# FAST DANUBE Project results (Feasibility study)

Claudiu Dutu - AFDJ Galati

14.11.2025, online

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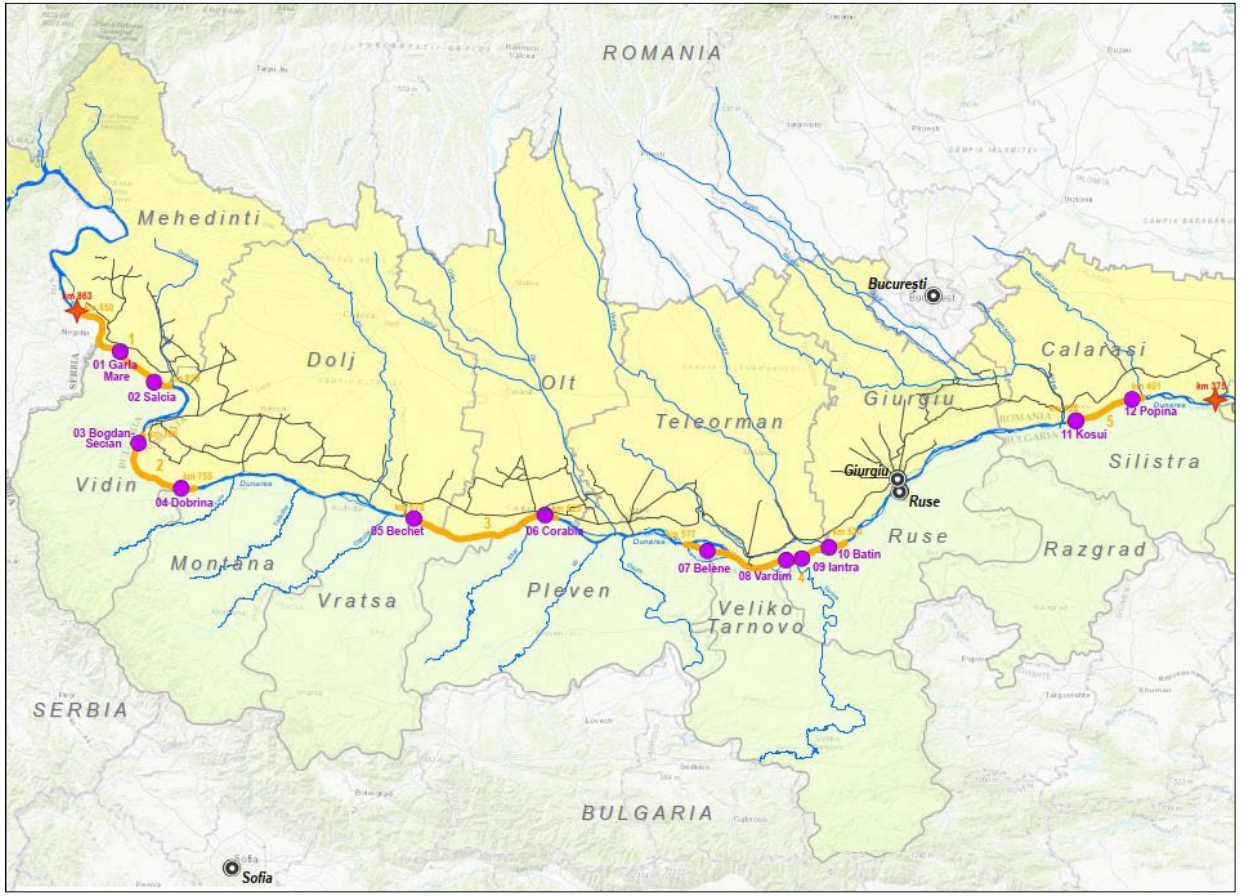
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- *Located on a pre-identified section of the Rhine-Danube Corridor (Bulgarian-Romanian common section);*

- *Aims to accelerate the removal of an existing bottleneck along this cross-border section of the Danube as it will identify the works to achieve stable navigation conditions all year round;*

- *It is part of a Global Project to implement the Fairway Rehabilitation and Maintenance Danube Master Plan.*




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# FAST DANUBE goals and objective

## *FAST DANUBE goals:*

*Implement a strategy to improve navigation based on:*

- *Increasing traffic safety;*
- *Increasing the number of days per year during which the minimum conditions are provided for navigation traffic through the Rhine – Danube corridor. The target increase in usage is from a current level of 280 days to 340 days/year.*
- *Increasing the total goods transported; to be targeted as a 20% increase in traffic compared with 2014 usage levels; presumably measured in tonnage.*

