс
	Retention tank ZBDV capacity increase and upgrade			2
	(305 m [°])		305	m³
	Retention tank ZBDV upgrade	no	1	pc
	New retention tank ZBDV-AB (900 m ³)		900	m°
	New retention tank ZBDV-Vrtojba (905 m ³)		905	m³

Technical Assistance This includes:

- Works supervision during the construction phase
- Publicity
- Management and operational support during first year of WWTP operation.

Summary WWTP Catchment Area Data

Item	Unit	Before	After
Population			
Population in catchment	Nr.	31,559	31,993
Waste Water Network			
% population connected	%	73	95
Infiltration	%	116	<116
Pollution overflow during rainfall	Kg COD/year	98,300	58,860
Population Equivalent *)	PE	~43,000	43,832
Total length of wastewater network (incl. stormwater & main collectors) – Nova Gorica and Sempeter-Vrtojba	km	137.5	145.3
Population served per length of wastewater network in Nova Gorica	Nr/km	164	209
Separate sewer network in Miren (excl. Stormwater)	km	0	10.2
Population served per length of wastewater network in Miren	Nr/km	0	230
Waste Water Treatment			
Treatment to 91/271/EEC	%	0	87
Capacity of the WWTP in Population equivalent	PE	0	50,500

*) incl. ~2,000 pe from septic tanks

Possible opportunities for extension of the CWWTP catchment area are limited to the agglomeration of Bilje in Miren-Kostanjevica Municipality with about 1,500 p.e. The agglomeration of Bilje is not covered by the current inter-municipal project agreement and a separate treatment facility is being considered by the municipality of Miren-Kostanjevica.

JASPERS Comments

Conclusions

<u>CWWTP:</u> The adopted design capacity of 50,500 p.e for the WWTP is considered acceptable for the documented needs of the catchment area. The adopted hydraulic design capacity assumes that after the present project sewer network rehabilitation works will become implemented to reduce the rate of infiltration to less than half the current level.

The proposed engineering approach to waste water treatment is considered to be advanced in selecting membrane technology and thermal sludge drying. The costs of investments and also of operation are therefore expected to be at the high end. It is fully recognised that tertiary treatment is required for the selected location of the WWTP. The selected membrane technology will ensure maximum and better than required environmental protection of the Vrtojbica Stream and downstream impact areas. The discharge of suspended matter will be insignificant and all year round disinfection of the effluent is achieved.

The plant will be procured according to Yellow Fidic Conditions of Contract. The available design documentation is therefore functional only and not qualified to a degree allowing for an engineering review of design for unit processes and functions.

<u>Sewer system network</u>. The reviewed documentation does not include detailed design specifications for the sewer network components. However the quoted applied design norms and standards are commonly used and so is the hydraulic model. The applied design is therefore presumed to be acceptable. During the final site visit physical constraints along the alignments of some of the main pipelines and new retention basins were inspected. The necessity for replacing utilities and for rehabilitation of entire roads is recognised.

<u>Infiltration</u>: The current rate of infiltration into the sewer network of Nova Gorica amounts to 116% of the dry weather wastewater flow. The sewer network overflow structures and the WWTP capacity assume a significant reduction of this rate. If this is not implemented more wastewater than assumed by the project will be off-loaded to the recipients and reduce the positive environmental impact of the project.

The thermal sludge drying plant will consume large amounts of energy for evaporation of about 5,000 ton of water annually. Energy efficiency and recovery will therefore decide the future operational costs for this project component. Energy efficiency evaluation criteria and guarantees should therefore be included in the tender criteria for this component.

3.2.3 Project Cost Estimates

3.2.3.1 Investments

The total investment costs in constant prices (May 2012) amount to Euro 46.35 million including VAT.

	Value in EUR	Eligible costs	Other costs
Nova Gorica Wastewater Treatment Plant			
Technological facility	13,830,000	13,830,000	0
External infrastructure for the WWTP	1,500,000	1,500,000	0
Total WWTP	15,330,000	15,330,000	0
Municipal infrastructure for WWTP and other supporting facilities			
Internal infrastructure for WTP	2,864,000	2,864,000	0
Technical assistance	860,000	860,000	
Building facilities	2,423,769	2,423,769	0
External infrastructure for buildings	600,000	600,000	0
Total MI for WWTP and other supporting facilities	6,747,769	6,747,769	
Collector through Vrtojba			
Collector total	2.684.500	2,684,500	0
	, ,	, ,	
Sewer system			
Municipality of Nova Gorica			
Total sewer system in the Municipality of Nova			
Gorica	2,780,000	2,780,000	0
Šempeter – Vrtojba sewer system			
Total sewer system in the Municipality of Šempeter – Vrtojba	2,930,000	2,930,000	0
Municipality of Miren - Kostanjevica			
Total sewer system of the Municipality of			
Miren - Kostanjevica	6,440,000	6,440,000	0
Total sewer system	12,150,000	12,150,000	0
TOTAL investment in WWTP and sewer			
system	36,912,269	36,912,269	0
Other costs			
Unforeseen works – 5%	884,925	884,925	0
Supervision – 1.8%	664,421	664,421	0
Public information	163,705	163,705	0
Total other costs	1,713,050	1,713,050	0
TOTAL whole investment without VAT	38,625,319	38,625,319	0
	7.004.000		7 705 66 1
	7,964,690	0	7,725,064
Grand Total with VAT	46,350,383	38,625,319	7,725,064

A breakdown of project investments according to type and location is provided in the below table.

