INSTITUT GRAĐEVINARSTVA HRVATSKE d.d.
CIVIL ENGINEERING INSTITUTE OF CROATIA

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CLIENT: **HRVATSKE VODE**

ENVIRONMENTAL IMPACT STUDY – EXECUTIVE SUMMARY

METKOVIĆ PUBLIC SEWERAGE SYSTEM

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REVISION B

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CLIENT: **HRVATSKE VODE**

Ulica grada Vukovara 220, 10000 Zagreb

PROJECT NAME: **METKOVIĆ PUBLIC SEWERAGE SYSTEM**

PROJECT TYPE: **ENVIRONMENTAL IMPACT STUDY- EXECUTIVE SUMMARY**

PROJECT No.: **38 00 0125/ Metković**

PROJECT MANAGER: **ANITA ERDELEZ, M.Sc.Civ.Eng.**

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PLACE AND DATE: **Split, July 2008.**

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REVISION B

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A. EXECUTIVE SUMMARY

The area of Lower Neretva, together with the town of Metković surroundings, is the area of conflicted uses: agriculture, water management, tourism, hunting and nature conservation.

Namely, the Lower Neretva plain is the largest Mediterranean wetland in Croatia (about 12.500 ha) and one of the last river deltas in the Mediterranean. In particular due to its ornithological significance, the Lower Neretva has been designated for the Ramsar List of Wetlands of International Importance and included in the Important Bird Areas (IBAs) in Europe project carried out by the BirdLife International (formerly known as the International Council for Bird Preservation. Some parts of the area are under protection; however, there is a proposal to proclaim the entire area of Lower Neretva, from Počitelj to the Neretva River mouth, the Lower Neretva Nature Park.

In the area of the town of Metković, untreated wastewater is being discharged into the Neretva River or infiltrates the underground. According to water quality researches carried out to date, the Neretva River does not entirely comply with the water classification requirements. Apart from physical-chemical parameters (dissolved salts); microbiological parameters also do not meet the quality standards, which is directly caused by discharge of untreated wastewater. Thus, wastewater collection, treatment and discharge in the town of Metković, the larges urbanized zone within the area of interest, is urgent and inevitable.

A proposed solution for the Metković sewerage system: sewer network, wastewater transfer from the left to the right Neretva River bank, wastewater treatment plant in Jerkovac (Duvrat) and discharge of treated effluent into the Neretva River, entirely complies with the postulates set forth in the physical planning documents i.e. its is outside any particularly protected area and therefore not subjected to legal restrictions.

However, considering the sensitivity of the broader environment, one shall take into account the impact of discharged treated effluent, since the recipient quality (the Neretva River) has dominant impact on all users in the area of Lower Neretva, population included.

The recipient state (the Neretva River) will be monitored. The monitoring plan comprises: surface water, groundwater, waste sludge, air and noise.

B.POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

1. Project compliance with the international obligations of the Republic of Croatia

Water resources management, arisen from international obligations of the Republic of Croatia, comprises improvement, conservation and protection of fresh(water) and coastal sea. The Republic of Croatia has ratified the conventions and protocols on water protection as bilateral treaties on cooperation in water management.

As a signatory country i.e. contracting party to the Convention for the Protection of the Mediterranean Sea against Pollution and the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources (Official Gazette No. 1/90, International Treaties,), the Republic of Croatia shall take all appropriate measures to prevent, abate, combat and control pollution of the Mediterranean Sea Area caused by discharges from rivers, coastal establishments or outfalls, or emanating from any other land-based sources within its territories.

2. Client's environment protection policy

Environmental protection ***legal framework*** has been based on the following legal documents:

a) Physical planning documents,
b) Legislation in the field of environment protection

a) Extract from physical planning documents

Spatial Planning Strategy of the Republic of Croatia (June 1977), Spatial Planning Program of the Republic of Croatia (OG No. 50/99)

According to the Spatial Planning Strategy and Program of the Republic of Croatia, construction of a biological wastewater treatment plant is planned for the town of Metković.

Physical plan of the Dubrovnik-Neretva County *(Official gazette of the Dubrovnik-Neretva County No. 6/2003, 3/2005 and 3/2006)*

Wastewater from the central region of the town of Metković on the left bank of the Neretva River, which has already been sewered, will be collected, together with the wastewater from new settlements (the area along the state road Metković – Opuzen, Klade), by a new sewer situated on the left bank and transferred to the right bank by a submarine siphon where it will be transferred, together with wastewater collected in settlements on the right river bank and industrial-commercial zone, to the wastewater treatment plant to be constructed downstream from the populated area. After treatment at the WWTP, effluent will be discharged into the Neretva River. Settlements Vid and Prud, with the wastewater that, at present, endangers the Norin River spring which is used for water supply, will also be connected to the sewerage system.

Physical plan of the Town of Metković *(The Neretva Gazette No. 06/2004)*

Wastewater disposal from the Metković urban area will be solved by a common sewerage system (public sewerage system). It has been planned to connect the existing sewerage network on the Neretva River left bank to the new sewer and transfer the wastewater to the Neretva River right bank via submarine siphon. On the right bank of the Neretva River, wastewater collected by a new sewer on the left bank will be connected to the new sewer, together with the wastewater collected in a settlement on the right bank and industrial-commercial zone, and transported to the wastewater treatment plant.

The wastewater treatment plant site is planned in Jerkovac – Duvrat zone, about 3 km downstream from the Metković town center. Ground level at the WWTP site ranges from 1,8 to 2,4 m+MSL. The WWTP site is situated nearby the railroad Metković – Ploče and the road Metković - Kula Norinska.

Construction of public sewerage system is also planned in Prud and Vid settlements. Technical and economic feasibility of construction of small-scale independent wastewater disposal systems shall be assessed as to decide in favor of that solution or connect them to the Metković sewerage system.

Construction of the WWTP to treat the wastewater collected in Metković town center as well as reconstruction and extension of the town sewerage system are a priority in order to protect the water of the Neretva River.

Facilities that will not be connected to the public sewerage system or will be connected in the future shall be provided with triple-chamber impermeable cess-pools or biological treatment plants.

b) Legislation in the field of environment protection

Effluent discharge into a recipient (sea) has been regulated by the following acts and regulations.

- National Water Protection Master Plan (NN - Official Gazette, further referred to as OG, No 8/99) – water classification.
- Regulations on Limit Values of Parameters, Dangerous and Other Substances in Wastewater (OG 40/99, 6/01, 14/01) – treatment levels, effluent standard parameters, maximum concentrations of parameters in effluent prior to discharge into a natural recipient.

- Directive on Bathing Water Quality Standards (OG No. 33/96) - assessment of sea water quality on marine beaches.

Regulations and directives are based on the Water Act (OG No. 107/95) and elaborated in compliance with the EU standards i.e. Urban Waste Water Treatment Directive 91/271/EEC, Bathing Water Directive 76/160/EEC.

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1. Ordinance on Environmental Impact Assessment (OG No. 59/00)
2. Environmental Protection Act (OG No. 82/94, 128/99)
3. Nature Conservation Act (OG No. 70/05)
4. Water Act (OG No. 107/95, 150/05)
5. Act on Water Management Financing (OG No. 107/95, 150/05)
6. Utility Services Act (OG No. 26/03, 82/04, 110/04, 178/04)
7. Waste Act (OG No. 178/04)
8. Noise Protection Act (OG No. 20/03)
9. Air Protection Act (OG No 178/04)
10. National Water Protection Master Plan (OG No 8/99)
11. Ordinance on Air Quality Limit Values 133/05)
12. Directive on Water Classification (OG No. 77/98)
13. Directive on Dangerous Substances in Freshwater and Coastal Sea Water (OG No. 78/98)
14. Directive on Bathing Water Quality Standards (OG No. 33/96)
15. Ordinance on Agricultural Land Protection against Pollution (OG No 15/92)
16. Regulations on Noise Limit Values in Work and Domestic Environment (OG No. 37/90)
17. Regulations of Sanitary Quality of Drinking Water (OG No. 46/94)
18. Ordinance on Waste Types (OG No. 27/96)
19. Ordinance on Requirements for Handling Waste (OG No. 123/97)
20. Convention for the Protection of the Mediterranean Sea against Pollution (OG - International Treaties 1/92)
21. Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources (OG – International Treaties 1/92)
22. Council Directive of 2l May 1991 concerning urban waste water treatment, O.J. NoL. 135/40, 1991. (91/271 EEC)
23. Spatial Planning Strategy of the Republic of Croatia (1999.) Ministry of Environmental Protection, Physical Planning and Construction of the Republic of Croatia , Zagreb
24. Physical Plan of the Dubrovnik-Neretva County (Official gazette of the Dubrovnik-Neretva County No. 06/03, 03/05, 03/06)
25. Physical Plan of the Town of Metković (The Neretva gazette No. 06/06)
26. Spatial Planning Programme of the Republic of Croatia (50/06)

C. PROJECT DESCRIPTION

1. Sewerage system concept

Construction of the public sewerage system in the Metković town center is planned under the project. Public sewerage system concept has been set forth in the Conceptual design of the Metković town center sewerage system (Hidroprojekt-ING, 1997.). Conceptual design foresees wastewater collection on both river banks by a common trunk sewer and its transport to the common wastewater treatment plant. The town of Metković WWTP is being planned on the Neretva River right bank in the Duvrat area.

A combined-type sewerage system has been constructed in the Metković town center, the old town area and in some new settlements on the left bank of the Neretva River. Only a portion of combined-type sewerage network has been constructed on the right bank of the Neretva River. Wastewater and stormwater is being discharged into the Neretva River with no prior treatment.

A combined-type wastewater disposal has been planned in the town of Metković as follows:

- combined-type sewerage system in central town areas on both river banks
- separate-type sewerage system in other town and suburban areas on both river banks.