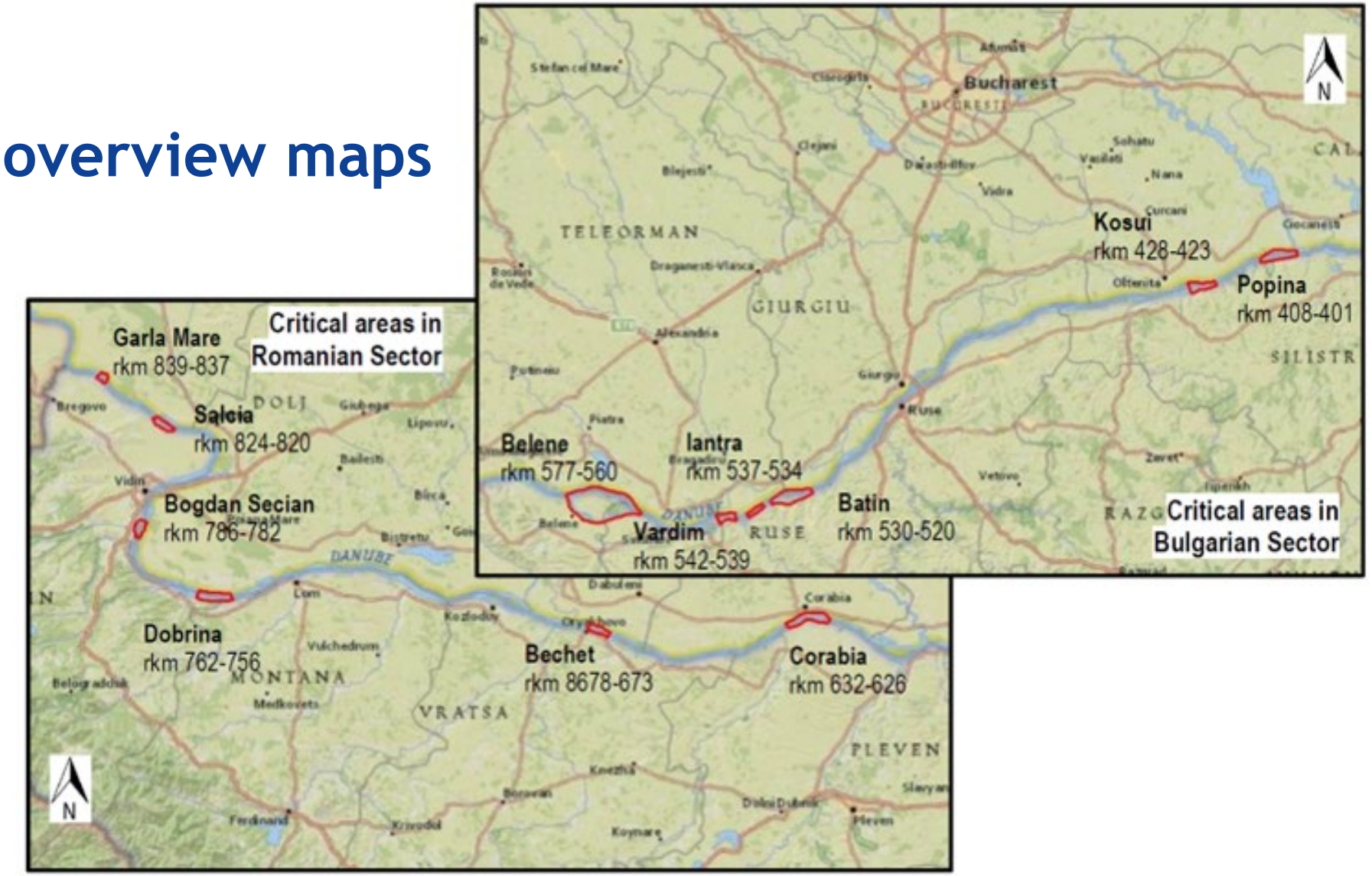
## *FAST DANUBE objective:*

*Ensure unimpeded navigation for at least 340 days/year, including Q= approx. 3000 $m^3$/sec, by maintaining a fairway of adequate width and depth with an appropriate alignment.*

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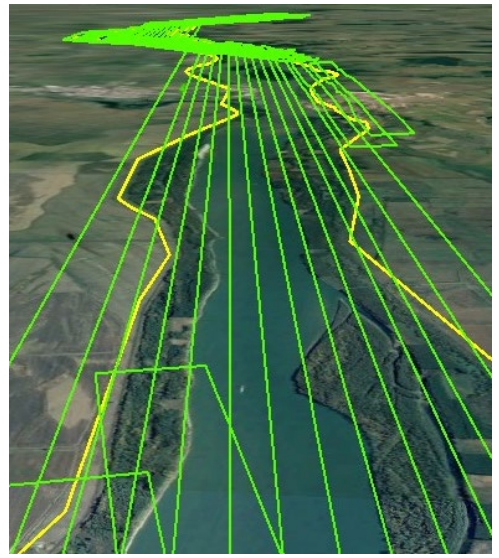
# Critical areas overview maps

