



“NETWORK OF DANUBE WATERWAY ADMINISTRATIONS”

South-East European Transnational Cooperation Programme

STATUS QUO REPORT ON ENC ACTIVITIES

BG - EAEMDR

Document ID:	O 5.25	
Activity:	5.2	
Author / Project Partner:	Date:	Version:
Desislava Ivanova, Plamen Kutinchev / EAEMDR	23.09.2009	0.1
Desislava Ivanova, Plamen Kutinchev / EAEMDR	17.11.2009	Draft version
Desislava Ivanova, Plamen Kutinchev / EAEMDR	20.01.2010	Final version

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1 LIST OF ABBREVIATIONS

Act	Activity
CCNR	Central Commission for Navigation on the Rhine
CARIS	Computer Aided Resource Information System
DC	Danube Commission
DXF	Drawing Exchange Format (data file format developed by Autodesk)
dGPS	Differential Global Positioning System
EC	European commission
ECDIS	Electronic Chart Display and Information System
EAEMDR	Executive Agency for Exploration And Maintenance Of Danube River
ENC	Electronic Navigational Chart
FTP	File Transfer Protocol
GIS	Geographical Information System
IENC	Inland Electronic Navigational Chart
ISRS	Inland Ship Reporting Standard
NTX	Data file format developed by the company CARIS
RIS	River Information Services
UTM	Universal Transverse Mercator
WGS	World Geodetic system

2 SCOPE OF DOCUMENT

Activity 5.2 is related to the harmonisation of activities in the field of Inland ENC production and distribution.

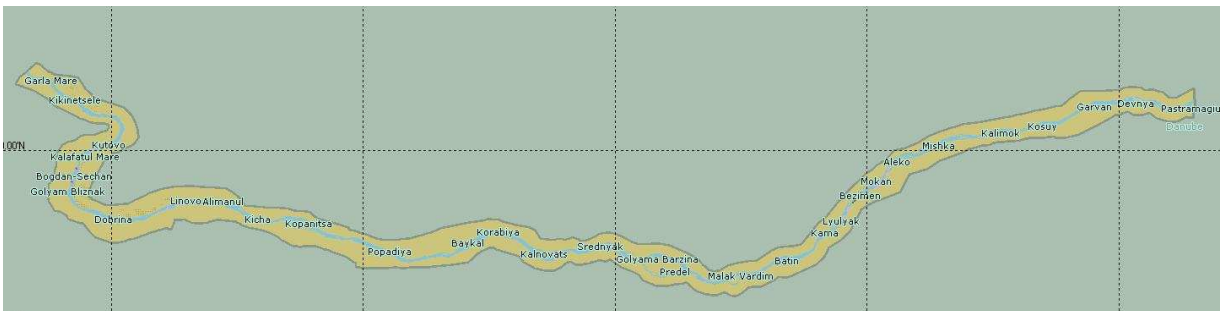
According to description of work Act 5.2 (Task 5.2.3) every partner shall identify and describe the status quo on ENC activities and what are the problems. The status quo shall at least contain relevant information about:

- IENC coverage of the national stretch (incl. reasons and solution if this is not achieved so far)
- Availability of depth information within the Inland ENC`s
- The IENC production process from raw GIS data into IENC objects, involved persons or organisations, used equipment and software tools
- IENC publication process (distribution of updates and new releases)
- Sources (data basis) and accuracy for IENC charts
- Create and maintain IENC`s according to the Inland ECDIS Standard
- Cooperations
- Updates, updating circle

3 IENC COVERAGE

The ENC`s are developed in Bulgaria but still they haven't been officially published on the website of EAEMDR. The charts include the entire Bulgarian – Romanian section between km 845,650 (the estuary of the Timok River) and km 375,000 (the port of Silistra). The total length of the common Bulgarian – Romanian section of the Danube River is 471km.

The inland waterway with international importance has been classified as Grade 7. According to the minimum requirements for edition 1.02 in the first version of the chart



there will be no depths presented. This is due to the lack of software technology developed for automatic processing of depths data. The EA EMDR plans to develop such a technology in order to include depths data for the entire Bulgarian – Romanian river section. Bulgaria has no other inland waterways suitable for navigation but the Danube River.