Construction of independent small-scale public sewerage system is being planned in Prud and Vid settlements. Thus, those systems are not being analyzed in this Study. Construction of triple-chamber cess-pools or biological treatment plants, depending on local conditions, is being planned in Glušci and Dubravica settlements.

2. Input data and sizing

In Phases 1 and 2, system loads will be 10.000 p.e. and 20.000 p.e., respectively. The Neretva River will be a recipient. Pursuant to the National Water Protection Master Plan, the Neretva River has been classified as Category II water from the Bosnia and Herzegovina boundary to the sea. According to the respective regulations in force, the following treatment levels shall be installed:

- in Phase 1: primary (I) + secondary (II)
- in Phase 2: primary (I) + secondary (II) + tertiary (III).

Conditions for trade effluent discharge into public sewerage system will be set forth in water requirements.

Wastewater quantities and characteristics

Construction Phase 1 comprises the state to date with the development till the year 2005. Phase 2 is being planned 10-15 years after the Phase 1. Number of public sewerage system users is being forecasted as follows:

	Phase 1	Phase 2
Population	8.400	16.000
Service-industrial zone	1.600	4.000
Total (p.e.)	10.000	20.000

Forecasts of the average daily flows in Phase 1 and 2 are Q=2.000 m^3/day and Q=4.000 m^3/day, respectively. Wastewater loads have been estimated according to ATV 131 guidelines.

Sizing of sewerage system facilities

Sewers can be dived to rising mains (about 1100 m length) and gravity mains (about 7400 m length).

There are 10 ***pumping stations,*** 5 at each river bank.

Relief structures will be constructed in front of the WWTP and adjacent to PS Metković to reduce large inflows to the treatment plant.

Wastewater treatment plant

The WWTP site is being planned on the right bank of the Neretva River in Duvrat area. Secondary treatment has been selected for Phase 1 with loads under 10.000 p.e. while tertiary treatment will be installed under Phase 2 with loads 20.000 p.e.

In respect to the existing and planned combined-type sewerage, a retention tank will be installed in front of the WWTP to collect the first, more polluted, stormwater to be later treated at the WWTP upon rain stop.

WWTP secondary (II) treatment installations (Phase 1):

- automatic coarse screens,
- automatic fine screen,
- aerated grit/grease removal
- biological tank
- secondary settling tank
- sludge thickening
- sludge dewatering
- sludge drying beds

Removal of phosphorus compounds by biological treatment is anticipated in Phase 2. This will be achieved by installation of anaerobic tank in front of the (existing) biological tank with anoxic and aerobic processes.

Outfall

Treated effluent from the WWTP shall be discharged into the upper layer (above the dividing line between the saltwater and freshwater) of the Neretva River. In Opuzen, sea level rises to about 2 m depth (measured from the river surface); while in Metković it rises to about 2.5 m. Thus, outfall shall be placed at about 2 meter depth under the river surface, and no deeper. If the aforementioned depths are recalculated in respect to the absolute elevation (geodesic zero), outfall shall be placed at an elevation about -1.20 m below the MSL.

D. BASELINE DATA

1. Meteorology and climatology

General climate features i.e. air temperature, precipitation, relative humidity, evapotranspiration and air currents in the area of Metković are given based on the gauging data at the nearest meteorological station in Opuzen ($\varphi = 43^o01'$, $\lambda = 17^o34'$, h = 2 m) in the period 1969.-1998.

The average annual temperature range chart has a simple wave form with the maximum in July (24.9^{o}C) and the minimum in January (7.1^{o}C). In the analyzed period, July was the warmest month of the year with 77% occurrence. In July, average temperature ranged between 23.9^{o}C and 27.2^{o}C. Although the average monthly temperature is the lowest in January, December was the coldest month (47%), followed by January (30%) and February (27%). In January, the lowest and the highest average temperatures were 3.4^{o}C and 9.4^{o}C, respectively. Due to the sea influence, fall is warmer than spring; thus, annual temperature range chart is asymmetrical.

Total annual precipitation is 1.236 mm. Large precipitation in cold part of the year is a characteristic of the maritime precipitation regime. Out of total annual precipitation 65% falls in the period form October to March. In the annual precipitation range, the maximum occurs in late fall and beginning of winter while the minimum occurs in summer. Maximum monthly precipitation occurs in November (180 mm) and December (162 mm), and the minimum in July (36 mm). In the analyzed period 1969.-

1998, maximum daily precipitation was 146,8 mm. According to the respective distribution, that daily precipitation could be expected once in 70 years.
Changes in wind directions during the day are the least in winter. Air currents from E and SE directions (35-40%) dominate all three monitoring periods. Winds blowing from other directions are rare. Daily changes in wind directions occur more often in spring. In the morning, as well as in winter, the most frequent are SE and E winds (37 I 35%). Similar changes in wind direction occur also in summer. In the morning, east and southeast winds occur with the same frequency (41%), while air currents from the west (52% and 50%) and SE (18 and 20%) dominate at 2pm and 9 pm. In fall, as well as in other seasons, SE and E air currents (44 and 37%) prevail at 7 am.
Relative air humidity is greater than 60% throughout the year with no major variations. Average annual relative humidity is 69% with the maximum average monthly relative humidity of 74% in November and December and the minimum 60% in July.
Annual range of potential evapotranspiration corresponds to the annual air temperature range, with the minimum in winter (48 mm in January) and the maximum in summer (260 mm in July).

2. Natural and cultural heritage

Protected areas of nature

In the area of Neretva, as well as in the broader area of the town of Metković, based on the Nature Conservation Act (OG No. 30/94, 72/94, 107/03, 162/03), there are the following protected areas of nature:

- special zoological (ornithologic) reserve
  - Pod Gredom – Vid
  - Prud – Metković
  - Orepak – Kula Norinska
- special ichtiologic - ornithologic reserve
  - southeastern section of the Neretva River and Osinj islet
  - forest park
  - Predolac – Šibanica – Metković
- important landscape
  - Modro oko and Desne – Ploče lake
- horticultural monument
  - individual cypress tree – Metković

Physical plan of the Dubrovnik – Neretva County proposes, based on the Nature Conservation Act, protection of the following areas of nature:

- nature park
  - Donja Neretva
- special zoological (ornithologic) reserve
  - Delta Neretve (Ploče – Parila)
  - Jezero Kuti – Opuzen
- horticultural monument
  - old park at the Metković center

The Physical Plan of the Dubrovnik-Neretva County proposes protection of the area of Blato (Slivno Municipality) south of Mala Neretva, situated within the potentially valuable area for the Lower Neretva Nature Park, as particularly valuable area – important landscape.

Parts of the planned project are situated in an area proposed to become the Nature Park according to the Physical Plan of the Dubrovnik-Neretva County.

Protected cultural heritage

In the area of the town of Metković, the following cultural property has been protected:

- Registered cultural property
  - Bukovac – Šiljeg house, in Vid settlement
  - Markota house, Vid
  - Erešova kula (tower), Vid
  - Church of sv. Vid, Vid
  - Narona archeological zone, Vid
- Listed cultural property
  - Metković historical urban unit in the town of Metković
  - Vid rural unit, in Vid settlement
  - the Neretva River delta surrounded by cliffs
  - antique Narona Port on the Neretva River
  - broader region of Vid settlement and the Neretva River delta from Metković to the sea
  - Neretva river region around Vid and Metković.

Some facilities within the planned project will be sited in areas with listed cultural property. At the archeological sites i.e. potential archeological zones, comprehensive preliminary researches shall be carried out.

3. Population and infrastructure

The Town of Metković is situated on a natural traffic route by the Neretva River, which extends through the Dinaric mountain barrier, thus connecting coastal region with the inland. The area of Lower Neretva has been navigable since the 4th century BC. In the antiquity, the town of Narona (present day Vid) was one of the important towns on the eastern Adriatic coast.

Nowadays, Metković urban center extends over 2.291,6 ha. According to the 2001 Census, it had a population of 13.873. Metković urban center is the center of the local self-government unit the Town of Metković.

Since it is situated on an important international route, geographic and geostrategic position of Metković is the prerequisite for its future economic development. Agriculture, followed by commerce and traffic, will be the bearers of economic development. It is expected that industrial production will be linked to processing of agricultural products (Urbos, 2000).

Nowadays, the Town of Metković area is being supplied from two water supply systems:

- water supply system Neretva - Pelješac - Korčula - Lastovo (N-P-K-L)
- water supply system Doljani.

Water supply from the Doljani system is insufficient both in terms of quality and quantity; thus, future water supply of the Town of Metković has been planned mainly from the N-P-K-L system.

The Metković urban center has been partially sewered by separate sewerage networks that discharge directly into the Neretva River. Construction of an integral sewerage system has been planned to transfer wastewater from the left rivet river bank to the right one and its transport via common trunk sewer to the central wastewater treatment plant situated downstream outside the populated area.

In the Town of Metković, ultimate solid waste disposal has not been solved adequately. The existing Dubravica landfill is unarranged. According to the Physical Plan of the Dubrovnik-Neretva County solid waste disposal is planned at the landfill in Veraje in the Glušci area.

Power is supplied from TS 110/35 kV "Opuzen" via three substations 35/10 kV "Metković 1, "Metković 2" and "Opuzen". Those substations shall be rehabilitated, in particular TS "Metković 1",

which is out of date and unreliable, and not satisfying present and future power supply needs. Consumers are directly supply via network substations 10(20)/0.4.kV.

In terms of the road traffic, international traffic in north-south direction (Central Europe - Mediterranean) and west-east direction (Western Europe – Southern Adriatic) takes place in the area of Metković.

Rehabilitation of the existing railroad Ploče - Metković – Sarajevo and further is being planned.

The Metković cargo port is of importance for the county.