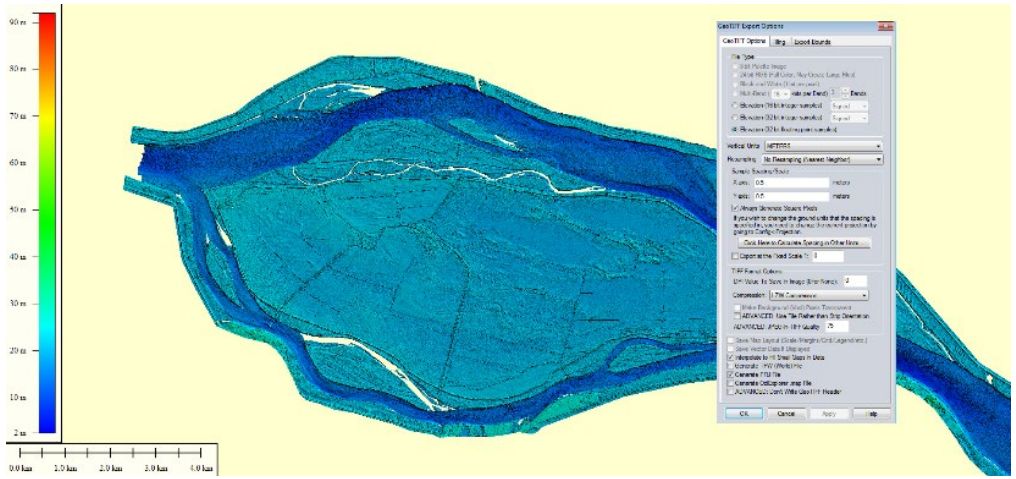


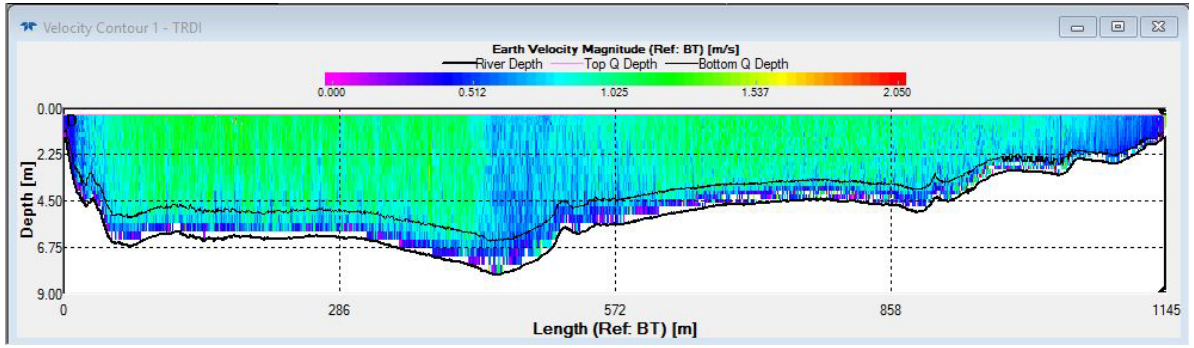

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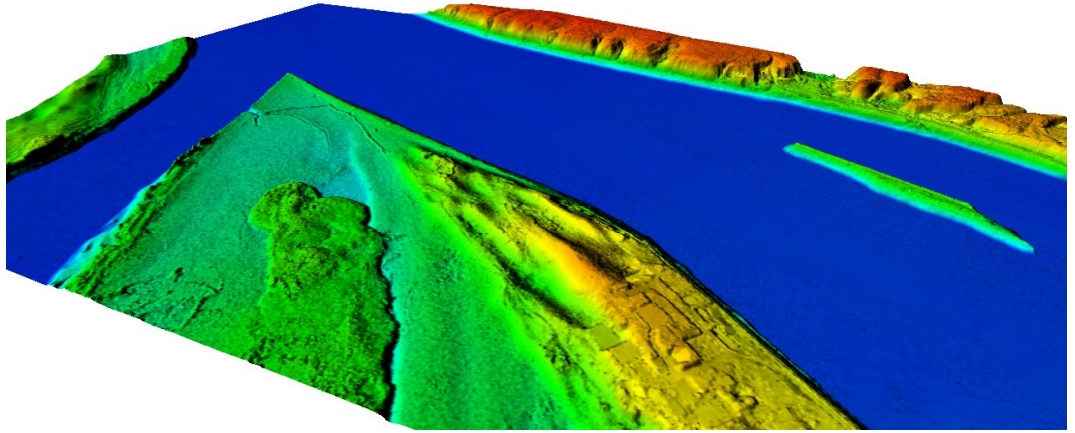
# Measurements Field Surveys

- *Field surveying by aerial LiDAR scanning: 2 campaigns, 2017*
- *Hydrographic measurements: 2 campaigns, 2017*







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# Measurements Field Surveys

- ***Sediments field measurements campaign: 2 campaigns, 2017***
  - *6890 suspended and 1553 riverbed sediment samples were taken – first campaign*
  - *5273 suspended and 1128 riverbed sediment samples – second campaign*
  - *Results: riverbed sediment and suspended sediment grain size distribution*
- ***Geotechnical survey: 1 campaign, 2017***
  - *30 boreholes on the Bulgarian bank and 30 on the Romanian, down to 15m depth from the surface, geotechnical laboratory testing*
  - *Results: geotechnical characterization.*
- ***Site visits in all CPs: 1 campaign, 2021***
  - *site observations of landslide areas – Bulgarian bank*





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# Hydrodynamic Mathematical Modelling
## Model software packages

**1D modelling:**

- **Flood Modeller Pro** software package
- free surface flow Saint-Venant equations
- modules: incl. sediment transport