The overall cost for the 50,500 pe. WWTP amounts to 437 Euro/p.e. Provision of sewer services for Miren amounts to about Euro 2,765 per inhabitant or 6,440 Euro per household.

Sewer network unit costs derived from Annex 7 appears below. The sewer unit costs are based on costs before adjustments of prices to May 2012 level. Actual and updated unit costs would therefore be different (slightly higher) than the ones appearing in the below table.

Unit costs from Appendix 7

						Unit Cost
No.	Investment Description	Dimension	Quantity	Unit	Cost in Euro	Euro/m
1	New combined sewer in street "UI. Milojke "trukelj"	Ø300-1000	480	m	233,850	487
2	New combined sewer in the area of Grcna	Ø 300-600	990	m	361,200	365
3	New sewer channels in the area of "Kurja vas":					
	- Gravitational wastewater channels DN 200 mm	Ø200	923	m	276,900	300
	- Pressurized wastewater channel DN 80 mm	Ø80	350	m	73,500	210
	- Pumping station "Kurja vas"	Pst	1	рс	15,000	15,000
4	New pressure sewer in the area of Streliska ul.					
	- Pressurized wastewater channel DN 80 mm	Ø80	120	m	25,200	210
	- Pumping station "Streliska"	Pst	1	рс	15,000	15,000
5	New stormwater sewers area in the hospital "F. Degranca" area	Ø300-600	320	m	87,500	273
6	New combined sewer channels "UI. Padlih borcev", "Stjenkova ul." and "Feiglova	Ø400-1400	671	m	312,000	465
7	New sewer in the area of "Pristava"					
	- Combined channels	Ø400-1400	725	m	254,140	351
	- Wastewater channel	Ø250	38	m	8,360	220
8	New combined sewers and water main replacement area of "Vrtojba"					
	- Channel V1: DN 300 - 700 mm	Ø300-700	395	m	134,538	341
	- Channel V2: DN 600 - 1400 mm	Ø600-1400	1,150	m	517,500	450
_	- Upgrade of the waterwarks main pipe DN 200 mm	Ø200	1,984	m	168,640	85
9	New combined sewer channels in "Krozna cesta" street	Ø200-900	818	m	227,500	278
10	New pressure and gravitational sewer in the area of "spodnja Vrtojba" and "Gramozna cesta"					
	- Gravitational wastewater channels DN 250 mm	Ø250	965	m	318,450	330
	- Pressurized wastewater channel DN 80 mm	Ø80	75	m	15,750	210
	- Pumping station "Spodnja Vrtojba"	Pst	1	рс	15,000	15,000
11	New wastewater sewers in the area of "Na hribu"	Ø250	1,082	m	357,000	330
12	Conversion of combined sewer line to retention facility			рс	64,600	
13	Extension of the main wastewater sewer collector:	Ø1000-1100	505	m	404,000	800
14	Sewer system Miren - new					
	-Secondary sewer network DN 250 mm	Ø250	11,400	m	5,009,300	439
	- Gravitational collectors DN 250 - 300 mm	Ø250-300	1,750	m	700,000	400
	- Pressure sewers DN 50 - 250 mm	Ø50-250	2,775	m	575,700	207
	- Pumping stations no.1, no.2, no3, no.4, no.5	Pst	5	pc	155,000	31,000
45	Network Structures		4		047.000	70.050
15	Diplace of SO structures (RVV15, RVV12, RVV8, Rd-		4	pc	317,000	79,250
16	KVV0-1) Willi.		6		216.000	26.000
10	Dyly D_{1} D_{2} D_{2} D_{3} D_{1} D_{1} D_{2} D_{3} D_{1} D_{2} D_{3}		0	ρc	216,000	36,000
17	Liberado of SO structures (DV// P1_DV// P_DV// CD		5	00	200.000	60.000
17			5	μc	300,000	00,000
10	Liperaded of the SO structure DV// D 12 with:		1	00	60.000	60.000
19	Construction of new SO structures (RV/V17_RV/V9		9	pc pc	610,000	67,856
10	BVV9a BVV0-Odc S-16 BVV0-Odc S-17 BVV0-Odc S-		3	po	010,703	07,000
	10 RV/V0-C RV/V0-V1 RV/V0-V2) with:					
20	Retention tank capacity increase 360 m ² fushing system and air cleaning		1	nc	320.000	889
21	Upgrade of the structure STREE "ZBDV-K" with:		1	nc	80,000	80.000
	- Installation of a throttle			P~	00,000	00,000
	- Installation of a Tank Flushing System					
	- Installation of a screening device on the overflow crest					
22	Retention STRFF "ZBDV-AB" with 900 m3		1	DC	367,290	408
	- Installed throttle			- PV	00.,200	.00
	- Installed Tank Flushing System					
	- Installed Air Cleaning - Chemical Filter					
	- Installed Pumping station					
	- Outflow channel DN 200 mm		200	m	50.000	250

3.2.3.2 Costs of Operation

The expected costs for the first full year of operation (2015) appear in the table below.