4. Water quality

The program of regular monitoring of the Neretva River water quality in the territory of the Republic of Croatia comprises the following sampling stations:

- Metković (40155), upstream at the outskirts of the urban center,
- Opuzen (401579).

The monitoring program has been carried out according to the Directive on Water Classification (OG No. 77/98) since 2001. The following groups of parameters are being tested:

- physical-chemical
- oxygen regime
- nutrients
- microbiological
- biological
- metals
- organic compounds

Sampling has been carried out in the watercourse surface layer. In respect to the specific conditions in the Neretva River (seawater – salt wedge intrusion in watercourse bottom layers), measured parameter values refer to upper layer only. Based on the Neretva River water classification assessment at the Metković and Opuzen profiles, the following is concluded:

- In the year 2001, the Neretva River to Metković has been classified as category II-III. Pursuant to the National Water Protection Master Plan (OG No 8/99) the Neretva River water quality from the Bosnia Herzegovina boundary to the sea shall meet Category II standards.
- In the year 2001, the Neretva River, from Opuzen downstream, has been classified as category II-V. Note that Category V was determined based on electric conductivity, which is consequence of saltwater intrusion i.e. increased values of chlorides and sulphates.
- In the year 2002, the Neretva River to Metković has been classified as category II-IV. It was classified as Category IV also due to saltwater intrusion.
- In the year 2002, the Neretva River, from Opuzen downstream, has been classified as category II-V. Salinity has been increased again.
- The Neretva River water quality does not meet all water classification standards. Apart from physical-chemical parameters (dissolved salts); microbiological parameters also did not meet the required standards on both stations.

Hereinafter, the Neretva River water quality will be analyzed per depth based on the research results presented in scientific project Protection against salt water intrusion into water and soil in the Lower Neretva, development of numerical models (Vranješ, 2003, 2004). The researches determined “layered” flow in the lower course of the Neretva River. At the bottom, because of greater density, seawater intrudes deep into the Neretva riverbed. In the Neretva surface layer, freshwater flows towards the sea. Under the impact of the tides, that seawater wedge keeps shifting upstream and downstream. In the Neretva riverbed cross-section, a vertical divide line has been observed between the layers of different density. Also, there is a transition layer between the bottom saltwater and top

freshwater layer. Due to diffusion, but also dispersion, saltwater from the bottom layer intrudes the top layer, as already determined in classification of the Neretva River water. In summer – dry period, the Neretva River flow is very low (about 50 m^3/s) and the salt wedge penetrates all the way to Gabela i.e. about 25 km upstream from the river mouth (Vranješ, 2004.). In fall, with higher precipitation and larger water quantities discharged from the hydroelectric power plants, salt wedge is pushed out from the riverbed as happened in November 2003 (Vranješ, 2004.).

5. Landscape

The town of Metković is situated in the area of Lower Neretva. The Spatial Planning Strategy of the Republic of Croatia defined that area as a specific landscape unit. The Neretva River has been depositing material from the upstream area thus forming a large alluvial area, the river delta included, in the coastal region of Croatia. Plains were filled and leveled with the surrounding terrain with the parts of former relief – limestone olistholites extending from the plain like islands thus featuring an exquisite landscape. The area of Blace, south of Mala Neretva, is particularly interesting in terms of landscape. In that area, there is a picturesque contact between the wetlands and limestone olistholites that look like they grow out from the wetlands, complete with several small lakes and circular-shaped "eyes". The entire area is characterized by water abundance, not only from the Neretva River but also form numerous springs. A landscape is particular due to numerous biologically rich fluvial-wetland units. Wetlands, as parts of natural landscape, are habitats to many bird species either flying over or wintering there. In particular due to its ornithological significance, the Lower Neretva has been designated for the Ramsar List of Wetlands of International Importance and included in the Important Bird Areas (IBAs) in Europe. As a part of the cultivated landscape, agricultural landscape is particularly interesting. Those are small narrow agricultural land plots surrounded by water that can be reached by boats, which are which are also characteristic for that area. Mainly developed landscape extends from the Metković urban center to Vid. It is also an area rich in building heritage structures with Narona as one of the most valuable archeological sites dating from the antiquity in the Republic of Croatia.

6. Pedology

Pedologic researches in the area of interest have been carried out from the 60's of the twentieth century on. The data provided by the Institute for Adriatic Crops and Karst Reclamation (Institut za melioraciju krša i jadranske kulture) in Split. The results of those researches are given in the Study of the Lower Neretva Watershed Management (Studija uređenja sliva donje Neretve), elaborated by the Faculty of Civil Engineering in Split, in 1996. Elaboration of a detailed pedologic map for purposes of agriculture management and irrigation by the Faculty of Agriculture in Zagreb, is under way. Researched area is characterized by low alluvial plain of the Neretva River, the Norin River and remains of arms of the rivers. Based on the carried out researched, the following soil types can be distinguished:

Alluvial soil near the riverbed – formed by river beds by intensive sedimentation process; this zone is characterized by distinct layered form of sand, silt and clay particles, thus sandy-silty soil of extremely carbonate structure were formed. Filtration coefficient, estimated by Auger Hole method, ranges from 0,60 to 2,00 m/day at 2 m depth.

Basin hydromorphic soil – characterized by steady sedimentation process; thus, apart from clayey and sandy silts, peat can also be found. Filtration coefficient ranges from 0,1 to 2,50 m/day.

Organogenic soil – originated on the edges of present-day or former lakes and wetlands. Peat is mainly clayey, brown to black, poorly distributed. Near the ground surface, up to 30 cm depth, there is large portion of humus in peat, thus increasing its productivity.

Peat strata reach up to 6 m depth. Filtration coefficient ranges from 0,6 to 3,0 m/day.

7. Geology data

The town of Metković is situated by the Neretva River, in a plain surrounded by carbonate rocks on its northwest and southeast boundary. In terms of geology, it belongs to the Svitovsko-Ljubuški tectonic unit.

According to the results of geotechnical investigations, under the surface layers mainly consisted of humus and peat there are sediments of variable thickness mainly consisted of fine-grained silty to clayey loose sand, and very soft to soft silt and clay with small percentage of fine-grained sand and organic matter.

Researched area was subjected to strong tectonic processes. All rocks older than Quaternary ones are characterized by Dinaric strike direction. Numerous faults cross synclinal and anticlinal structural forms.

Long-term hydrochemical processes in carbonate rocks caused not only forming of significant karst phenomena and structures, but also sedimentation of *terra rossa* and even bauxite, which can be found in large quantities in the broader researched area.

To conclude, although there were no investigation works at the WWTP site, very unfavorable geotechnical conditions in terms of foundations can be expected. Thus, the need for foundations placed on the strata of better bearing capacity situated at depths greater than common ones for that type of structure shall not be excluded. Those expectations are based on the data obtained by investigations within the project The Town of Metković Flood Protection – right bank of the Neretva River, Final Design, elaborated by the Faculty of Civil Engineering in Split, in 2001. Construction of a pumping station for inland water drainage from the Jerkovac area is being planned near the WWTP site. Several boreholes were bored at the site, which showed very low or almost no bearing capacity along the entire borehole depth. Because of a high groundwater level almost in the entire sewerage network alignment, difficulties during pipe laying and pumping station construction can be expected. There were negative experiences related to the construction of a sewerage system pumping station on the right riverbank, near the bridge in Metković. Thus, comprehensive geotechnical investigations will be required for design purposes.

8. Hydrogeology data

In hydrographic terms, researched area is being defined by the Neretva River and the Norino tributary with numerous river arms. In terms of hydrogeology, two basic hydrogeologic units can be differentiated in the area of interest:

- carbonate rocks of older geologic age, very fractured and karstified – joint and dissolution porosity – very permeable
- sedimentary rocks of younger geologic age – intergranular porosity – variable permeability.

Because of their fracturing and exposure to long-term chemical processes, carbonate rocks are very karstified on the surface. Thus, there are almost no surface flows since stormwater drains fast into the underground. Groundwater drains towards lower grounds i.e. sea, forming numerous springs along the way on the contact with relatively less permeable Quaternary sediments. Capacities of those springs are different and very variable throughout the year. Their yield depends on the underground catchment in carbonate rocks in the spring hinterland, precipitation intensity and distribution throughout the year as well as the contact with sedimentary rocks that caused spring generation. Namely, some ground surfaces are temporary or permanently being under water, meaning that the area is constantly marshed.

The Doljani spring has been capped for water supply of the town of Metković. Springs near Prudi settlement, with the highest yield, are being used for regional water supply system Neretva - Pelješac - Korčula. Detailed researches were carried out within investigation works for reclamation purposes in the broader area of interest in order to obtain basic hydrogeologic parameters of the aquifers. Three aquifers of variable thickness have been determined to the 60 m depth within detrital sedimentary rock formations. Occurrence of those aquifers is not constant, nor by depth neither by spatial distribution.

Numerous hydrochemical test of groundwater were carried out within the aforementioned comprehensive hydrogeologic researches. Namely, the Neretva River mouth delta and constant trend of coast sinking are the causes for the growing occurrence of salt groundwater in Quaternary river banks. A chemical stratification of groundwater in rocks of intergranular porosity has been registered in vertical direction i.e. total mineralization increases with depth. In carbonate bedrock underlying the Quaternary sediments, it is believed that the connate groundwater has been registered with total mineralization even greater than salinity of the sea (more than 64 g /l).

In terms of hydrogeology, there is no doubt that the existing wastewater disposal, as well as the planned sewerage system construction, complete with the selected WWTP site, will have no impact on the quality of capped groundwater used for water supply of population.