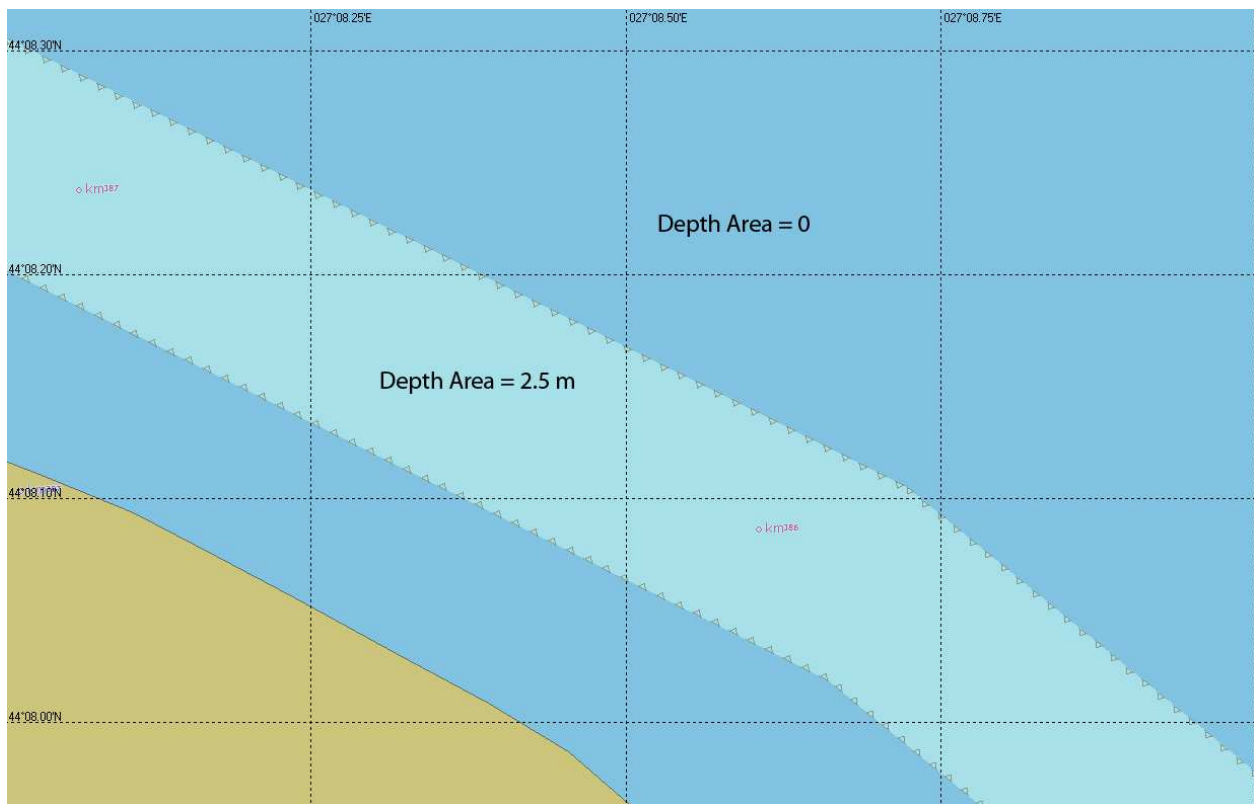
The content of the Bulgarian IENC`s are in accordance with the European Inland ECDIS Standard, Edition 1.02. Edition 2.0 is the current version of the recommendations and regulations of the Central Commission for Navigation on the Rhine (CCNR), the European Commission (EC) and the Danube Commission (DC).

There are no gaps of the IENC coverage. The whole Bulgarian – Romanian common sector of the Danube is covered with IENC. In the future we consider upgrading the IENC to edition 2.0.

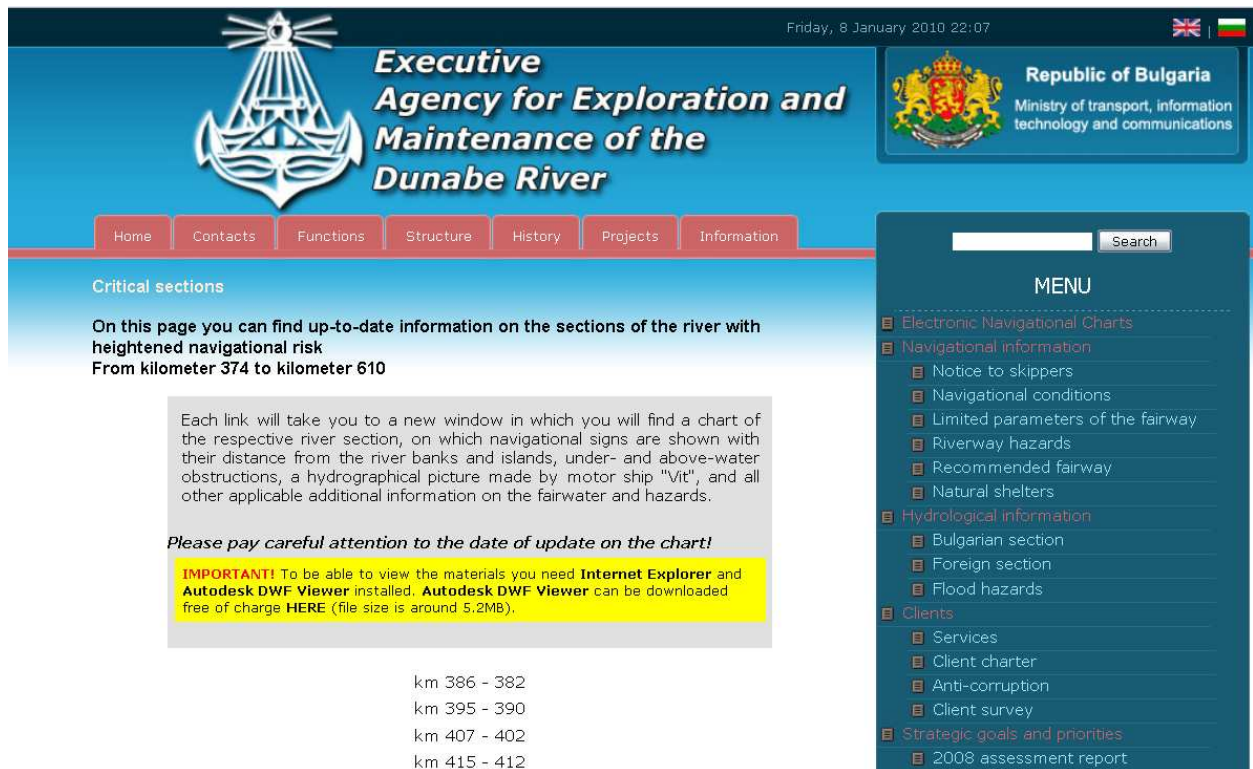
The IENC for the whole Bulgarian – Romanian sector from km 375 to km 845 are published on the Agency website and can be downloaded free of charge. There is also a possibility the ENCs to be sent in S-57 format by email on request. At the current moment the charts published on the Web site are not available for commercial purposes. If they are used for such purposes, this would be without the permission of the Agency.