Wastewater Treatment Plant	Euro /year
Variable costs	457,309
Energy	149,455
Polymers – sludge dewatering	24,046
Ferrous sulphide – Phosphorous removal	69,698
Hypochlorite – membrane cleaning	3,243
Sludge treatment	198,800
Water consumption	12,068
Fixed costs	408,235
Energy	117,493
Final disposal of sludge	38,142
Staff	108,000
Maintenance of buildings	34,000
Maintenance of equipment	85,600
Chemical analyses and environmental monitoring	25,000
Total treatment plant	903,514
2015 p.e. load incl. septic tanks	43,832

The initial treatment costs are thus estimated at Euro 20.6 per p.e. without VAT.

JASPERS Comments

Conclusions

The resulting unit cost for the WWTP is considered high compared to what would be expected for a traditional facility of similar capacity. However, the Nova Gorica plant is of a higher standard and will provide all year disinfection of the effluent and drying of the sludge to 92% dry solids. Further, the ground level of the construction site needs to be raised by almost 5 meters to provide protection against the 100-year flood level. When all these aspects are considered the final unit cost is not unreasonable.

The costs are all inclusive and cover necessary simultaneous rehabilitation or replacement / relocation of utility lines encountered (water, gas, electricity, etc.) as well as reinstatement of paved areas. Some streets are narrow and rehabilitation will be required for the full width due to the size of the installed pipelines. The unit costs may therefore be reasonable for the local conditions even after the previously mentioned 35% increase compared to a previous version of the project budget.

Contingencies for unforeseen works are according to Slovenian rules calculated as 5% of the value of works to become procured according to Red FIDIC conditions of contract. The basis for calculation of contingencies is therefore only about half the estimated overall costs of the works. The applied 5% contingencies for sewer works are low but acceptable due to the apparently all inclusive unit costs applied for the costing.

The costs of operation and maintenance of the WWTP reflects that the facility is sensitive to the costs of energy. The MBR process is energy intensive and so is the sludge drying process. Energy consumption costs therefore amounts to 1/3 of the estimated operational budget. Significant efforts should therefore be made to ensure a high level of energy efficiency for all elements. The cost of staff is considered on the low side especially if longer periods of continuous operation of the sludge drying facility are implemented.

3.3 Financial and Economic Analysis

3.3.1 Demand Analysis

The 2009 population of the catchment area amounted to 31,559 inhabitants. Currently sewerage collection services are provided for about 23,000 inhabitants (~73 %) only. Wastewater from households, institutions and the commercial sector is being discharged to recipients without treatment. Load surveys in 2009 concluded that the overall untreated amount of wastewater corresponds to 43,000 p.e. from within the catchment area plus about 2,000 p.e. from septic tank users outside the piped collection area.

The demand forecast includes the following assumptions:

- Sewer service ratio 95%;
- Water consumption 130 l/day/capita;
- Population growth rate 0.16% annually;
- Institutional growth rate 0.26% annually;
- Commercial sector growth rate 1.69%;
- Rate of infiltration to be reduced to 0.15 l/s/ha;
- The load from septic tanks (~12,000 users) will amount to 2,000 p.e.
- Sludge from small decentralised treatment facilities will be received for dewatering and drying.

The currently provided level of sewerage collection treatment services is not compliant with national objectives or the EC UWWD.

Concerning Demand Analysis the following comments can be made:

- The present water consumption is at around 150 l/d/p.e. with a downward trend. Increased tariffs and resource awareness will support the reduction. What is more, wastewater quantities may well be less than the quantities of water supplied. The adopted forecast is therefore feasible.
- The 2009 wastewater survey covered Nova Gorica. The conclusions made concerning both hydraulic and pollution loads may not be fully representative for the smaller communities. The load forecasts are therefore considered to be on the safe side.
- Infiltration reduction to the assumed design level will require significant leakage detection and network rehabilitation in addition to the present project
- A ratio of 1.60 between design capacity and current catchment area population (50,500/31,559) is considered to provide adequate capacity for treatment of wastewater from all sectors until the end of the planning period considering the expected limited overall growth/development trends in the area.

JASPERS Comments

Conclusions

The demand assumptions used are considered a reasonable base for project development. The assumed wastewater generation of 130 l/day/p.e. is acceptable. The downward trend from the current level of 150l/day is likely to continue with the foreseen tariff increases. Further, the sewage quantity may very well be smaller than the amount of drinking water sold.

The assumed limited growth rates for inhabitants, institutions and the commercial sector are reasonable for the region. The WWTP design includes 37.5% capacity for non household wastewater and future load increases. This is deemed feasible for the situation in the area.