9. Seismology data

Pursuant to the Official gazette No. 52, dated 1990, the area of interest is situated in a seismic zone where earthquakes of the following intensities can be expected:

8 grades of MCS-64 Scale with 63% probability in the recurrence period of 100 years, and

9 grades of MCS-64 Scale with 63% probability in the recurrence period of 500 years

In respect to geotectonic and hydrogeologic conditions, taking into account that groundwater level almost coincides with the ground level, according to Medvedev, basic earthquake intensity shall be increased by 1,5-2,0^{o}.

10. Hydrology data

The Neretva River is the longest river in karst region, also the richest in water, extending over the territories of the Republic of Bosnia Herzegovina and the Republic of Croatia. Its total length is 193 km, out of which 22 km in the Republic of Croatia. The main course of Neretva is navigable to Metković in the length of 21 km (Physical Plan of the Dubrovnik-Neretva County, 2002).

During 42 years of monitoring, the lowest water level -0,26 m+MSL was registered in 1964. The level of water in the Neretva River depends on the flow. Before hydroelectric power plants had been constructed on the Neretva River and the watercourse was in its natural state, the lowest flow in Metković of 32 m^3/s was registered in August 1925 (Celegin, 1958). Following the construction of cascades, there was a change in a hydrologic regime also in the lower course of the Neretva River. According to the water management requirements for construction of the Mostar hydroelectric power plant issued by *Republički sekretarijat za vodoprivredu SR Hrvatske* (1978.), the Investor was obliged to discharge the water management minimum of 50 m^3/s from the HE Mostar basin (Barbalić et al, 1997). In rain period, flows are a lot greater, reaching up to 450 m3/s, sometimes even more. The maximum flow in the Neretva River near Metković can not be determined with certainty since it depends on the operation regime of upstream hydroelectric power plants in the territory of the Republic of Bosnia Herzegovina. The maximum flows registered prior to power plant construction will be given, for comparison only. In winter, (rain season), maximum flow 2467 m^3/s was registered in 1937, 1950 and 1953 (Celegin, 1958.).

E. ENVIRONMENTAL IMPACTS

Potential adverse environmental impacts may occur:

- during construction,
- during system operation,
- due to accidents and failure in operation.

1. Environmental impacts during construction

Noise

During construction works, noise emitted by construction machinery and vehicles may exceed allowable noise limits.

Air pollution

Increased dusting, caused by earth and other works, may pollute the surrounding area atmosphere during unfavorable weather conditions (wind). Exhaust gases from construction machinery and vehicles may pollute the atmosphere.

Soil pollution

Material spilling from transport vehicles on roads and disposal of surplus excavated earth material on surfaces not intended nor prepared as landfill may cause soil pollution. Opening of new stone borrow pits may cause unfavorable environmental impacts.

Impact on existing facilities

There is a possibility of damages to the existing municipal utilities and facilities.

Impact on cultural property

Excavations may cause damages to some parts of cultural heritage.

2. Impacts during WWTP operation

Flora and fauna

Negative impact of the planned project on flora and fauna is not expected. Birds may concentrate at WWTP still water surface (settling tanks). Due to bird faecals, pollution around the WWTP may be significant.

Odors

Evaporation or vaporization of odorous gases and vapors (ammonia, amines, hydrogen sulfide, merkaptans, hydrocarbons, organic acids...) generated due to organic and inorganic matter degradation is expected at the following sewerage system facilities: raw wastewater pumping stations, coarse screens, grit-grease removal, waste collection tanks.

Noise

High level noise can be generated at the following public sewerage system facilities: pumping station, blower unit, automatic sludge dewatering, diesel generator.

Decline in land value

Since wastewater treatment plant is situated far enough from the residential area, there should be no large scale decline in the adjacent land value.

Wastewater infiltration

Infiltration of wastewater from the WWTP and booster stations into soil can occur at the mains and tank joints and other places due to structures cracking. It may also occur from hardstandings at solids and sludge load points.

Impacts due to waste disposal

Disposal of wastes produced at the wastewater treatment plant may cause unwanted environmental impacts such as odors and insect breeding, and could also endanger life of people and animals. Apart from the aforementioned, if disposed in uncontrolled manner, the WWTP sludge may cause further groundwater pollution.

Impacts due to discharge of insufficiently treated wastewater

Discharge of insufficiently treated wastewater into watercourses may cause water pollution downstream from the outfall with the consequence of significant decrease in watercourse biodiversity, odors in costal area and landscape deterioration.

3. Environmental accident impacts

Environmental accidents due to *force majeure* (major earthquake, ravages of war) may cause collapse of system facilities or damages to utilities. It would result in uncontrolled release of untreated wastewater into the Neretva River, thus deteriorating water quality to present state or even more polluted condition. A consequence of environmental accidents due to break in system operation will be short-term increase in watercourse pollution downstream from the outfall. During high waters in the Neretva River, the WWTP site may be flooded to the elevation 2,3 m+MSL

F. ANALYSIS OF ALTERNATIVES

Spatial distribution of system facilities has been determined by topography. In respect to the planned land use, area and distribution of consumers; the area at Duvrat has been selected as the most favorable WWTP site. Combined-type wastewater disposal has been retained. In respect to topography, all wastewater from the left bank of the Neretva River will be boosted to the right bank and connected to the trunk sewer.

Alternative solutions refer to wastewater and sludge treatment procedures. Wastewater lagoons have not been considered not only because of climate conditions but also due to insufficient available area. Physical-chemical treatment processes, with the application of chemical agents for waste matter reduction have also not been considered since it would be hard to satisfy the secondary (II) and tertiary (III) treatment standards with the acceptable application of agents. Aquaculture processes, in particular “constructed wetlands” for wastewater treatment (i.e. man-made marshes) are suitable for small settlements, but not for the town of Metković with the 20.000 p.e., because of relatively large area required for treatment plant siting. Out of potential activated sludge processes, a simultaneous sludge stabilization process has been selected. That process enables nitrogen removal in the same biotank by interchange of aerobic and anoxic zones. A biological process of phosphorus removal is provided with the addition of a small tank with anaerobic conditions. Since sludge stabilization is carried out simultaneously, proposed solution is the most appropriate for public sewerage system size under 20.000 p.e., in the ultimate phase. Waste remained after dewatering will be disposed at the sanitary landfill.

Environmental Impact Study did not provide comparison of costs per alternatives.

The study also analyzed two alternatives:

- not to construct entire public sewerage system, i.e. not to construct wastewater treatment plant
- to construct entire public sewerage system.

In case of "not to construct entire public sewerage system" there will be no direct wastewater treatment costs. That solution imposes no benefits but only losses caused by the Neretva River pollution e.g.:

- polluted groundwater
- polluted the Neretva River, inadequate for irrigation
- polluted waters can cause diseases and general damaged due to health problems of neighboring communities
- polluted and/or contaminated water of the Neretva River will prevent biodiversity preservation in water currents, and particulary in the Neretva's delta.

Some of the aforementioned losses can be quantified in financial terms and some don't.

However, payment for total losses can be expressed as "water protection fee", in compliance with the section 3 of the Act on Water Management Financing (OG No. 107/95). According to Article 14 of the Act, fee can not be smaller that wastewater treatment price.

Real value of water protection fee for average conditions in the Republic of Croatia has been estimated at 4,5 kn/m^3.

For the average daily wastewater flow in the planning period (the town of Metković with the 20 x 10^3 p.e.), 4.000 m^3/d, daily "water protection fee" would be 4000 x 4,5 = 18 x 10^3 kn/day, i.e. 6,57 x 10^6 kn/year annually.

Thus, in case of "not to construct entire public sewerage system", the town of Metković would pay annually 6,57 x 10^6 kn "water protection fee" or compesation for waste water, and as the same time the Neretva River would be polluted complete with all other undesirable consequences.

G. MITIGATION PLAN

The existing sewerage networks shall be rehabilitated before commencement of construction works.

1. Protection measures during the intervention works

Commonly mitigation

- Prior to the creating design and before construction permit is issued, it is imperative to review the status of a sewage network, examine hydraulic pressure and examine biological processes of cleaning and final processing and disposal of sludge. On the basis of the examination findings draft the plan of selected methods for waste water technologic purification and include it in Master project.
- Prior to the beginning of construction carry out all necessary repair works of the existing sewage network.
- Upon the completion of the construction of every single object, clean the construction site and establish the previous status on all surfaces, in line with the environmental planning project.

Water

- In order to protect ground water against entering of waste water the joints of channels, wells and tanks must be constructed so as to be watertight. When making calculations as well as during the construction make sure to prevent the occurrence of fissures on waste water and waste substances tanks, taking into account unwanted effects such as earthquake, among other, and the fact that material used for pipes is highly elastic. After the construction is completed, check that all parts of the system are watertight and repair the sections of channel not meeting these conditions.

Air quality

- Undertake protective measures for preventing, i.e. reducing dust and air pollution, including sprinkling water over the dusty material which may generate dust during the transport.
- Equipment and vehicles used for the construction works must be constantly monitored in order to make sure that the quantity and quality of gas emission does not exceed maximum allowable levels.

Noise

- Draft the plan of protection against noise generated by the construction site activities.

Soil

- Excess loading of construction material is forbidden as spilling might occur during the transport. Waste disposal at wild dumps is forbidden.

Protection of existing facilities

- Protect the existing buildings and installation from potential damaging by the construction works. In case of the interruption of one of utility installation, make repair in the shortest time possible, according to instructions and under the supervision of the authorized professional utility services administration.

Protection of cultural property

- Prior to the beginning of excavation request professional opinion from the authorized conservator's office and, if necessary, during the excavation ensure the presence of a qualified conservator.

Landscape

- Draft the landscape plan making sure that in the section of greening of the area enough space is foreseen for evergreen trees along the borders of the device.

Insects

- When drafting the project include the protection against insects by preventing the creation of "dead corners", i.e. still water surfaces. Prevent the retention of water on all working and traffic surfaces by ensuring adequate inclination and water capture wells.