4 COVERAGE OF DEPTH INFORMATION

The depth data for the ENC will be published in a separate layer of the chart. The initial chart version will only include depths along the fairway. On the following picture we can see that the depth of the fairway in this area is 2.50m, which guarantees safe navigation for the skippers.



There are many critical for navigation points in the Bulgarian section of the Danube River and the position of the fairway is often changed. A list of this critical section is publishing of the Web of the Agency (<http://www.appd-bg.org/siteen/page.php?8>) so that everyone, who is interested, can see them at anytime.



Friday, 8 January 2010 22:07

Executive Agency for Exploration and Maintenance of the Dunabe River

Republic of Bulgaria
Ministry of transport, information technology and communications

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Critical sections

On this page you can find up-to-date information on the sections of the river with heightened navigational risk
From kilometer 374 to kilometer 610

Each link will take you to a new window in which you will find a chart of the respective river section, on which navigational signs are shown with their distance from the river banks and islands, under- and above-water obstructions, a hydrographical picture made by motor ship "Vit", and all other applicable additional information on the fairwater and hazards.

Please pay careful attention to the date of update on the chart!

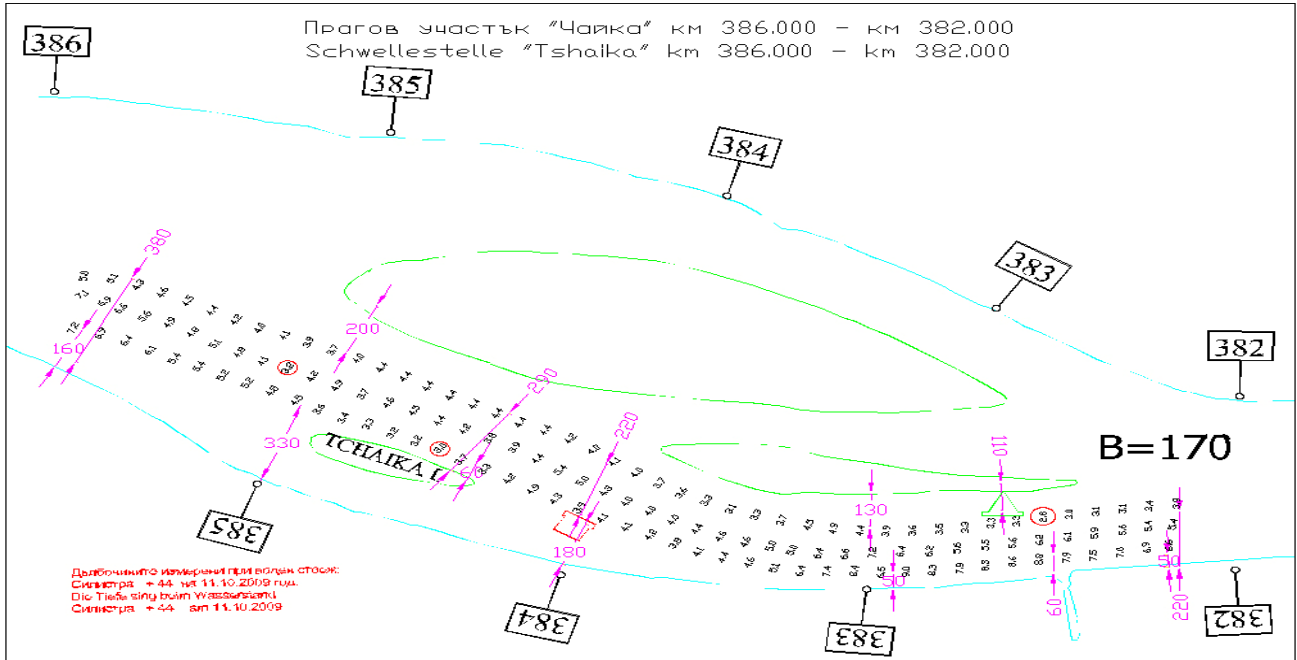
IMPORTANT! To be able to view the materials you need **Internet Explorer** and **Autodesk DWF Viewer** installed. **Autodesk DWF Viewer** can be downloaded free of charge **HERE** (file size is around 5.2MB).