The initial hydraulic load is high and infiltration reduction measures need to be implemented to protect against future excessive off-loading of pollutants from the sewer network.

3.3.2 Economic CBA

The economic analysis of the project follows the incremental approach as required by the European Commission's Guide to Cost-Benefit Analysis and Working Document No 4. The without-project scenario is not very clearly defined but would appear to represent a static continuation of the status quo including a negative annual cash flow.

The economic evaluation has been undertaken over a nominally 30 year reference period (see comment below) using a 5% discount rate which has been agreed with DG REGIO at national level and shows the project to realise the following returns:

- ➢ Economic internal rate of return 11,42 %;
- ➤ Economic net present value € 25.7 million;
- Benefit Cost ratio 1.48.

Quantified economic benefits with a total discounted value of € 79 million are derived from:

- Improved quality of water bodies (13.3 %);
- Resource-cost savings for newly-connected households (80.6 %);
- Project residual value (6.1 %)

Financial revenues are not included as a project benefit.

The financial investment costs have been converted into economic costs in line with the required approach (removing VAT and using a conversion factor to reflect the benefits of employing unskilled labour in a situation where there is involuntary unemployment).

There are a number of points that could be improved (e.g. to take a more dynamic approach to the valuation of benefits, taking into account rising household incomes for instance), but the approach is nevertheless considered adequate and the overall conclusion robust.

A number of conclusions from the financial analysis are also relevant to the economic analysis, notably in relation to reinvestment.

JASPERS Comments

Conclusions

The approach to the economic analysis is generally in line with EU and national level guidance, including the approach to the valuation of benefits.

3.3.3 Financial Analysis

The financial analysis of the project follows the incremental approach as required by the European Commission's Guide to Cost-Benefit Analysis, Working Document No 4. The Project is revenue generating (as per Articles 55.1 and 55.6) and therefore a financing gap is calculated (consistent with Article 55) as well as other required financial ratios, and financial sustainability is demonstrated.

Funding Gap

The funding gap rate calculation was performed in constant prices excluding contingency.

Some key assumptions and outputs of the financial analysis are as follows:

- Reference period
- 30 years (nominally, see comment below); 7 %;
- Discount rate (real)
 Funding gap rate
 80.91 %.

Tariffs & Affordability

The price increase associated with the project is calculated as the additional costs associated with the project in the form of operating expenditures and depreciation of the project assets (as an undiscounted sum over the whole reference period) and divides these by the total amount of wastewater to be billed in the same reference period. This increment is added to the existing price to give the final one. In the case of this project, it is then not until 2022 that the final price is reached.

The affordability analysis compares the 2022 price for water and wastewater (calculated as explained above) with average and below-average household income (based on 2009 figures) in order to demonstrate that the proposed price is affordable. The below-average figure used is apparently an official threshold below which the household is classified as being at risk of poverty (1 232 \in /month or 14 784 \in /year per household).

<u>Sustainability</u>

The project is calculated to deliver the following financial returns:

	Without Union Assistance (FRR/C)	With Union Assistance (FRR/K)
Financial rate of return (%)	-1.08 %	5.03 %
Net present value (€ millions)	- 27.2	-2.9

The financial analysis also presents a zero or positive cumulative cash flow throughout the reference period of the analysis

The approach to the calculation of the "with project" tariff meets the requirement in Working Document 4 that tariffs recover a "significant" part of project depreciation. It does not in any way address the sustainability of the existing asset base, for which the existing price is retained in constant price terms (i.e. is allowed to increase only in line with inflation).

The first three years of the analysis (2009-2011) have no costs and no revenues – effectively meaning that the project has a 27 year reference period. It would be preferable to start the analysis in 2012 and extend it until 2031, to follow the recommended 30-year reference period.

Reinvestment of equipment, which is assumed to have lifetime of 10 years, is spread over the asset lifetime, which gives a somewhat over-pessimistic view of the project's cash flow (when seen in present value terms).

The approach to the calculation of the affordability of the proposed prices could be improved in at two main respects: first, because a tariff due to be charged in 2022 is compared to household income in 2010, which is unduly pessimistic; second, because the analysis for the poorest households considers the income of a four-person household but the water consumption of an average household (with 2.8 or 2.9 members).

JASPERS Comments

Conclusions

The financial analysis is methodologically consistent with other Slovenian water sector projects and does not contravene any of the requirements of Working Document 4.

3.4 Environmental Issues

JASPERS Comments

Conclusions

On request of the Managing Authority JASPERS has not reviewed the environmental procedures of the proposed non major project. Various components and options for the project have during project preparation however been assessed.