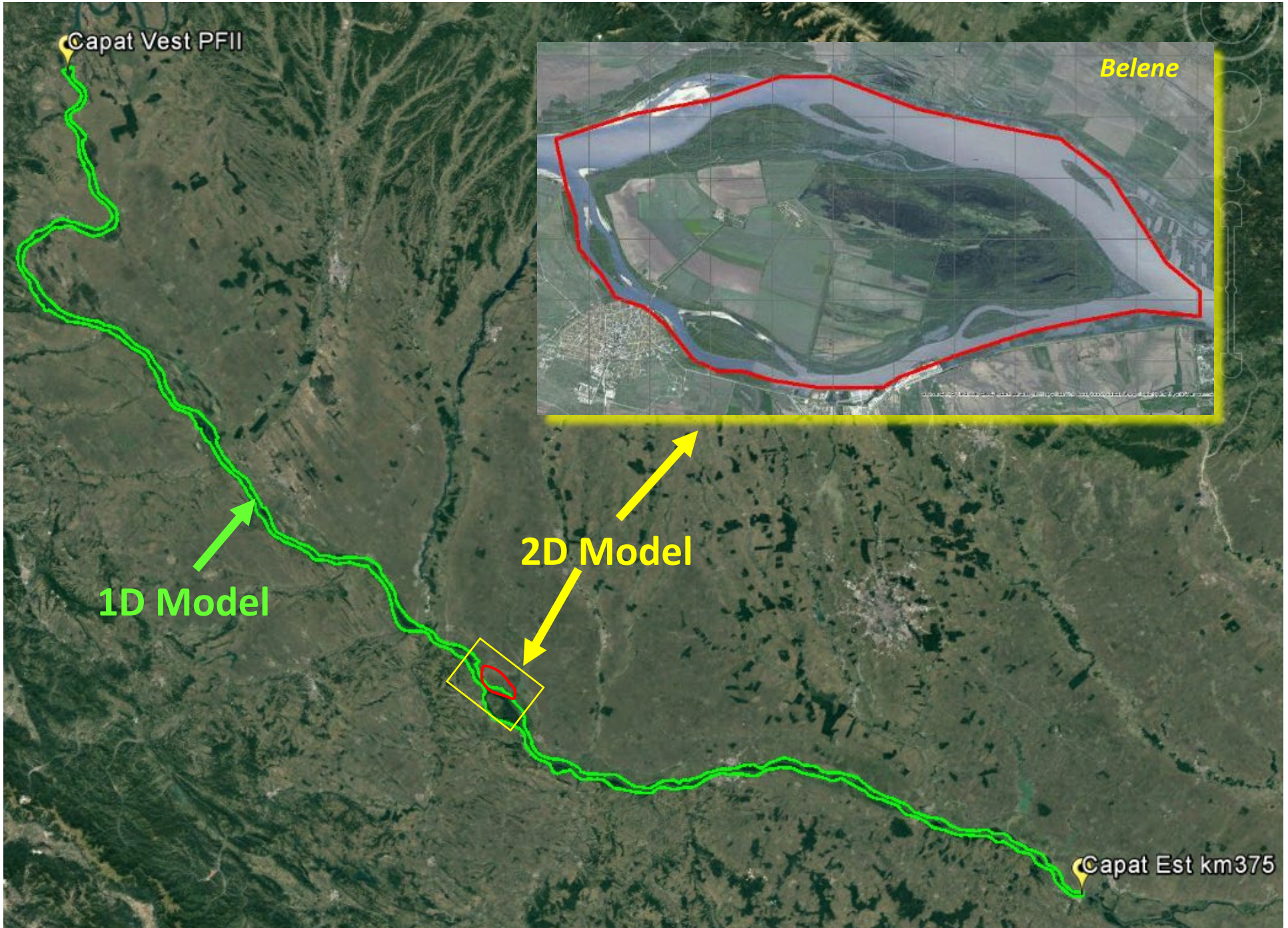



**2D modelling:**

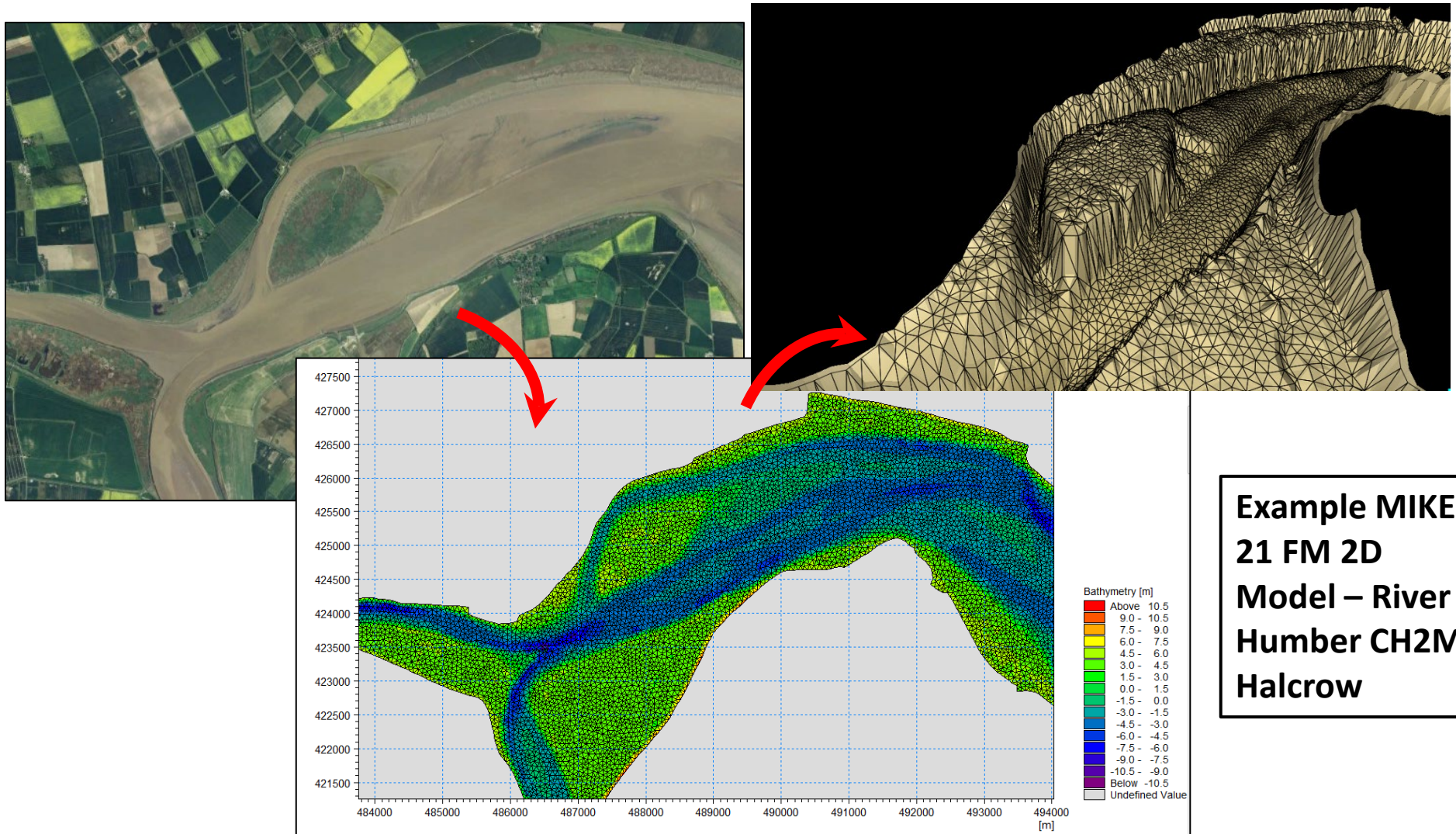
- **MIKE 21 Flow FM** software
- free surface flow integrated Navier-Stokes equations, using a flexible grid
- modules: hydrodynamic module, cohesive/non-cohesive sediment transport, morphology

**Navigation simulation modelling:**

- **SHIPMA** (v7) software developed by MARIN and Deltares
- fast-time simulator uses autopilot algorithm to simulate control of the vessel


Capat Vest PFII
Belene
1D Model
2D Model
Capat Est km375

# Hydrodynamic Mathematical Modelling
## Model Build / Calibration




**Example MIKE 21 FM 2D Model – River Humber CH2M Halcrow**

# Selecting the preferred option using Multi-Criteria Analysis (MCA)

- *MCA is a framework to assess and compare the relative strengths/weaknesses of alternative options for navigation improvements using a set of agreed decision-criteria to score and rank them.*

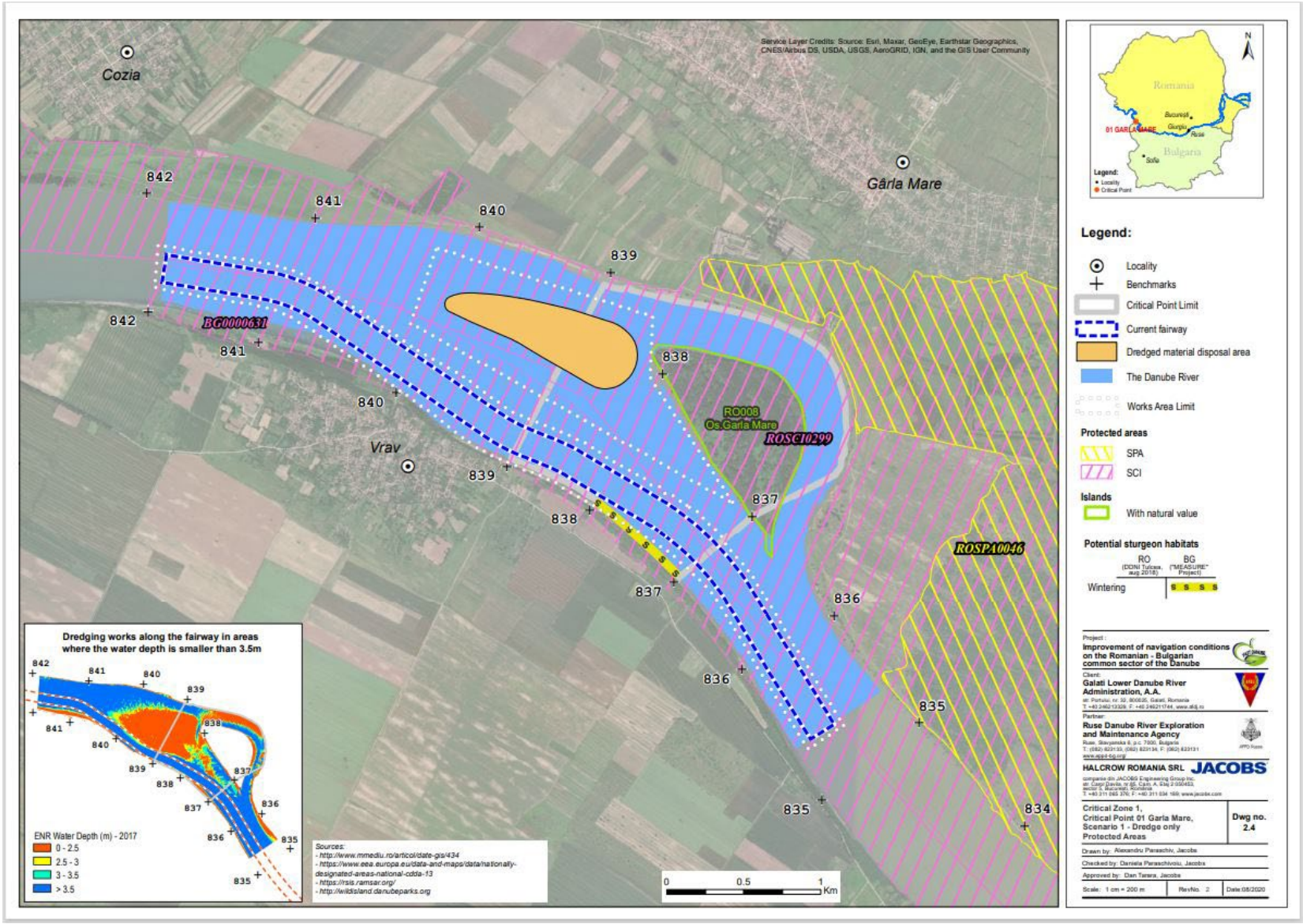
- *MCA results show a clear preference for minimum interventions, **Dredge-only** at:*