- km 386 - 382
- km 395 - 390
- km 407 - 402
- km 415 - 412

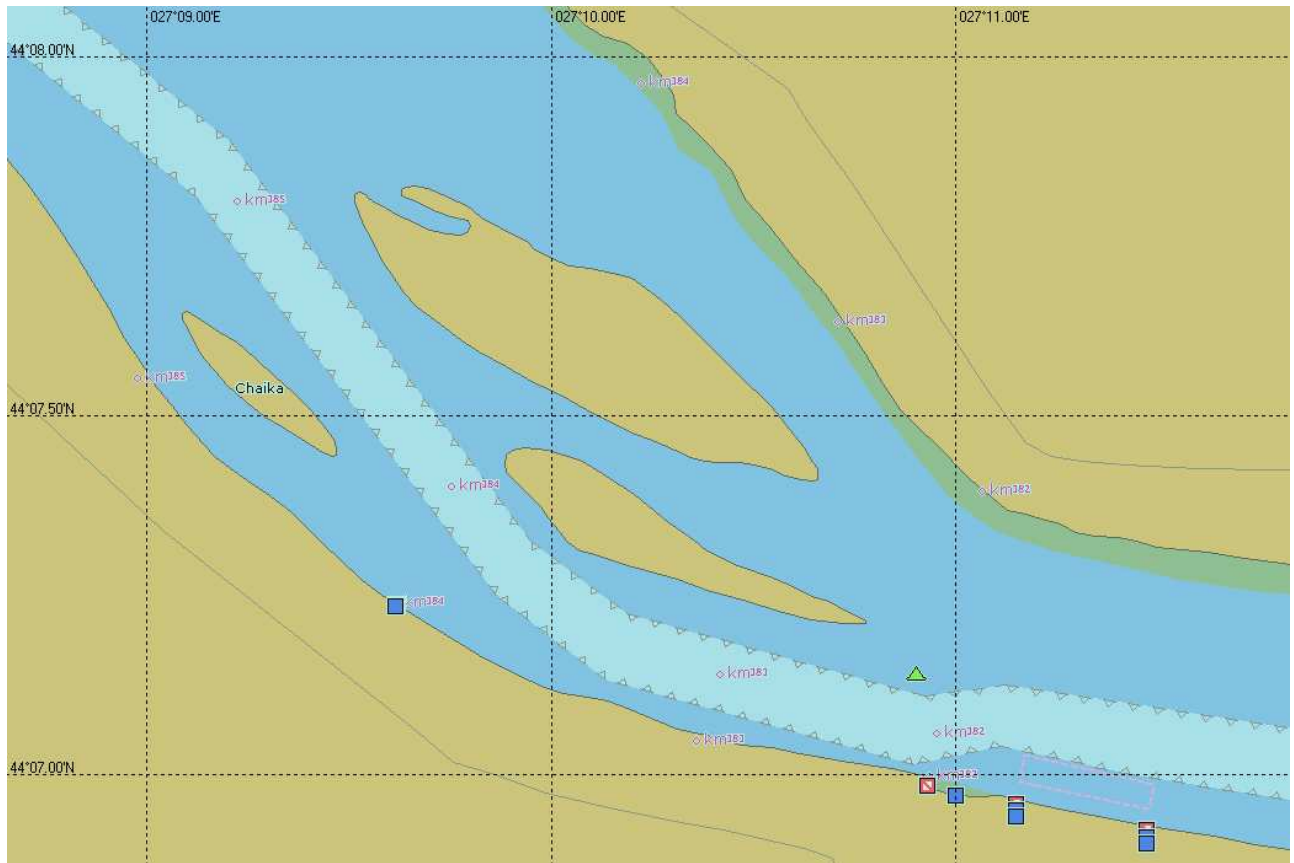
MENU

- Electronic Navigational Charts
- Navigational information
 - Notice to skippers
 - Navigational conditions
 - Limited parameters of the fairway
 - Riverway hazards
 - Recommended fairway
 - Natural shelters
- Hydrological information
 - Bulgarian section
 - Foreign section
 - Flood hazards
- Clients
 - Services
 - Client charter
 - Anti-corruption
 - Client survey
- Strategic goals and priorities
 - 2008 assessment report

The charts of the critical sections are processed in AutoCAD software so these files can be viewed by Autodesk DWF Viewer which is available for download for free from the website. Here is an example of a chart of critical section Chayka (km 386 – km 382).



On the following picture is presented the same section in the ENC



5 IENC PRODUCTION PROCESS

The software used by the EAEMDR to produce the IENC is the ENC Designer provided by SevenCs, including the following modules - ENC Manager, ENC Designer, ENC Optimizer, ENC Analyzer and DXF Converter.