3.5 **Financing Plan**

The financing plan including the sources of financing is shown below:

Item	Total	2012	2013	2014	2015
WWTP for Nova Gorica	21 740 628	10 768 018	10 972 610	0	0
Technical assistance	907 275	0	0	907 275	0
Collector through Vrtojba	2 755 830	1 089 907	1 665 923	0	0
Sewerage network	12 570 022	5 111 540	4 027 506	1 698 503	1 732 473
New York	2 843 145	1 693 020	1 150 125	0	0
Quiet - Kostanjevica	6 730 325	1 634 150	1 665 199	1 698 503	1 732 473
Šempeter - Vtrojba	2 996 552	1 784 370	1 212 182	0	0
TOTAL	37 973 754	16 969 465	16 666 038	2 605 778	1 732 473
Other costs	1 767 767	738 946	689 744	163 478	175 599
Unforeseen work - 5%	913 021	382 746	358 726	84 925	86 624
Control – 1.8%	683 528	305 450	299 989	46 904	31 185
Publicity	171 218	50 750	31 029	31 649	57 790
TOTAL	1 767 767	738 946	689 744	163 478	175 599
TOTAL The total investment	39 741 521	17 708 411	17 355 782	2 769 256	1 908 072
VAT - 20%	7 948 303	3 541 682	3 471 156	553 851	381 614
Total investment value	47 689 824	21 250 093	20 826 938	3 323 107	2 289 686
The amount of recoverable					
VAT	7 948 303	3 541 682	3 471 156	553 851	381 614
Costs	30 7/1 52/	17 708 /1/	17 355 782	2 769 256	1 008 072

Eligible costs	39 741 524	17 708 414	17 355 782	2 769 256	1 908 072
The remaining costs	0	0	0	0	0
Sources of Funding	39 741 521	17 708 411	17 355 782	2 769 256	1 908 072
Cohesion Fund	27 331 633	12 178 693	11 936 178	1 904 514	1 312 248
State Budget	4 823 230	2 149 182	2 106 384	336 091	231 573
Municipal budget	7 586 658	3 380 536	3 313 220	528 651	364 251
Sources Esseribility Study table 11/16 and CRA approadsheat file					

Source: Feasibility Study table 11/16 and CBA spreadsheet file

The overall shares of financing are as follows:

- 12.1 % State Budget \triangleright
- \triangleright Municipal Budgets 19.1 %

The overall timing of the expenditure is questionable, given that four months of 2012 are now past and the project has not yet received approval. This apparent slippage would however not appear to endanger the beneficiary's overall ability to close the project successfully in time to comply with the n+2 rule, i.e. by the end of 2015.

The treatment of VAT and contingencies is correct, assuming that the beneficiaries can indeed reclaim 100% of VAT on project costs.

The sums foreseen for contingencies, project control, and publicity are within acceptable limits (though see earlier comments about the modest extent of contingencies).

The conversion from constant to current prices is straightforward and transparent but appears to convert from a 2011 price level (appropriate for an earlier cost estimate) rather than the level of May 2012 that is now used.

Annex 1 (financial statements of the co-financing municipalities) gives the superficial impression that the co-financing required from the municipalities is feasible, but the feasibility study would benefit from a more detailed explanation of the financial planning by the municipalities given that the full municipal contribution is to be met with no recourse to borrowing by the beneficiaries

JASPERS Comments

Conclusions

The financing plan appears feasible but the Feasibility Study would benefit from a more careful explanation of the beneficiary municipalities' ability to co-finance the expected costs (an issue of presentation rather than substance).

3.6 Institutional Arrangements

The beneficiary municipalities have signed a joint agreement regarding implementation of the project. The agreement identifies Nova Gorica Municipality as the Applicant and responsible for management of the project.

Also, the beneficiary municipalities have nominated Vodovodi in Kanalizacija Nova Gorica d.d. as the project coordinator responsible for all project preparation activities. The company has been and remain responsible for preparation and implementation of the project.

No formal agreement regulating rights and obligations of the beneficiary municipalities after implementation of the project is referenced in the reviewed documentation.

Organisational aspects for the future operational period are seemingly only covered by the Operator Statutes and Operators agreements with the individual municipalities. Apparently there is no agreement between the project beneficiaries for regulation of user rights. After implementation ownership of the project components will be transferred to the individual municipalities. Therefore some property located in a municipality must be used by others to ensure project sustainability (the WWTP will belong to two municipalities but treat wastewater from all three stakeholders, and sewer lines in Sempeter-Vrtojba apply for transmission of wastewater from Nova Gorica to the WWTP). Project sustainability therefore requires that the necessary user rights are secured.

The joint municipal agreement should further establish an obligation of the owners to ensure proper and timely maintenance and repair of all jointly used assets. There should therefore be an obligation on the owners to pay the costs of maintenance and reinvestments. The proposed tariff strategy with a depreciation based lease fee may not be sustainable in the long term unless the depreciation is calculated on basis of the current costs for replacement of assets.

Further future financing problems could arise due to the fact that the two smaller municipalities will have to ensure availability of funds for maintenance and reinvestment for the WWTP.

Jaspers Comments

Conclusions

The institutional arrangements conform to the Slovenian requirements for municipal cooperation on wastewater management.

The role of Project Coordinator (PIU responsibility) is placed on the municipality owned water company which has been in charge of all previous project preparation activities.

Financial responsibilities for the project are with the administration of Nova Gorica Municipality.