2. Protection measures to be applied during intervention

Odors

- The following parts of the device must be roofed over:
    a. Pumping stations for raw water and sludge,
    b. Grids, sieves
    c. Sludge thickeners
    d. Sludge filtration device
    e. Space in the device for trapping waste from grids, sand and grease trap and filtered sludge.

- Maintain sub pressure in closed spaces of the device and purify polluted air before emission to the environment.
- Pursuant to the Decree on limit values of polluted substances in the air (Official Gazette No., No. 133/05) in the air tested at the border line of the device's location the below values must not be exceeded (24):
    - Ammoniac: 100 µg/m^3
    - Hydrogen sulphide: 5 µg /m^3
    - Merkaptane: 3 µg /m^3

  The above limit values must not be exceeded more than 7 times in one calendar year.

Water

- Make arrangement for drainage system for all working and traffic surfaces around the device and ensure regular cleaning, i.e. washing of these surfaces.
- Indicators of the concentration of hazardous and other substances in purified waste water at the exit of the device must not exceed values allowed for II. purification grade in the I. phase of the development of device, i.e. concentration can not be greater than:
  - BPK-5 25 µg O2/1
  - KPK 125 µg O2/1
  - R.T. 35 µg /l.

- After the construction of III. purification level in the 2nd phase, maximum allowable concentration of nutrients in purified water must not exceed the following values:
  - Total nitrogen 15 µg N/1
  - Total phosphorus 2 µg P/L

- Spillover/overflow of the mixture of precipitation and waste water at the reduction chamber facility may begin when the concentration of KPK is equal or less than 187 mg O2/l. Immersed apron must be mounted in front of the spillover threshold.

Insects

- In order to maintain hygienic working conditions and clean surroundings of the device, undertake appropriate measures to reduce the stalling of birds on the device.

Noise

- All machines generating noise of higher intensity should be placed in closed premises. The project for the device must contain the noise level assessment together with the plan of the installation of additional protection material. At the border line of the device's location maximum allowable noise level is 65 dBA in the day and 50 dBA at night, i.e. it must not exceed values set forth in the Regulation on maximum allowable noise level in the working and residential environment (Official Gazette No., NO. 145/04).

Land value preservation

- Public drainage system facilities must be constructed adequately and some of them need to be covered with the airing and air filtration devices. The device's surroundings must be regularly cleaned.

Waste management

- Waste from grids must be collected in closed tanks and transported on a daily basis to 1st t category landfill, pursuant to the Waste Management Regulation (Official Gazette No. No. 123/97, 112/01).
- Grease and other floating substances separated on grease trap must be collected and pressed towards the initial point of device. After they "collate" to the dispersed substances they must be removed from water on micro-sieves.
- Stabilized sludge containing around 50% of organic substances and cleaned from excess water, with the content of dry substances no less than 25% must be collected in separate tanks and transported to 1st category landfill, pursuant to the Waste Management Regulation (Official Gazette No.123/97, 112/01).

3. Protection measures in case of ecological accidents

- Make plans for the construction of a device in at least two independent parts of technological process i.e. still water phases mutually linked with the complex of channels and breeches.
- Fill in the area around the device so that the whole area is at 2, 5 meter above sea level.
- Master project must also contain plans of discharge of purified waste water in cases of high level of the Neretva River.
- The plan must also include the installation of reserve pumps with automatic switching at every pumping station.
- Energy supply for the device and pumping stations must be ensured from at least two independent sources. Reserve source of energy supply from diesel aggregate must be ensured for those pumping station for which safety overflow with the discharge into Neretva River is impossible to anticipate.
- The disposition of fire extinction apparatuses at the appropriate sections of electric installations and electro-machines must also be included in the plan.
- Pursuant to the Regulation on hydrant network for fire extinguishing (Official Gazette 08/06) build the external hydrant network on the entire area of the device.
- All metal parts on the device must be made of metal resistant to corrosion, i.e. protected from corrosive effects.
- Prepare the Intervention Plan for Environment Protection and for Emergency Pollution Operational Plan.

H. ENVIRONMENTAL MANAGEMENT AND TRAINING

A distribution business Metković d.o.o., based in Metković, has been registered, among other utility-related activities, for the following services: wastewater collection and treatment and municipal waste disposal. Within a distribution business Metković, there are separate organization units for the aforementioned services. Long-term involvement in operation & maintenance of public sewerage system provided enough experience, professional staff and adequate equipment. In terms of WWTP operation & maintenance, new staff shall be employed and trained for those services.

I. ENVIRONMENTAL MONITORING PLAN

The results of environmental monitoring will be used for additional mitigation if environmental quality requirements increase or inefficiency of the proposed mitigation is determined.

Environmental monitoring plan shall comprise the following:

- surface waters,
- groundwater,
- air,
- noise,
- treated effluent sludge.

1. Surface water monitoring

The following indicators should be measured at both the entry and exit of the device:

- water flow (m3/s)
- concentration of dispersed substances (mg/1)
- concentration of five-day biochemical expenditure (mg O2/1)
- concentration of chemical expenditure (mg O2/1)

- concentration of total nitrogen (mg N/1)
- concentration of total phosphorus (mg P/1)

Water samples are to be collected during 24 hours in equally distributed periods. Altogether 12 samples must be collected in one year.

2. Groundwater monitoring

At piezometer (monitoring well) located along the southern border of the device the following indicators must be measured:

- water level (m)
- water temperature (°C)
- water turbidity (SiO2/1)
- odor
- taste
- pH
- consumption of KMnO4 (mg O2/1)
- electro conductivity (µS/cm)
- ammoniac (mg N/1)
- nitrite (mg N/1)
- nitrate (mg N/1)
- greases and oils (µg/1)
- mineral oils (µg/1)
- polychlorinated biphenyls (PCBs) (µg/1)
- phenols (µg/1)

Examinations must commence at least one year prior to putting the device into operation. Take six samples in one year in equally distributed time periods.

3. Air quality monitoring plan

Along the border of the device, the following indicators should be measured:

- direction and speed of wind (m/s)
- Air temperature
- Moist in the air (%)
- Precipitation (mm/min)
- Ammoniac (mg NH2/m3)
- Hydrogen sulphide (mg H2S/m3)
- Merkaptane (mg C2H2SH/m3)

Measurement should start at least one year prior to the putting device into operation. Measurement must be carried out two times in a year in the duration of ten days, during the hot and cold season. Once in a year during the hot season, air samples should be collected in the imminent vicinity of the pumping stations.
Monitoring should be carried out throughout the first five years of the device operation.

4. Noise level monitoring plan

Measurement of noise level must be carried out in the day and at night in the station near the border of the device. Measurement must commence at least one year prior to putting the device into operation and must be carried out two times in a year, each time in the duration of five days. In the first year

after the construction Measurement of noise must be performed in an interrupted period of five days and that in the imminent vicinity of pumping stations.

5. Waste sludge monitoring plan

The program of monitoring sludge encompasses the following indicators:

- Daily quantity of processed and filtered sludge (M3/d)
- Daily mass of the sludge's dry substance (t/d)
- Concentration of total nitrogen concentration (mg N/kg S.T.)
- Concentration of total phosphorus concentration (mg N/kg S.T.)
- Total potassium concentration (mg N/kg S.T.)
- Concentration of cadmium (mg N/kg S.T.)
- Concentration of lead (mg N/kg S.T.)
- Concentration of chromium (mg N/kg S.T.)
- Concentration of zinc (mg N/kg S.T.)
- Concentration of Polychlorinated biphenyls (PCBs) and Hexachlorocyclohexane (HCH)

Samples of sludge must be taken from stabilized ff sludge prepared for transport. Altogether 12 samples must be taken during one year and that in equally distributed periods.
According to Regulation on the protection of agricultural land from the hazardous substances pollution (Official Gazette No. 15/92) all indicators must be checked once in a year
Pursuant to Waste Management Regulations (Official Gazette No. 123/97, 112/01) before disposing of sludge and residue after the cleaning of sewage system to landfills designated for such type of waste it is necessary to determine the content of eluates.

6. Environment protection cost estimate

Based on the environmental monitoring plan, the annual environment protection costs have been estimated at 220.000,00 HRK. The aforementioned value amounts about 0,34 % of construction costs i.e. 1,4 % of O&M costs.

J. APPENDICES

Participants in the Study:

Građevinski fakultet Sveučilišta u Zagrebu (Faculty of Civil Engineering, University of Zagreb)

Prof. Zlatko Pollak, PhD. Geol. (geology, seismology, pedology and hydrogeology data)

Prof. emer. Stanislav Tedeschi, PhD Civ.Eng. (Study project manager and author of one part of the Study)

Državni hidrometeorološki zavod (State Weather Bureau), Zagreb

Marjana Gaić-Čapka, PhD (data on temperature, precipitation and relative humidity)

Ksenija Zaninović, M.Sc.(data on air currents and evapotranspiration)

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Record of Interagency/Forum/Consultation Meetings

EIA Study was available for the public review in the period 1.03.2007 – 14.03.2007 in the premises of the Town of Metković. Information about public review was announced in the national daily newspaper "Slobodna Dalmacija" and Official Gazzette of Dubrovačko-neretvanska County as well as on the notice boards of the Town of Metković and Dubrovačko-neretvanska County. There were no comments and suggestions about the Study given by the interested public during this period.