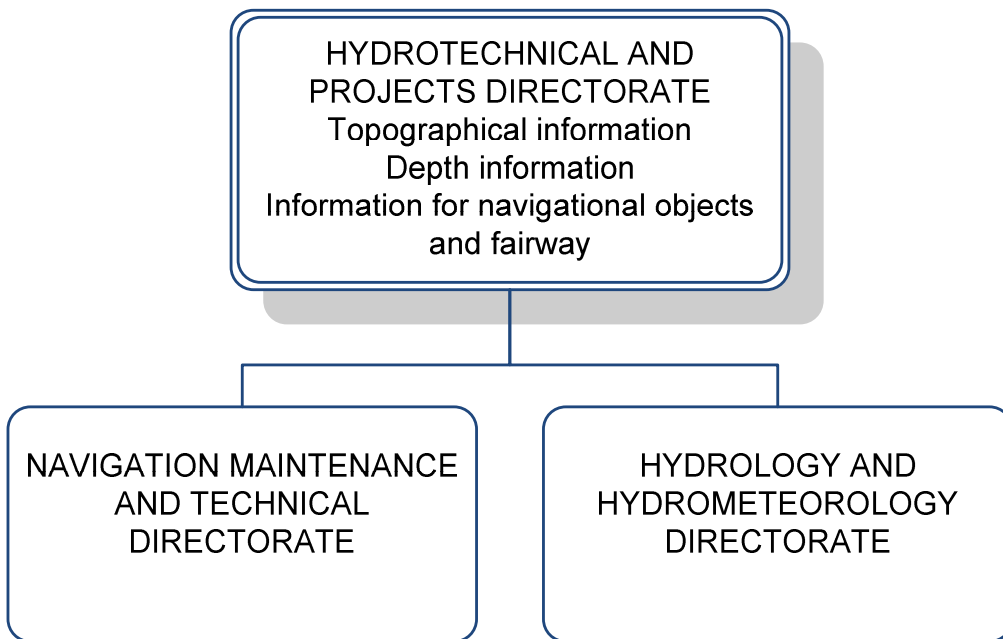
The software versions are as follows:

- ENC Designer - version 4.2.9: For creating and editing digital hydrographic chart data based on S-57.
- Enc Analyzer - version 2.1.5: It is a quality assurance tool for S-57. It is used to check accuracy and encoding consistency.
- DXF Converter - version 3.5.15: To convert DXF (AutoCAD) files into the S-57 data format for further processing.
- ENC Optimizer - version 2.2.13: To minimize data storage and maximize display performance.
- NTX Converter - version 2.1.8: To convert NTX (CARIS) data format files into the S-57 data format for further processing
- ENC Manager - version 2.2.8: It is used for ENC data maintenance and production of S-57 update files as well as complete exchange sets which comply with the IHO S-57 Standard.
- ENC Referencer - version 1.9: For geographic referencing of raster data (image) files.

Several directorates within the EAEMDR are taking part in the charts preparation process.

The main role in charts production belongs to the Hydrotechnical and Projects Directorate. The experts within this Directorate acquire and process the topographical and hydrographical information. The information regarding water levels is submitted by the Hydrology and Hydrometeorology Directorate and the information regarding

navigational signs, fairway, mooring locations and other navigational issues is submitted by the Navigation Maintenance and Technical Directorate. The following scheme presents the distribution of different types of information between the Directorates within the Agency.

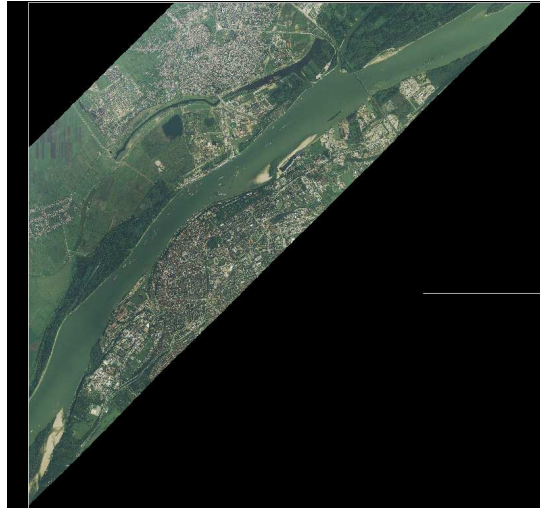


The team that performs the topographical and hydrographical surveys plans its surveys together with the experts from Navigation Maintenance and Technical Directorate. Four experts are assigned with the tasks of chart elaboration. Two of them are responsible for acquiring and primary processing of data; one – for creating and updating of the IENC`s and one performs control of activities from the beginning to the end.

The IENC`s data is presented in different layers:

- Topographical information layer;
- Fairway, navigational signs, mooring stands, restricted areas layer;
- Depth layer.

The information from satellite images and aero-photos was used for fixed objects and was put on the IENC`s.