The institutional framework for the operational period should however be strengthened through establishment of a joint venture agreement for management and use of project assets owned by other municipalities.

3.6.1 Asset management

Ownership of project assets will upon completion be transferred to the municipalities in which they are physically located. The Municipalities of Sempeter-Vrtojba and Miren-Konstanjevica will therefore become joint owners of the WWTP.

Operation and management responsibilities for the assets will thus be shared by the municipalities. The municipalities lease the assets to the operator for a fee. The revenue thereof will as needed be used for asset maintenance and replacement.

Operator

The beneficiaries have each entered a management agreement with Vodovodi in Kanalizacija Nova Gorica d.d. for operation of project assets.

3.7 Procurement and Timetable

The procurement plan includes the following tenders:

Contract	Scope	Tender Procedure
No		
1	Joint infrastructure measures for	FIDIC Red Book
	treatment and service facilities at the	
	site of the WWTP	
2	WWTP (50,500 p.e.)	FIDIC Yellow Book
3	Sewer system rehabilitation and	FIDIC Red Book
	upgrade in Nova Gorica and	
	Sempeter-Vrtojba municipalities	
4	Construction of separate sewer system	FIDIC Red Book
	in Miren	
5	Construction supervision	Not specified
6	Publicity	Not specified

The procurement plan is generally feasible for the project. Tendering should be an open form of competition based on Slovenian procurement law and EU tendering guidelines.

However, there is a need to update the implementation schedule. Procurement of the WWTP is likely to take longer than currently allowed for in the schedule. The tender submission period will be a minimum of three months followed by tender evaluation and contract negotiation.

The supervision contract should ensure sufficient technical capacity for reviewing the received technical proposal and subsequent approval designs.

The assumed method for supervision and management of the works contracts is not defined in the reviewed documentation. It should however be considered to appoint a FIDIC Engineer for this very complex project.

JASPERS Comments

Conclusions

The given procurement strategy is considered feasible for the project. The form of tendering for all contracts should be an Open form of competition based on Slovenian procurement law and EU tendering guidelines.

The Applicant should consider including also technical assistance/expertise to assist in evaluation of the received Yellow FIDIC tenders and the subsequent approval designs of the selected contractor.

The overall implementation schedule should be revised as some dates foreseen in the Feasibility Study will not be achievable.

The scope of supervision and project management activities to be procured needs to be defined and terms of reference developed.

3.7.1 Project Implementation

Contracts no. 1 and 3 (see above) are planned for completion by end year 2013. The WWTP contract (no. 2) is planned for completion by end 2014 where 2014 is supposed to be a trial period during which the plant is managed by the contractor who will train the future operator's staff until the final handover.

Construction of the sewer network for Miren (Contract 5) is planned for completion by end 2015. Contracts no 5 and 6 will be implemented in parallel to the first four.

The implementation period for the Yellow FIDIC WWTP contract is considered to be underestimated. The selected Contractor needs time to prepare detailed design, obtain approvals and to procure tailor-made equipment. The minimum implementation period for the WWTP works is therefore considered to become about two years followed by the a defects notification period The overall contract period may therefore be about three years.

JASPERS Comments

Conclusions

The project implementation schedule needs to be updated with a realistic time plan.

3.8 State Aid

The feasibility study mentions no state aid issues in relation to the project. There may be some question as to whether the project must comply with the rules on Services of General Economic Interest (which have recently been updated and are directly applicable in all EU Member States), and if so, whether the necessary conditions are met.

3.9 Other Issues

No other issues other than those described in this note have emerged.

4 Sensitivity and Risks

4.1 Sensitivity Analysis

The sensitivity analysis has been carried out for the impact of investment costs, operating costs and revenues / economic benefits and identifies critical variables (in line with current DG Regio guidance) as those for which a 1 % change leads to a more than 1 % change in FNPV or ENPV. On this basis only revenues and economic benefits are identified as critical variables.

4.2 Risk Analysis

A Monte-Carlo analysis was undertaken for investment cost with the following outcome for ENPV:

\triangleright	Expected value	25.8 m€; and
		. – . –

Standard deviation 1.7 m€.

This means that there is calculated to be a 90% probability of the ENPV lying between 22.9 m€ and 28.6 m€.

The Monte Carlo methodology for risk assessment makes little sense if only one input variable is subject to variation. At least the project's investment costs, operating costs and economic benefits (or financial revenues) should be included as input parameters in the analysis. Furthermore the distributions of the input variables should be described, as well as that of the output.

4.2.1 Risks to physical project implementation and grant disbursement

A risk assessment to the physical implementation and grant disbursement has not been undertaken and is not presented in the Feasibility Study.

Although a risk assessment of physical implementation of the project has not been presented, the following main risks can be considered:

Tendering and contracting delays

Risks of delayed contracting are of concern mainly for measures comprised by Yellow FIDIC tender procedures.

> Weather / technological risks

The technologies involved in the project measures are all standard civil engineering approaches and are not considered to be risky in technological terms. Obtaining design approvals and construction permits for Yellow FIDIC elements involves some risks of delays.