Public meeting was held on March 5th 2007 in the Metković cultural center. Present officials and citizens were:

1. Ivo Margeta, Chief of administrative department for municipal services and enviromental protection of Dubrovačko-neretvanska County

2. Stanislav Tedeschi, Consultant
3. Tonći Jerković, Secretary of Town of Metković
4. Petar Čarapina, Chief of administrative department for economy of Town of Metković
5. Željko Mordžin, Manager of «Metković» d.o.o. utility services
6. Ivo Jelaš, interested citizen
7. Mile Granić, interested citizen
8. Ivica Puljan, interested citizen
9. Damir Erceg, employee of the Town of Metković

During public meeting Mr. Ivica Puljan asked if the project had predicted solution of stormwater discharge. Consultant answered that in the center of Metković, as well as in the old part of town and partly in the recently developed settlements situated on the left and right Neretva river bank, sewerage network with combined system and no previous treatment before discharge was constructed.
Conceptual Design of sewerage system of the Town of Metković (Hidroprojekt-Ing, 1997.) proposes construction of: the combined system in the central parts of the Town on the left and right Neretva river bank and separate system for the area of the Town of Metković and its suburban zones on the both Neretva river banks.
Conceptual design also proposes construction of whole sewage network which should be based on gravity flow with number of pumping stations (in respect topographic features) in order to provide subsequent gravity flow regime. Alternative solution recommended a possibility of useing sewerage network with decreased pressure drive in network (vacuum sewerage system) for the settlements with separate system.

The copy of Minutes from the public debate and Decision issued by Ministry of Environmental Protection, Physical Planning and Construction are given hereinafter:

COMMISSION FOR EVALUATION
OF THE METKOVIĆ PUBLIC DRAINAGE
SYSTEM ENVIRONMENTAL IMPACT
ASSESSMENT

Zagreb, April 5, 2007

School of Civil Engineering
c/o Prof. Stanislav Tedeschi
Fra ANdrije Kačića Miošića 26
10000 Zagreb

SUBJECT: Documents from the public debate on the Metković Public Drainage System Environmental Impact Assessment
- to be delivered

We are enclosing here the documents from the public presentation and public debate on the Metković Public Drainage System Environmental Impact Assessment that took place from March 1-14, 2007 in Metković.

Also, kindly e-mail us to kristina.pastorcic@mzopug.hr the Draft Conclusion for the purposes of organization of the 3rd session of the Committee.

For all inquiries, please contact Kristina Pastorčić, the Commission secretary in the Ministry of Environmental Protection, Physical Planning and Construction, phone: 3713 137; fax: 3782 157; e-mail: kristina.pastorcic@mzopug.hr.

Sincerely,

COMMISSION SECRETARY

Kristina Pastorčić, b. Sc. (Civ. Eng.)

REPUBLIC OF CROATIA
DUBROVNIK-NERETVA COUNTY
Office for Public Utility Services
and Environmental Protection

Class: 351-01/03-01/84
Reg. No: 2117/1-09-07-11
Dubrovnik, April 4, 2007

TO: MINISTRY FOR ENVIRONMENTAL
PROTECTION AND PHYSICAL PLANNING
Commission for Evaluation of the Metković
Public Drainage System Environmental
Impact Assessment
10000 Zagreb
Ulica Republike Austrije 14

Subject: Delivery of the documents from the public presentation of the Metković Public Drainage System Environmental Impact Assessment

Dear Sirs,

We hereby inform you that, in accordance with the Decision of the Commission for Evaluation of the Metković Public Drainage System Environmental Impact Assessment of January 29, 2007, a public presentation on Metković Public Drainage System Environmental Impact Assessment took place from March 1 – 14, 2007 in the Town Office for Economic Affairs.
We enclose here the documents presented at the public presentation.
We also enclose here a copy of the advertisement published in Slobodna Dalmacija daily of February 22, 2007.
The public debate took place on March 5, 2007 at 6 p.m. in the Metković Cultural Center.
We also enclose here the Minutes from the public debate.
A book of objections and suggestions was available in the premises where the public presentation was organized. No objections were entered in it during the presentation.
Also, no objection to the Assessment was submitted to the Commission within the announced deadline.

Sincerely,

Ivo Margeta
Head

CC:
1. Archive
2. Files

M I N U T E S

- from the public debate on the Metković Public Drainage System Environmental Impact Assessment, held on March 5, 2007 in the Metković Cultural Center, Metković, Ulica Stjepana Radića 1.

Start: at 6 p.m.
Attending:

1. Ivo Margeta, Head of the County Office for Public Utility Services and Environmental Protection - Dubrovnik
2. Stanislav Tedeschi, Metković Public Drainage System Environmental Impact Assessment Project Manager - Zagreb
3. Tonći Jerković, Town Government Secretary
4. Petar Čarapina, Head of Town Office for Economic Affairs
5. Željko Mordžin, "Metković" d.o.o. – Director, Metković Utility Company
6. Damir Erceg, administrative officer in the town office
7. Ivo Jelaš, Metković
8. Mile Granić, Metković
9. Ivica Puljan, Metković

The public debate on the Metković Public Drainage System Environmental Impact Assessment was opened by Ivo Margeta, Head of the Dubrovnik County Office for Public Utility Services and Environmental Protection. His Office is in charge for the entire procedure of the project, including obtaining of location permits. Having greeted all the present, particularly Prof. Stanislav Tedeschi, Metković Public Drainage System Environmental Impact Assessment Project Manager and the author of parts of it, Ivo Margeta said that the Commission for Evaluation of the Metković Public Drainage System Environmental Impact Assessment decided on its January 29, 2007 session in Zagreb to organize public presentation of the Metković Public Drainage System Environmental Impact Assessment, prepared by the School of Civil Engineering of the Zagreb University, Kačićeva 26. Having claimed that the Metković Public Drainage System Environmental Impact Assessment contains all the elements required by the provisions of Article 5 of the Rules on Environmental Impact Assessment, important for positive assessment of the said project. The premises of the Metković Town Government, Ulica Stjepana Radića 1 were chosen for the presentation which was to last 14 days, starting on the eighth day after publishing of the announcement in Slobodna Dalmacija daily and on bulletin boards of the County and Town Governments. The public presentation lasted from March 1, 2007 to March 14, 2007, every working day from 9 a.m. to 2 p.m. The public debate was planned for March 5, 2007 at 6 p.m., in the premises of the Metković Cultural Center, Ulica Stjepana Radića 1 (it has just started). Her added that the public presentation is organized and coordinated by the County Office for Public Utility Services and Environmental Protection (Dubrovnik, Pred dvorom 1) to which all written opinions, suggestions and objections concerning the said Assessment are to be delivered within 8 days after the end of the public presentation. There is also the possibility of writing opinions, suggestions and objections in the book available for such purpose during the public

presentation in the premises of the Metković Town Government – Office for Economic Affairs, Metković, Ulica Stjepana Radića 1.

After introductory comments on the public presentation, Ivo Margeta expressed his regret about the small number of those attending today's occasion, although the debate was regularly announced. He invited Prof. Stanislav Tedeschi, Metković Public Drainage System Environmental Impact Assessment Project Manager and the author of parts of it, to explain the Assessment.

Having greeted all the present, Prof. Stanislav Tedeschi said, among other things, that the making of the said Assessment is the basis for preparation of the location permit. It could be said that the Assessment is one of the first instruments in a row (others include location permit, project documents, building permit). It is based on the preliminary design of the Metković Sewer System made by Hidroprojekt-Ing, Zagreb. It is aligned with the Town and County Physical Plans as regards the location of the Metković Public Drainage System. The said plan envisages that, after completion of the integrated public drainage system, the town of Metković will solve its waste water drainage with the common sewer system in such way that the sewer network on the left bank of the Neretva River (the town lies on both sides of the river) be attached to a new collector and lead the waste water by means of an underwater siphon to the right bank of the river. There, the new collector would take the waste water from the left riverbank and from the residential areas on the right riverbank, as well as those from the industrial and trade zones. All this waste water would than be taken to the new wastewater purifier planned to be installed in Jerkovići – Duvrat area, some three kilometers downstream from the center of Metković. The facilities not connected to the system, and those scheduled for connection later, would have to build three-part impermeable septic tanks or arrange for plant sewage treatment. This would improve the quality of the waters of the Neretva River (which would thus be classified into Category II) downstream Metković (provided that the town of Opuzen carried out the same project). All this would improve the general health of the citizens, biological diversity in surface water layers (particularly in the lower Neretva, which is included in the list of the Ramsar Convention), quality of underground streams, recreation activities on rivers and riverbanks and the scenery of the proposed Nature Park "Lower Neretva".

Continuing his remarks, Prof. Stanislav Tedeschi spotlighted the geological, seismological, pedological and hydrogeological data obtained by the Zagreb School of Civil Engineering, as well as the meteorological and climatic conditions obtained by the State Institute for Hydrometeorology (as a co-author of the Assessment) for the area of the town of Metković and the Lower Neretva. He paid particular attention to the building and use of waste water treatment facilities (and other appertaining installations) in the context of the hydroelectric power plants in the Upper Neretva (Bosnia and Herzegovina). As a result, noise and odors appear in the facility and active silt from the waste water settles in it. All this should be put in line with regulations. The said Assessment deals with that and with protection of environment, when it comes to the building of the Metković public drainage system.

Continuing the debate after Prof. Tedeschi's detailed explanation of the Metković Public Drainage System Environmental Impact Assessment, Ivo Margeta invited all the

present to join the discussion, which, after all, is the purpose of this meeting and the entire public debate on the Metković Public Drainage System Environmental Impact Assessment as a precondition for its adoption and for continuation of the building of the Metković public drainage system.

In the discussion that followed, Mr. Ivica Puljan wanted to know whether the project envisages dealing with precipitation waters, too.

Prof. Stanislav Tedeschi replied to Mr. Puljan that the said Assessment deals with precipitation waters, too. It should be kept in mind that the center of Metković, the old part of the town and some new residential areas on the left and right banks use a sewer network with combined drainage. Thus, wastewater and precipitation water from the existing sewer systems are discharged into the Neretva without treatment. However, the preliminary design of the Metković sewer system (Hidroprojekt-Ing, 1997) envisages a combined discharge for the Town of Metković: a mixed discharge in the town's central parts on both riverbanks and a distributive discharge for all other parts of the town on both sides of the river. The preliminary design also envisages that the entire sewer network be built on gravitational principle, although the local topography would require building of a number of pumping stations in order to enable the gravitational principle and reduce burial to an extent. As an alternative solution, the Assessment proposes a sewer network with reduced pressure (vacuum sewer system) in the parts odf the town that use the distribution discharge.