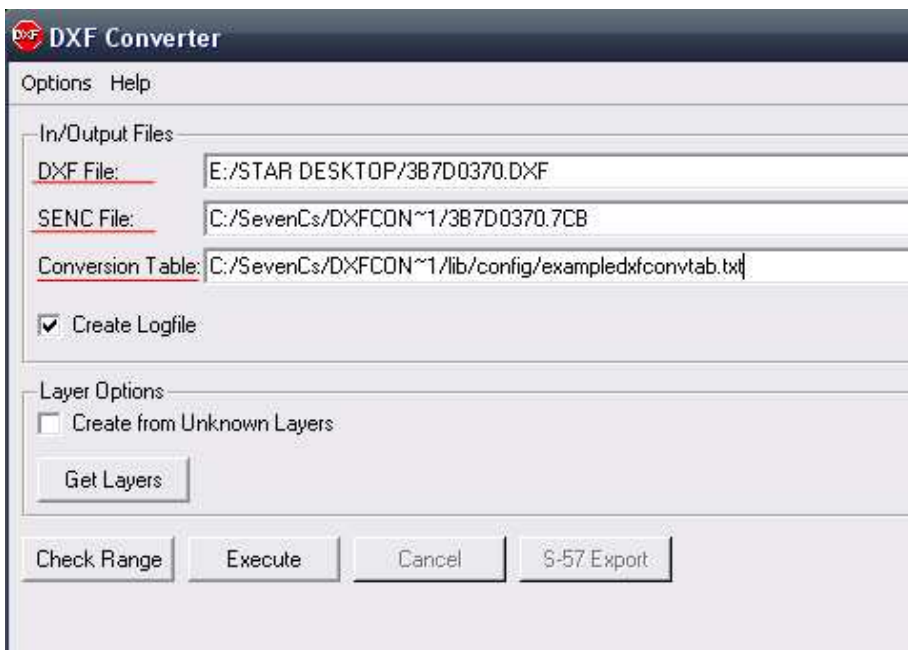
The information in addition to the standard are the main transport routes which link the ports, port facilities (harbour facility - shipyard, harbour master`s office, Pontoon Piers), hydro-technical constructions.

After that all the notice marks, fairway, buoys and mooring places are imported from AutoCAD to ENC Designer. The DXF Converter from SevenCs is used for this procedure.

The following picture is an image from AutoCAD and shows the section from km 491 to km 484 of the Danube, the area of Ruse – Giurgiu Bridge.



For the purpose of converting objects the DXF Converter needs a conversation table, which is shown above.



```

|
|This file can be used as a base to create a new conversion table
|#Comment lines start with a #.
|#Layer names not present in the conversion table are marked as comment lines.

#2207 DXF Entities read altogether.
#0 DXF Entities read with errors.
#
#Entities which need special treatment in the conversion table:
#1410 INSERT Entities with 1131 attributes read.
#149 TEXT Entities read.
#0 SHAPE Entities read.
#162 XData sequences read.
#
#Complete entity statistic: (including non-convertable entities/sections)
#ARC (BLOCK) 7
#ATTDEF 1
#ATTDEF (BLOCK) 4
#ATTRIB (INSERT) 1131
#CIRCLE 5
#CIRCLE (BLOCK) 2
#DIMENSION 148
#HATCH 2
#HATCH (BLOCK) 11
#INSERT 1410
#INSERT (BLOCK) 6
#LINE 20
#LINE (BLOCK) 577
#LWPOLYLINE 450
#LWPOLYLINE (BLOCK) 28
#MTEXT 3
#MTEXT (BLOCK) 148
#POINT (BLOCK) 444
#POLYLINE 9
#REGION 1
#SEQEND 9
#SOLID (BLOCK) 296
#TEXT 149
#VERTEX 1470
#Number of blocks: 177 (Blocks are not converted!)

#dxfconverter version 3.6

::HEADER
scale 50000
usage 3
lexicalLevel 1

::LAYER
#0 NOS-57class | attribHandle=0_0 # unknown!
#ALL NOS-57class | attribHandle=ALL_0 # unknown!
#ASHADE NOS-57class | # unknown!
#BUY NOS-57class | attribHandle=BUY_0 # unknown!
#CITY NOS-57class | attribHandle=CITY_0 # unknown!
#DEPTH NOS-57class | # unknown!
#DIMENSION NOS-57class | # unknown!
#EDIT_TEXT NOS-57class | attribHandle=EDIT_TEXT_0 # unknown!
#FARVATER wtexas
#ISLANDS NOS-57class | # unknown!
#KILOMETRE NOS-57class | attribHandle=KILOMETRE_0 # unknown!
#NAMES NOS-57class | attribHandle=NAMES_0 # unknown!
#PHOTO NOS-57class | # unknown!
#PLOT NOS-57class | # unknown!
#RIVER_SIDE NOS-57class | attribHandle=RIVER_SIDE_0 # unknown!
#ROADS NOS-57class | # unknown!
#SANDS NOS-57class | attribHandle=SANDS_0 # unknown!



























```

On this conversation table you can see that only the fairway layer is read from the AutoCAD layers. And only that layer will be converted in IENC. After that there is an IENC file (*.7CB) created from DXF Converter which can be used in IENC.