| | | |
|---|---|---|
| *- Garla Mare* | *- Salcia* | *- Bogdan Secian* |
| *- Dobrina* | *- Corabia* | *- Vardim* |
| *- Iantra* | *- Batin* | *- Kosui* |

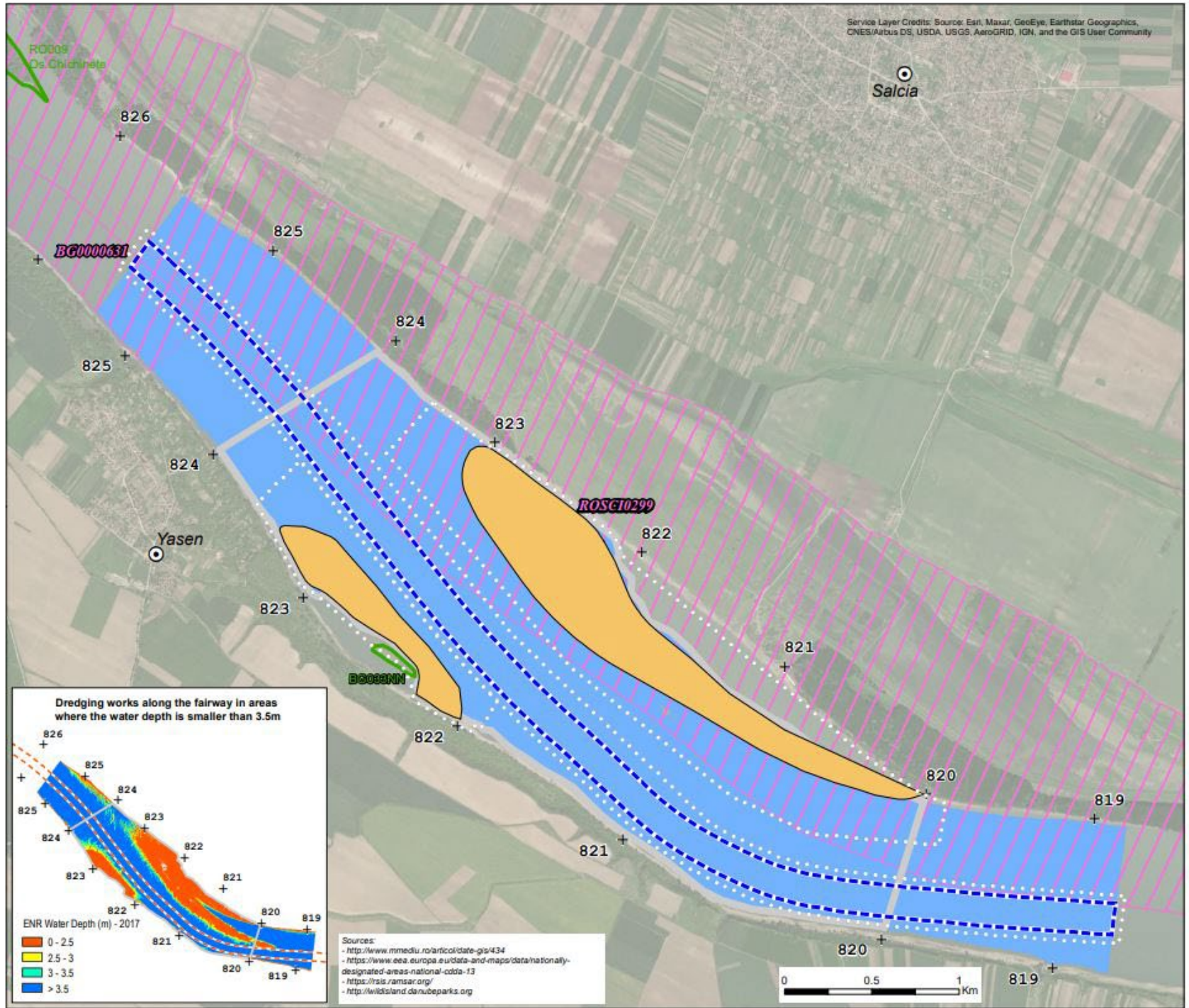
- *In the cases of Bechet, Belene and Popina, dredge-only has been rejected as an ineffective sustainable approach (in the longer term) on grounds of other overriding factors. Rigid engineering, morphological and morph-engineering options are therefore selected with reference to MCA scores.*