The debate ended at 7 p.m.

Minutes taken by:

Damir Erceg

The list of persons attending the public debate on the Metković Public Drainage System Environmental Impact Assessment, held on March 5, 2007 (Monday) at 6 p.m. in the premises of the Metković Cultural Center, Ulica Stjepana Radića 1, METKOVIĆ.

1. Ivo Margeta, Head of the County Office for Public Utility Services and Environmental Protection - Dubrovnik
2. Stanislav Tedeschi, Metković Public Drainage System Environmental Impact Assessment Project Manager – Zagreb
3. Petar Čarapina, Head of Town Office for Economic Affairs
4. Željko Mordžin, "Metković" d.o.o. – Director, Metković Utility Company
5. Tonći Jerković, Town Government Secretary
6. Mile Granić, Metković
7. Ivo Jelaš, Metković
8. Damir Erceg, administrative officer in the town office
9. Ivica Puljan, Metković

REPUBLIC OF CROATIA
MINISTRY OF ENVIRONMENTAL PROTECTION,
PHYSICAL PLANNING AND CONSTRUCTION
10000 Zagreb
Ul. Republike Austrije 20
Class: UP/I 351-03/06-02/71
Reg. No.:531-08-3-1STZ/KP-07-13
Zagreb, May 14, 2007

Pursuant to Article 30 of Environmental Protection Act (Official Gazette No. 82/94, 128/99) the Ministry of Environmental Protection, Physical Planning and Construction (hereinafter: MEPPPC) and related to Article 12 of the Law on organization and scope of work of the ministries and state administration organizations (Official Gazette No., No. 199/03), referring to the request of the City of Metković, Stjepana Radića 1, Metković, after the procedure of environmental impact assessment has been conducted, passed the following

DECISION

1. Planned interventions – public sewage/drainage system of the City of Metković, with waste water purification device (located on the following cadastral lots: No. 5507, 5508,5509, 5510, 5511/1, 5511/2, 5511/3, 5512, 5513, 5514, 5515, 5515, 5516, 5517,5518, 5519, 5520, 5521, 5522, 5523, 5524, 5525, 5526, 5527, 5528, 5529, 5530, 5531, 5532, 5533, 5534, 5535, 5536,5537, 5538, 5539, 5540, cadastral lot Metković) with a total capacity of 20.000 ES - is acceptable for the environment providing measures for the environment protection and monitoring of environmental status are applied.

ENVIRONMENTAL PROTECTION MEASURES

A1. Protection measures during the intervention works

1. Prior to the creating design and before construction permit is issued, it is imperative to review the status of a sewage network, examine hydraulic pressure and examine biological processes of cleaning and final processing and disposal of sludge. On the basis of the examination findings draft the plan of selected methods for waste water technologic purification and include it in Master project.

2. Prior to the beginning of construction carry out all necessary repair works of the existing sewage network.

3. Draft the plan of protection against noise generated by the construction site activities.

4. Draft the landscape plan making sure that in the section of greening of the area enough space is foreseen for evergreen trees along the borders of the device.

5. In order to protect ground water against entering of waste water the joints of channels, wells and tanks must be constructed so as to be watertight. When making calculations as well as during the construction make sure to prevent the occurrence of fissures on waste water and waste substances tanks, taking into account unwanted effects such as earthquake, among other, and the fact that

material used for pipes is highly elastic. After the construction is completed, check that all parts of the system are watertight and repair the sections of channel not meeting these conditions.

6. When drafting the project include the protection against insects by preventing the creation of "dead corners", i.e. still water surfaces. Prevent the retention of water on all working and traffic surfaces by ensuring adequate inclination and water capture wells.

7. Undertake protective measures for preventing, i.e. reducing dust and air pollution, including sprinkling water over the dusty material which may generate dust during the transport.

8. Equipment and vehicles used for the construction works must be constantly monitored in order to make sure that the quantity and quality of gas emission does not exceed maximum allowable levels.

9. Excess loading of construction material is forbidden as spilling might occur during the transport. Waste disposal at wild dumps is forbidden.

10. Protect the existing buildings and installation from potential damaging by the construction works. In case of the interruption of one of utility installation, make repair in the shortest time possible, according to instructions and under the supervision of the authorized professional utility services administration.

11. Prior to the beginning of excavation request professional opinion from the authorized conservator's office and, if necessary, during the excavation ensure the presence of a qualified conservator.

12. Upon the completion of the construction of every single object, clean the construction site and establish the previous status on all surfaces, in line with the environmental planning project.

A2. Protection measures to be applied during intervention

13. The following parts of the device must be roofed over:

    f. Pumping stations for raw water and sludge,
    g. Grids, sieves
    h. Sludge thickeners
    i. Sludge filtration device
    j. Space in the device for trapping waste from grids, sand and grease trap and filtered sludge.

14. Maintain sub pressure in closed spaces of the device and purify polluted air before emission to the environment.

15. Pursuant to the Decree on limit values of polluted substances in the air (Official Gazette No., No. 133/05) in the air tested at the border line of the device's location the below values must not be exceeded (24):

- Ammoniac: 100 µg/m3
- Hydrogen sulphide: 5 µg /m3
- Merkaptane: 3 µg /m3

The above limit values must not be exceeded more than 7 times in one calendar year.

16. Make arrangement for drainage system for all working and traffic surfaces around the device and ensure regular cleaning, i.e. washing of these surfaces.

17. All machines generating noise of higher intensity should be placed in closed premises. The project for the device must contain the noise level assessment together with the plan of the installation of additional protection material. At the border line of the device's location maximum allowable noise level is 65 dBA in the day and 50 dBA at night, i.e. it must not exceed values set forth in the Regulation on maximum allowable noise level in the working and residential environment (Official Gazette No., NO. 145/04).

18. In order to maintain hygienic working conditions and clean surroundings of the device, undertake appropriate measures to reduce the stalling of birds on the device.

19. Public drainage system facilities must be constructed adequately and some of them need to be covered with the airing and air filtration devices. The device's surroundings must be regularly cleaned.

20. Waste from grids must be collected in closed tanks and transported on a daily basis to 1st t category landfill, pursuant to the Waste Management Regulation (Official Gazette No. No. 123/97, 112/01).

21. Grease and other floating substances separated on grease trap must be collected and pressed towards the initial point of device. After they "collate" to the dispersed substances they must be removed from water on micro-sieves.

22. Stabilized sludge containing around 50% of organic substances and cleaned from excess water, with the content of dry substances no less than 25% must be collected in separate tanks and transported to 1st category landfill, pursuant to the Waste Management Regulation (Official Gazette No.123/97, 112/01).

23. Indicators of the concentration of hazardous and other substances in purified waste water at the exit of the device must not exceed values allowed for II. purification grade in the I. phase of the development of device, i.e. concentration can not be greater than:

    - BPK-5 25 µg O2/1
    - KPK 125 µg O2/1
    - R.T. 35 µg /l.

24. After the construction of III. purification level in the 2nd phase, maximum allowable concentration of nutrients in purified water must not exceed the following values:

    - Total nitrogen 15 µg N/1
    - Total phosphorus 2 µg P/L

25. Spillover/overflow of the mixture of precipitation and waste water at the reduction chamber facility may begin when the concentration of KPK is equal or less than 187 mg O2/l. Immersed apron must be mounted in front of the spillover threshold.

A.4. Protection measures in case of ecological accidents

26. Make plans for the construction of a device in at least two independent parts of technological process i.e. still water phases mutually linked with the complex of channels and breeches.

27. Fill in the area around the device so that the whole area is at 2, 5 meter above sea level.

28. Master project must also contain plans of discharge of purified waste water in cases of high level of the Neretva River.

29. The plan must also include the installation of reserve pumps with automatic switching at every pumping station.

30. Energy supply for the device and pumping stations must be ensured from at least two independent sources. Reserve source of energy supply from diesel aggregate must be ensured for those pumping station for which safety overflow with the discharge into Neretva River is impossible to anticipate.

31. The disposition of fire extinction apparatuses at the appropriate sections of electric installations and electro-machines must also be included in the plan.

32. Pursuant to the Regulation on hydrant network for fire extinguishing (Official Gazette 08/06) build the external hydrant network on the entire area of the device.

33. All metal parts on the device must be made of metal resistant to corrosion, i.e. protected from corrosive effects.

34. Prepare the Intervention Plan for Environment Protection and for Emergency Pollution Operational Plan.

B. PROGRAM FOR MONITORING ENVIRONMENTAL STATUS

1. The following indicators should be measured at both the entry and exit of the device:
    - water flow (m3/s)
    - concentration of dispersed substances (mg/1)
    - concentration of five-day biochemical expenditure (mg O2/1)
    - concentration of chemical expenditure (mg O2/1)
    - concentration of total nitrogen (mg N/1)
    - concentration of total phosphorus (mg P/1)

Water samples are to be collected during 24 hours in equally distributed periods. Altogether 12 samples must be collected in one year.

2. At piezometer (monitoring well) located along the southern border of the device the following indicators must be measured:
    - water level (m)
    - water temperature (°C)
    - water turbidity (SiO2/1)
    - odor
    - taste
    - pH

- consumption of KMnO4 (mg O2/1)
- electro conductivity (µS/cm)
- ammoniac (mg N/1)
- nitrite (mg N/1)
- nitrate (mg N/1)
- greases and oils (µg/1)
- mineral oils (µg/1)
- polychlorinated biphenyls (PCBs) (µg/1)
- phenols (µg/1)

Examinations must commence at least one year prior to putting the device into operation. Take six samples in one year in equally distributed time periods.