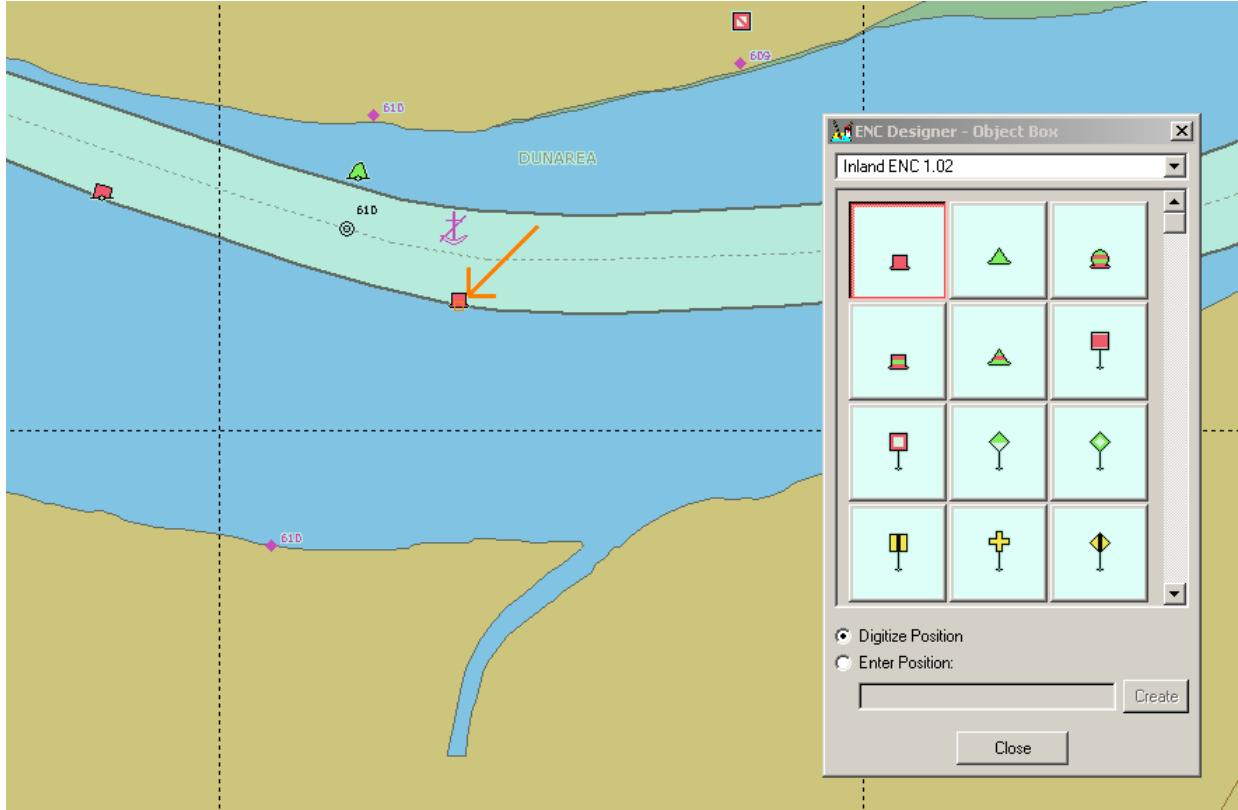
Here is how the IENC look after conversation:



When the fairway is changed, the position of the buoys is changed as well. Information about the position of the buoys with their coordinates is published on the Web site (http://www.appd-bg.org/en/navigation_en.html).

Kalnovate isl.	611.300		230	640	4.3	155		43°41'529"	24°42'902"	10.12.2009
Kalnovate isl.	612.200		220	540	4.0	155		43°41'768"	24°42'277"	10.12.2009
Kalnovate isl.	612.500		500	200	7.3	155		43°41'713"	24°41'966"	10.12.2009
Kalnovate isl.	614.200		230	410	4.9	138		43°42'513"	24°40'716"	28.11.2009
	623.400		400	460	8.5	108	Korabia	43°45'056"	24°35'405"	28.11.2009
	625.000		300	440	3.5	108	Korabia	43°45'341"	24°34'307"	28.11.2009
	627.000									
	627.000									
	627.800		220	190	5.0	141	Korabia	43°46'088"	24°32'687"	10.12.2009
Korabia	629.400		320	1 170	4.4	117	Korabia	43°46'095"	24°31'264"	09.12.2009
	629.900		890	500	5.1	117	Korabia	43°45'785"	24°30'923"	09.12.2009
Korabia	631.000		730	530	4.8	117	Korabia	43°45'779"	24°30'374"	09.12.2009
Korabia	631.600		980	520	4.3	117	Korabia	43°45'597"	24°29'923"	09.12.2009
Korabia	631.800		720	850	4.3	117	Korabia	43°45'677"	24°29'657"	09.12.2009
Korabia	632.500		560	970	3.7	117	Korabia	43°45'540"	24°29'205"	09.12.2009
Baikal isl.	640.000		320	830	4.3	117	Korabia	43°43'299"	24°24'638"	09.12.2009
Baikal isl.	643.000									
Dolni Vadin	648.000									
	653.500		430	440	6.1	144	Beket	43°41'539"	24°15'291"	29.11.2009
Ledenika	657.750									
	660.000		390	470	6.4	144	Beket	43°41'058"	24°10'017"	29.11.2009
	660.300									
	660.300									
Leskovetc isl.	667.000		490	230	8.2	158	Beket	43°42'048"	24°05'306"	09.12.2009
Leskovetc isl.	668.000		220	540	5.6	158	Beket	43°42'427"	24°04'839"	09.12.2009
Leskovetc isl.	675.000		500	340	5.0	144	Beket	43°43'088"	24°03'132"	28.11.2009

The above mentioned information is used for entering the exact position of the object in ENC Designer.



6 IENC PUBLICATION PROCESS

The IENC`s for the Bulgarian – Romanian section of the Danube River are in a process of publication. They will be published in the S-57 format, edition 1.02 of the Inland ECDIS Standard. They will be available for free use through the internet website of the Agency: <http://www.appd-bg.org/site/page.php?2>.