Legal Ownership / Institutional Aspects.

The site for the WWTP is publically owned and sewer construction are planned for location in public roads. The associated risks are therefore considered to be limited.

4.2.2 Risks to fulfilment of project objectives

An analysis of the risks to the fulfilment of project objectives is not presented in the application.

Technological/environmental risks:

- The current high level of infiltration into the sewer network of Nova Gorica involves a number of risks if not remediated as foreseen. Off-loading to the recipients will become more frequent than assumed and a continued high dry weather loading on the wastewater management system increase energy consumption all stages.
- Property owners may delay connection to the sewer system. This will delay achievement of environmental targets and reduce revenues.

JASPERS Comments

Conclusions

The sensitivity analysis is in line with European Commission guidance. The risk analysis should make more attempt to interpret what the outputs of the quantitative risk analysis really mean.

5 Recommendations

5.1 Jaspers Conclusions

The project seems approvable in its present stage. The Jaspers comments were taken into account. Even though the project is non-major and enters the national approval process, the JASPERS opinion was requested and treated as prerequisite for the project approval.

On request of the Slovene Managing Authority, JASPERS did not involve its environmental expert team. Environmental issues are dealt with by the competent Slovene authorities.

5.1.1 Technical Issues

Objectives

The key objectives of the project are well defined and the solutions supported by an option analysis in principal three key objectives have been selected for the proposed project. These have all been evaluated and assessed in detail by JASPERS:

JASPERS recognises that there is no legal requirement for disinfection of the WWTP effluent. The Applicant's justifications for adoption of this objective are however convincing and JASPERS is able to endorse it.

Option Analysis

Catchment area: The options developed and assessed represent the most immediate and feasible options. The options reviewed by JASPERS are compliant with the OP ETID and the Urban Waste Water Treatment Directive.

From the documentation reviewed it seems valid to select the proposed option with a centralised WWTP for the Slovenian municipalities.

Treatment Technology: The developed options are considered feasible for the purpose.

Thermal sludge drying: The two considered sludge management options are feasible and relevant for the current situation in Slovenia. The Slovenia regulations are likely in a few years to result in establishment of one or more dedicated sludge treatment facilities to reduce the overall national costs. Economies of scale work against the establishment of own drying facilities at WWTPs the size of Nova Gorica. However, at present the selected choice seems reasonable for achieving the overall objectives of the project as there is no large scale centralised sludge incineration facility available in Slovenia.

Sewer network components: Options for the sewer network components appear to be feasible and relevant for their purposes. They have generally been developed and assessed during preparation of the relevant design documentation for the works.

The option analysis is considered to be comprehensive, relevant and to have covered all relevant aspects of the project. Financial comparison of the options is based on the net present value of their costs but not benefits. Based on the information provided it is however not possible to assess whether the alternative options have been priced on an entirely comparable basis, nor to capture the slightly different benefits of the options considered.

Engineering Approach

CWWTP: The adopted design capacity of 50,500 p.e for the WWTP is considered acceptable for the documented needs of the catchment area. The adopted hydraulic design capacity assumes that after the present project sewer network rehabilitation works will become implemented to reduce the rate of infiltration to less than half the current level.

The proposed engineering approach to waste water treatment is considered to be advanced in selecting membrane technology and thermal sludge drying. The costs of investments and also of operation are therefore expected to be at the high end. It is fully recognised that tertiary treatment is required for the selected location of the WWTP. The selected membrane technology will ensure maximum and better than required environmental protection of the Vrtojbica Stream and downstream impact areas. The discharge of suspended matter will be insignificant and all year round disinfection of the effluent is achieved.

The plant will be procured according to Yellow Fidic Conditions of Contract. The available design documentation is therefore functional only and not qualified to a degree allowing for an engineering review of design for unit processes and functions.

Sewer system network: The reviewed documentation does not include detailed design specifications for the sewer network components. However the quoted applied design norms and standards are commonly used and so is the hydraulic model. The applied design is therefore presumed to be acceptable. During the final site visit physical constraints along the alignments of some of the main pipelines and new retention basins were inspected. The necessity for replacing utilities and for rehabilitation of entire roads is recognised.

Infiltration: The current rate of infiltration into the sewer network of Nova Gorica amounts to 116% of the dry weather wastewater flow. The sewer network overflow structures and the WWTP capacity assume a significant reduction of this rate. If this is not implemented more wastewater than assumed by the project will be off-loaded to the recipients and reduce the positive environmental impact of the project.

The thermal sludge drying plant will consume large amounts of energy for evaporation of about 5,000 ton of water annually. Energy efficiency and recovery will therefore decide the future operational costs for this project component. Energy efficiency evaluation criteria and guarantees should therefore be included in the tender criteria for this component.

Cost Effectiveness

The resulting unit cost for the WWTP is considered high compared to what would be expected for a traditional facility of similar capacity. However, the Nova Gorica plant is of a higher standard and will provide all year disinfection of the effluent and drying of the sludge to 92% dry solids. Further, the ground level of the construction site needs to be raised by almost 5 meters to provide protection against the 100-year flood level. When all these aspects are considered the final unit cost is not unreasonable.