3. Along the border of the device, the following indicators should be measured:
    - direction and speed of wind (m/s)
    - Air temperature
    - Moist in the air (%)
    - Precipitation (mm/min)
    - Ammoniac (mg NH2/m3)
    - Hydrogen sulphide (mg H2S/m3)
    - Merkaptane (mg C2H2SH/m3)

Measurement should start at least one year prior to the putting device into operation. Measurement must be carried out two times in a year in the duration of ten days, during the hot and cold season. Once in a year during the hot season, air samples should be collected in the imminent vicinity of the pumping stations.
Monitoring should be carried out throughout the first five years of the device operation.

4. Measurement of noise level must be carried out in the day and at night in the station near the border of the device. Measurement must commence at least one year prior to putting the device into operation and must be carried out two times in a year, each time in the duration of five days. In the first year after the construction Measurement of noise must be performed in an interrupted period of five days and that in the imminent vicinity of pumping stations.

5. The program of monitoring sludge encompasses the following indicators:
    - Daily quantity of processed and filtered sludge (M3/d)
    - Daily mass of the sludge's dry substance (t/d)
    - Concentration of total nitrogen concentration (mg N/kg S.T.)
    - Concentration of total phosphorus concentration (mg N/kg S.T.)
    - Total potassium concentration (mg N/kg S.T.)
    - Concentration of cadmium (mg N/kg S.T.)
    - Concentration of lead (mg N/kg S.T.)
    - Concentration of chromium (mg N/kg S.T.)
    - Concentration of zinc (mg N/kg S.T.)
    - Concentration of Polychlorinated biphenyls (PCBs) and Hexachlorocyclohexane (HCH)

Samples of sludge must be taken from stabilized ff sludge prepared for transport. Altogether 12 samples must be taken during one year and that in equally distributed periods.
According to Regulation on the protection of agricultural land from the hazardous substances pollution (Official Gazette No. 15/92) all indicators must be checked once in a year

Pursuant to Waste Management Regulations (Official Gazette No. 123/97, 112/01) before disposing of sludge and residue after the cleaning of sewage system to landfills designated for such type of waste it is necessary to determine the content of eluates.

II. The holder of planned intervention, i.e. the City of Metković, Stjepana Radića 1, Metković, is obliged to ensure that all established measures with regard to environment protection and the program of monitoring environmental status are strictly applied.

EXPLANATION

On 24 April, 2006, the holder of the planned intervention, the City of Metković submitted the request for carrying out the environmental impact assessment procedure for the planned intervention – the public drainage system for the City of Metković with the waste water purification device. The request was submitted jointly with the environmental impact assessment study of the City of Metković public drainage system, prepared by Faculty of Civil Engineering of the University of Zagreb, Fra Andrije Kačića Miočića 26, Zagreb, on March, 2006 with the amendment made in December, 2006.

By its Decision (Class: UP/I 351-03/06-02/71; Reg. No: 531-08-3-1-STZ/KP-06-8) dated 3 July, 2006, the Ministry of Environmental Protection, Physical Planning and Construction, appointed the Commission for the environmental impact assessment of the subject intervention. The following persons were appointed: Sandra Tucak Zorić, B. of Eng., MEPPPC, Directorate for environmental protection, as President of the Commission; Mijo Vranješ, Faculty for Civil Engineering and Architecture, University of Split, as Deputy of President of the Commission, Slaven Rački, B. of Eng.,Pliva Hrvatska d.o.o., as Member of the Commission, Zlatko Ledecki, B. of Chem. Eng., Ministry of Agriculture, Forestry and Water Management, Directorate for Water Management, as Member of the Commission, Marina Oreb, Mr. Sci, County office for physical planning of Dubrovnik-Neretva County as Member of the Commission, Mato Lakić, M.D., Public Health Institute of Dubrovnik-Neretva County as Member of the Commission, Eugen Draganović, M. Sci, Ministry of Culture, as Member of the Commission, Željko Mordin, B.E., the City of Metković, as Member of the Commission, and Kristina Pastorčić, B. Eng., MEPPPC, Directorate for environmental protection, as the Secretary of Commission.

The Commission has held three sessions. On the first session, held on 10 October, 2006 in Metković, the Commission assessed that the submitted Study contains some deficiencies and requested from the holder of intervention to ensure that changes and amendments of the Study in line with comments issued by members of the Commission are made in an appropriate time period. On its second session, held on 29 January, 2007 in Zagreb, members of the Commission expressed their satisfaction with the amendments to the Study and after they established that the Study contains all essential elements necessary for making the evaluation of acceptability of the intervention, they issued Decision to open the Study to public scrutiny and public discussion. The 14-days public scrutiny has been organized in the area of the City of Metković together with public discussion. Invitation for public discussion and public scrutiny was published in the daily *Slobodna Dalmacija* and on public billboards of the Dubrovnik-Neretva County and the City of Metković. Administrative department of municipal activities and environmental protection of the Dubrovnik-Neretva County coordinated public scrutiny. During the public scrutiny no written comments have been received. The Commission held its third session on 18 April 2007 in Zagreb and members of the Commission adopted the Conclusion by which the planned intervention – public drainage system of the City of Metković with waste water purification device was assessed as acceptable for the environment under the condition that environmental protection measures are applied and environmental status monitoring program carried out, as set forth in the Conclusion of the Commission.

Acceptability of the proposed intervention for the environment has been explained as follows: " Repair works and expansion of public drainage system of the City of Metković will be carried out in a longer period of time, i.e. construction per phases of a longer duration has been foreseen, namely, the 1st phase for 10,000 ES and 2nd phase additional 10,000 ES, i.e. total capacity of 20,000 ES. On the basis

of the existing technical and spatial documentation the most favorable alternative of the intervention has been selected.
According to the disposition of urban settlement in the specific area, topographic circumstances, position of the device and purified waste water discharge into the Neretva River optimal solution consists of conducting the main collector from the left river bank to the right and further downstream the Neretva River up to the area of Duvrat where the waste water purification device is located, in compliance with the Urban planning of the City of Metković (Neretvanski glasnik, local newspapers, No. 06/2004).
According to plans, the City of Metković will keep the combined method of drainage, consisting of:

- mixed method in central areas of the city, on the left and the right river bank, at the surface of approximately 2x 75 ha = 150 ha
- dividing system from other city's and suburban areas from both banks of the Neretva River

The construction of public drainage system has also been planned for the city district Metković. For the settlements Glušci and Dubravica the construction of three-part waterproof septic pits, i.e. plant installations in which plants are used as a purification agent, depending on weather conditions.

As planned the entire sewage system will be constructed on the principle of gravity. Due to topographic conditions of the terrain a certain number of pre-pumping stations should be erected in order to enable continuous gravitational flow and reduce in part the depth of entrenchment.
As an alternative solution for parts of the city with separated drainage system proposals have been made for using channel network in which the pressure is lowered by the power (vacuum sewage).
For the purpose of waste water purification for the city district Metković process in which activated sludge is used with the application of nitritification and denitritification method has been selected. Also, biological process for the removal of phosphorus compounds from wastewater has bee foreseen. In addition to the processing of sludge, which will be simultaneously stabilized in biological tank for waste water purification, the process of sludge thickening with extracting excess water by means of machines for sludge filtering has been foreseen. In the first construction period sludge will be filtered in the fields for drying within the space of the device which will be kept as safety drive in the future period. In case the content and concentration of waste substances will meet the requirements of Regulation of the protection of agricultural land from the pollution of hazardous waste (Official Gazette No. 15/92) stabilized and filtered sludge will be used in agriculture and/or forestry.
The proposed procedure for waste water purification is relatively simple and its operating is safe. The advantage of such procedure is that a very high level of waste water purification may be attained. As regards potential negative effect on the environment these can be prevented or, in case of a negative impact on the environment the consequences can be efficiently mitigated. For sludge processing, depending on the size of the device and final disposal method, the application of simultaneous stabilization procedure represents optimal and efficient alternative.
When it is established, on the basis of environmental impact assessment or any other regulations in force that changes in the environment resulted in exceeding the allowable limits for such type of intervention, it is imperative to apply additional measures for the protection of the environment which measures will be subsequently issued by the state administration bodies authorized for environmental protection affairs in the Dubrovnik-Neretva County.
Based on the above stated facts, the Ministry of Environmental Protection, Physical Planning and Construction concluded that the proposed measures for environment protection for subject-matter intervention are fully compatible with laws and other regulations as well as standards and measures which ensure that adverse impact is reduced to a minimum and that the highest possible preservation of environmental quality is maintained, and, pursuant to Article 30, Paragraph 2 of the Environmental Protection Act (Official Gazette No. 82/94 and 128/99) it has decided as in the disposition of Decision.

Instruction on legal redress

Against this Decision appeal is not admitted, however administrative proceedings may be initiated. Administrative procedure is initiated by the appeal which must be submitted within 30 days from the day of the receipt of this Decision and is to be delivered directly or by postal services to the Administrative Court of the Republic of Croatia.

Pursuant to the provisions set forth under Article 6 of the Law on Administrative Fee (Official Gazette No. 8/96, 131/97, 68/98, 66/99, 145/99, 116/00, 163/03 and 17/04) the holder of the intervention, being local self government unit, is exempt from paying of administrative fee for this Decision.

To be delivered:

1. The City of Metković,
2. Faculty of Civil Engineering, University of Zagreb, Fra Andrije Kačića Miošića 26, Zagreb
3. The Dubrovnik-Neretva County, County office for physical planning, Petilovrijenci 2, Dubrovnik
4. Directorate for Inspection Affairs, here
5. Directorate for Physical Planning, here
6. Archive, here