The charts are already published. The basic problem with the ENC`s elaboration is the lack of qualified personnel due to the low payment which the employees get for their work, the lack of financing for technology modernization for measurement and data processing and for the performance of topographical and hydrographical surveys.



Monday, 11

Executive Agency for Exploration and Maintenance of the Dunabe River

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Electronic navigation charts

The link below will take you to a new window where you can find Electronic navigation charts (ENCs).

Please pay careful attention to the date of update!

IMPORTANT! To be able to view the materials you need **SeeMyENC** installed. **SeeMyENC**, can be downloaded free of charge: [CLICK HERE](#)

Last modified: 03.12.2009 г.

The whole Bulgarian-Romanian sector of Danube river (km375-km845).

If there are remarks or recommendations about the published ENC`s please send them to me at : kutinchev@appd-bg.org

Further charts are available at the following websites:

Austria - Via Donau
Croatia - CRUP
Serbia - PLOVPUT
Romania - AFDJ
Netherlands - RIS Сървър
Czech Republic - Waterway Charts/SPS Praha
Germany - Charts not available for free

7 IENC SOURCES AND ACCURACY

To develop the ENC`s, the Bulgarian side has used the following data sources:

- For the topographical information – aero-photo and satellite pictures and old topographic charts. The entire topographical information is geodetically referred in WGS-84 and UTM zone 35;
- For the depths – through actual measurements done with a dGPS positioning system and a single-beam echo sounder for depths.

Sources used by The Executive Agency for Exploration and Maintenance of The Danube are aero-photo images scale 1:5000 resolution 0.5 meter / pixel, satellite images are high resolution images 1 to 2 m. The images that EAEMDR uses for creating the IENC are the same as the images used by AFDJ – Giurgiu, because the whole Bulgarian sector from the Danube from km 845 to km 375 is common with Romania and it is necessary to have the same source in order to have no differences in the IENC`s.



The Bulgarian side has planned future subscription for periodical supply of aero-photo and satellite pictures. The plans also include buying of geodetical GPS equipment with centimeter precision and a multi-beam echo sounder and updating of the software products for the new Inland ECDIS Standard.

The charts were produced on the basis of the information available at the time of generation and are updated when new data become available. The source data for the IENC production are provided out of surveys. The surveying department (hydrotechnical) is equipped with tools and technologies to assess the sources to meet the minimum requirement for ENC production.

8 INLAND ECDIS STANDARD

The Bulgarian ENC`s are produced according to the Inland ECDIS standard, edition 1.02. So far we haven't planned ENC`s publication for each version of the standard right after it has become official due to the limited financing.

The Bulgarian Inland ENC`s consist of digitized data conforming to the IHO (International Hydrographic Organization) S-57 ENC Product Specification that records all relevant charted features for safe navigation, such as coastlines, buoys, lights, etc.

Quality control of the IENC`s is done at every stage of their production. Software control is also performed with ENC Optimizer and ENC Analyzer.

9 UTILISATION OF LOCATION CODES AND RIS INDEX

There are objects in the Bulgarian IENC`s which are encoded with the 20 digit ISRS Location Code. Encoded are mainly stations for water level measurement, ports, built-up areas, bridges, sunken vessels and etc.

According to the Directive for RIS Harmonization 200/44/EC Bulgaria has adopted the Regulation for RIS Submission on the Inland Waterways of the Republic of Bulgaria, published in the Official Gazette, issue No. 3 dd. 11.01.2008. This Regulation determines the minimal data according to Enclosure 1 as Bulgaria has taken the obligation to fulfill these requirements.

The RIS index is provided according to the RIS Index Encoding Guide. It is provided for the entire Bulgarian section of the Danube River. The RIS index is updated when there is a change in the information regarding some of the objects encoded.

A Microsoft Excel table has been developed for encoding of objects with the RIS index. After the table has been filled the RIS index it is included in the ENC for the respective object. The Agency doesn't have and therefore no software module is used for transformation the ISRS Location Codes from the IENC objects to the RIS Index.

10. COOPERATIONS

Bulgaria and Romania have established a very good cooperation not only regarding the work on the IENC`s but as a whole. An expert Bulgarian – Romanian working group was created within the Joint Bulgarian – Romanian Commission for the Danube River to work on the IENC`s production. A common team of Bulgarian and Romanian experts elaborates the IENC`s, discusses problems which have occurred during the working process, and performs joint surveys. An FTP server was created to improve the working process between the two Administrations which are responsible for the IENC`s. The result of the joint work of both parties will be the publication of one chart for the entire common section of the Danube River as the difference at this stage will be the referent water level.

The common sector between Bulgaria and Romania is 471 km long. On the following pictures it is presented in ENC and in Google:



11. CHART UPDATES, UPDATING CIRCLE

Currently Bulgaria is not planning a new edition of the chart. The period of chart updating has not been specified due to the dynamic changes in this river section.

In order to improve the IENC`s as a product, we always require a feedback from the users. The feedback is received through the Internet, the postal and telephone services.

Inland waterways are dynamic systems. In lower Danube section from km 375 to km 845 the waterway changes very often. If there is a change in the waterway or in the situation then the update is provided and published.