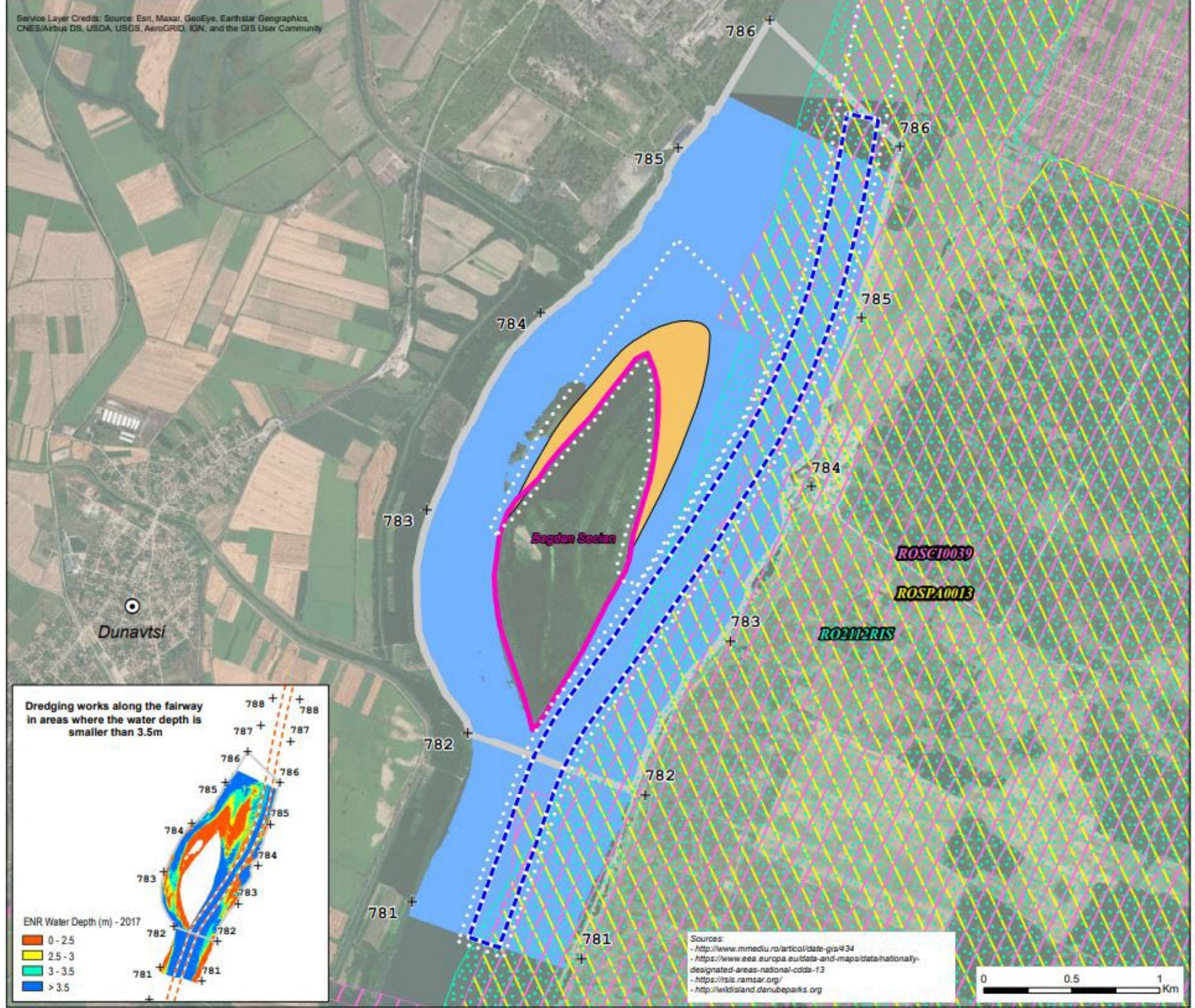
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RO009
Os Chichinete
Salcia
Yasen
BG0000631
ROSCI0299
BG0000NN
826
825
824
823
822
821
820
819
Dredging works along the fairway in areas where the water depth is smaller than 3.5m
ENR Water Depth (m) - 2017
0 - 2.5
2.5 - 3
3 - 3.5
> 3.5
Sources:
- http://www.mmediu.ro/articol/date-gis/434
- https://www.eea.europa.eu/data-and-maps/data/nationally-designated-areas-national-cdda-13
- https://rsis.ramsar.org/
- http://wildisland.danubeparks.org
0
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Km
Romania
Bucuresti
Giurgiu
02 SALCIA
Ruse
Bulgaria
Sofia
Legend:
Locality
Critical Point
Legend:
Locality
Benchmarks
Critical Point Limit
Current fairway
Dredged material disposal area
The Danube River
Works Area Limit
Protected areas
SCI
Islands
In natural state
Project :
Improvement of navigation conditions on the Romanian - Bulgarian common sector of the Danube
Client:
Galati Lower Danube River Administration, A.A.
Partner:
Ruse Danube River Exploration and Maintenance Agency
HALCROW ROMANIA SRL
JACOBS
Critical Zone 1,
Critical Point 02 Salcia,
Scenario 1 - Dredge only
Protected Areas
Dwg no. 2.5
Drawn by: Alexandru Parascchiv, Jacobs
Checked by: Daniela Parascchivoiu, Jacobs
Approved by: Dan Tarara, Jacobs
Scale: 1 cm = 200 m
Rev No. 2
Date: 8/2020







**Legend:**

- Locality
- Benchmarks
- Critical Point Limit
- Current fairway
- Dredged material disposal area
- The Danube River
- Works Area Limit

**Protected areas**

- SPA
- SCI
- RAMSAR

**Islands**

- Disturbed by human action

Project:
**Improvement of navigation conditions on the Romanian - Bulgarian common sector of the Danube**

Client:
**Galati Lower Danube River Administration, A.A.**
str. Portului, nr. 32, 800025, Galati, Romania
T: +40 246213329, F: +40 246211744, www.afdj.ro