The costs are all inclusive and cover necessary simultaneous rehabilitation or replacement / relocation of utility lines encountered (water, gas, electricity, etc.) as well as reinstatement of paved areas. Some streets are narrow and rehabilitation will be required for the full width due to the size of the installed pipelines. The unit costs may therefore be reasonable for the local conditions even after the previously mentioned 35% increase compared to a previous version of the project budget.

Contingencies for unforeseen works are according to Slovenian rules calculated as 5% of the value of works to become procured according to Red FIDIC conditions of contract. The basis for

calculation of contingencies is therefore only about half the estimated overall costs of the works. The applied 5% contingencies for sewer works are low but acceptable due to the apparently all inclusive unit costs applied for the costing.

The costs of operation and maintenance of the WWTP reflects that the facility is sensitive to the costs of energy. The MBR process is energy intensive and so is the sludge drying process. Energy consumption costs therefore amounts to 1/3 of the estimated operational budget. Significant efforts should therefore be made to ensure a high level of energy efficiency for all elements. The cost of staff is considered on the low side especially if longer periods of continuous operation of the sludge drying facility are implemented.

Demand Analysis

The demand assumptions used are considered a reasonable base for project development. The assumed wastewater generation of 130 l/day/p.e. is acceptable. The downward trend from the current level of 150l/day is likely to continue with the foreseen tariff increases. Further, the sewage quantity may very well be smaller than the amount of drinking water sold.

The assumed limited growth rates for inhabitants, institutions and the commercial sector are reasonable for the region. The WWTP design includes 37.5% capacity for non household wastewater and future load increases. This is deemed feasible for the situation in the area.

The initial hydraulic load is high and infiltration reduction measures need to be implemented to protect against future excessive off-loading of pollutants from the sewer network.

5.1.2 Financial and Economic Issues

Economic CBA

The approach to the economic analysis is generally in line with EU and national level guidance, including the approach to the valuation of benefits.

Financial Analysis

The financial analysis is in compliance with European Commission guidance and consistent with other CBAs for environmental projects in Slovenia.

Financing Plan/VAT

The financing plan appears feasible but the Feasibility Study would benefit from a more careful explanation of the beneficiary municipalities' ability to co-finance the expected costs (an issue of presentation rather than substance).

5.1.3 Institutional Issues

The institutional arrangements conform to the Slovenian requirements for municipal cooperation on wastewater management.

The role of Project Coordinator (PIU responsibility) is placed on the municipality owned water company which has been in charge of all previous project preparation activities.

Financial responsibilities for the project are with the administration of Nova Gorica Municipality.

The institutional framework for the operational period should however be strengthened through establishment of a joint venture agreement for management and use of project assets owned by other municipalities.

5.1.4 Procurement

The given procurement strategy is considered feasible for the project. The form of tendering for all contracts should be an Open form of competition based on Slovenian procurement law and EU tendering guidelines.

The Applicant should consider including also technical assistance/expertise to assist in evaluation of the received Yellow FIDIC tenders and the subsequent approval designs of the selected contractor.

The overall implementation schedule should be revised as some dates foreseen in the Feasibility Study will not be achievable.

The scope of supervision and project management activities to be procured needs to be defined and terms of reference developed.

5.1.5 Environmental Issues

On request of the Managing Authority JASPERS has not reviewed the environmental procedures of the proposed non major project. Various components and options for the project have during project preparation however been assessed.

5.2 Conditionalities

The Managing Authority might want to address some of the issues indicated by JASPERS in this completion note to improve the project.

Beside this, after finalising the documentation, a number of issues could be addressed in the agreements between the MA and the beneficiary. JASPERS proposes the measures/undertakings below in parallel to project implementation:

Technical Undertakings/Measures

- Set-up an infiltration reduction programme as part of the municipal sewer network rehabilitation programmes.
- Set-up a systematic sewer network flow monitoring and registration system.

Financial Undertakings/Measures

• Put in place an inter-municipal agreement governing the management of the key shared assets and ensuring that funds will be available for the maintenance and reinvestment of equipment at the WWTP in particular.

Procurement Risk:

- Include requirements for guaranteed maximum costs of operation for key elements in the tender dossier for the Yellow FIDIC contract.
- Include requirements for minimisation of energy consumptions and for feasible energy recovery measures in the tender dossier for the Yellow FIDIC contract.

6 Additional JASPERS considerations

n.a.

7 JASPERS section of grant application

JASPERS was involved at a comparably late stage of the project, where the project concept was already decided. JASPERS followed up the preparation of all documentation required (Feasibility Study, Economic, Financial and Institutional Analyses, Procurement Strategy). JASPERS commented at various stages reports and studies and supported the preparation of the model for the Cost-Benefit Analysis.

	Signature & date: 23.5, 2012
JASPERS Task Manager: Ralf Aymar	All Comes
	Signature & date: 23/5/12
JASPERS Head of Division: Eckart Tronnier	Wart Vonig