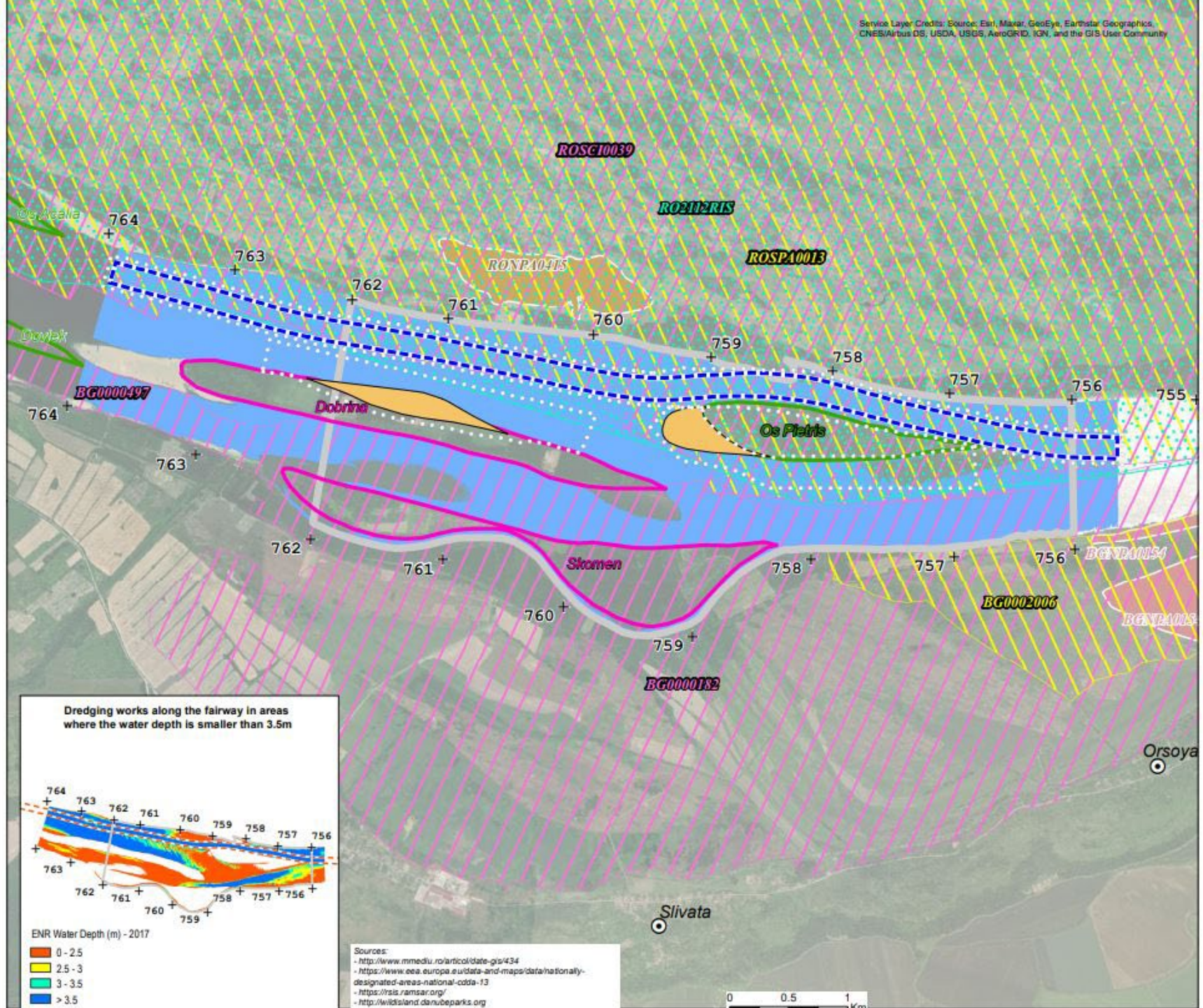
Partner:
**Ruse Danube River Exploration and Maintenance Agency**
Ruse, Stoyanovka 6, p.c. 7000, Bulgaria
T.: (082) 823133, (082) 823134, F: (082) 823131
www.appd-bg.org

**HALCROW ROMANIA SRL** **JACOBS**
companie din JACOBS Engineering Group Inc.
str. Caspi Davila, nr.65, Cam. A, Etaj 2 050453, sector 5, Bucuresti, Romania
T: +40 311 040 376; F: +40 311 034 169; www.jacobs.com

**Critical Zone 2, Critical Point 03 Bogdan-Secian, Scenario 1 - Dredge only**
**Protected Areas**

Dwg no. **2.6**

Drawn by: Alexandru Panaschiv, Jacobs
Checked by: Daniela Panaschivoiu, Jacobs
Approved by: Dan Tanasa, Jacobs
Scale: 1 cm = 200 m | Rev/No. 2 | Date: 8/2020




**Dredging works along the fairway in areas where the water depth is smaller than 3.5m**




ENR Water Depth (m) - 2017

- 0 - 2.5
- 2.5 - 3
- 3 - 3.5
- > 3.5

Sources:
- http://www.mmediu.ro/articol/date-gis/434
- https://www.eea.europa.eu/data-and-maps/data/nationally-designated-areas-national-cdda-13
- https://rsis.ramsar.org/
- http://wildisland.danubeparks.org

0 0.5 1 Km




**Legend:**

- Locality
- Benchmarks
- Critical Point Limit
- Current fairway
- Dredged material disposal area
- The Danube River
- Works Area Limit

**Protected areas**

- SPA
- SCI
- RAMSAR
- Romanian natural areas
  - RORN = Natural Reserve
  - ROPN = Natural Park
  - RONPA = Other protected natural areas
- Bulgarian natural areas:
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**Islands**

- In natural state
- Disturbed by human action

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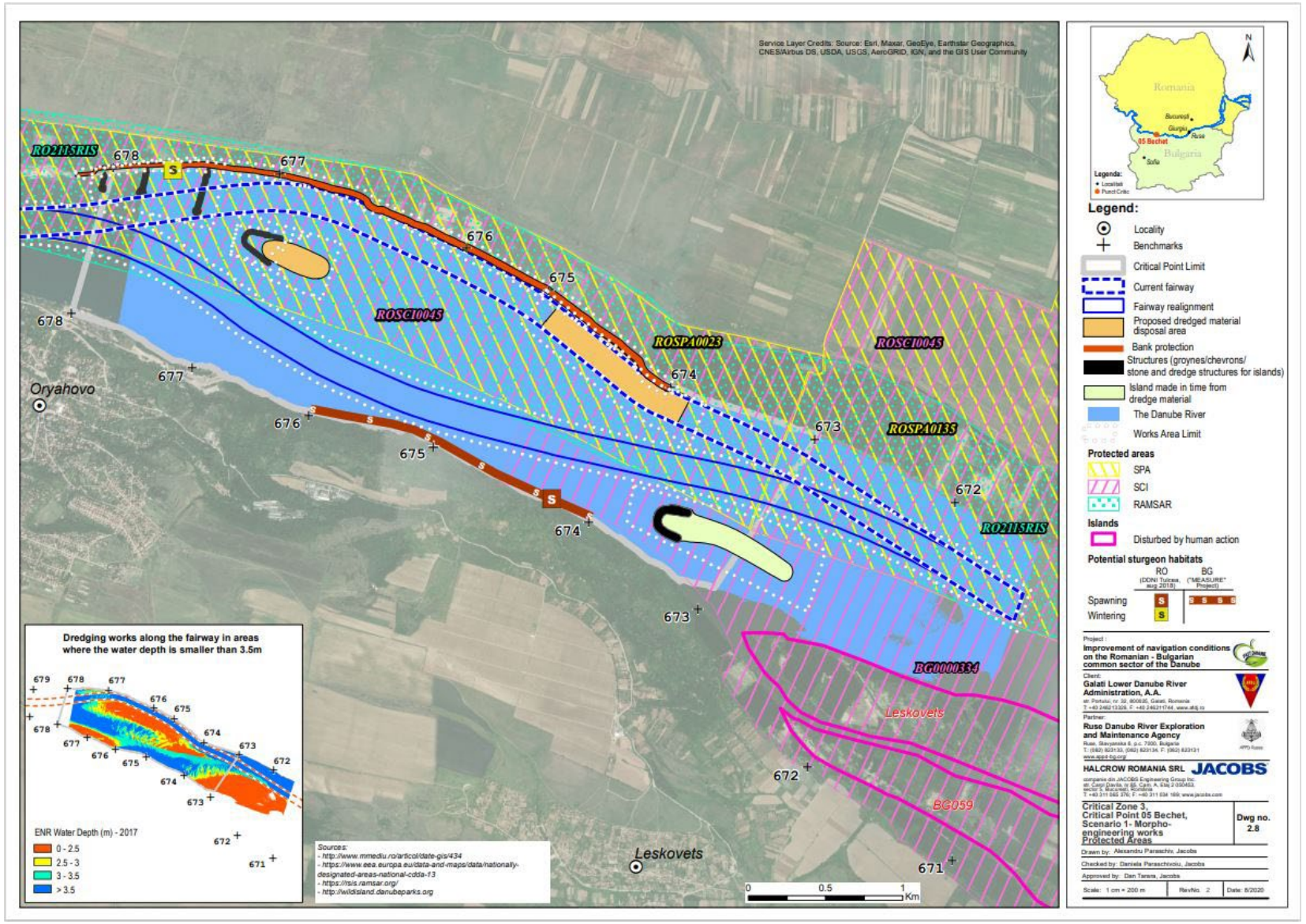
**Critical Zone 2, Critical Point 04 Dobrina, Scenario 1 - Dredge only**
**Protected Areas**

Dwg no. 2.7

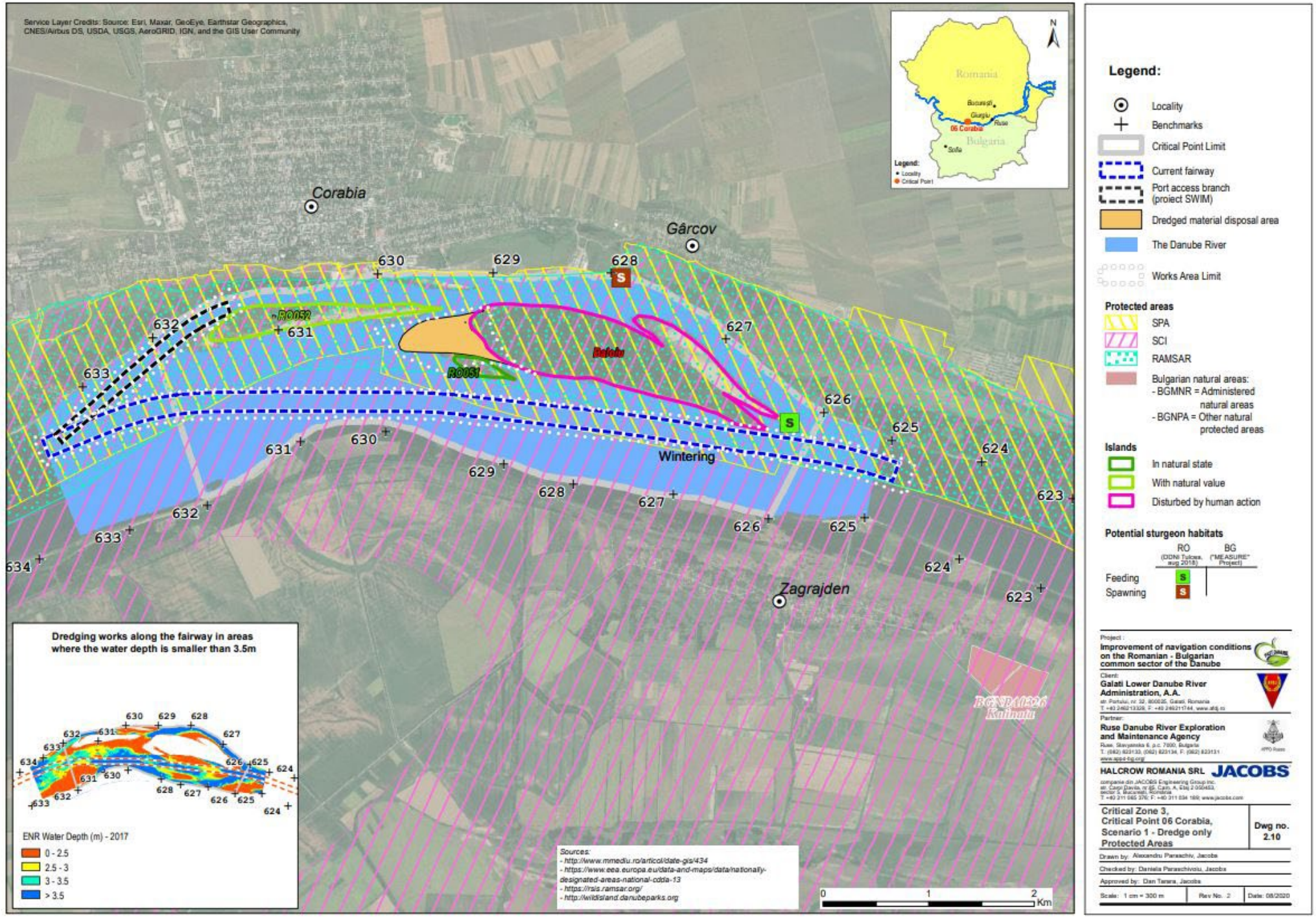
Drawn by: Alexandru Paraschiv, Jacobs
Checked by: Daniela Paraschivoiu, Jacobs
Approved by: Dan Tarara, Jacobs

Scale: 1 cm = 300 m | Rev/No.: 2 | Date: 9/2020

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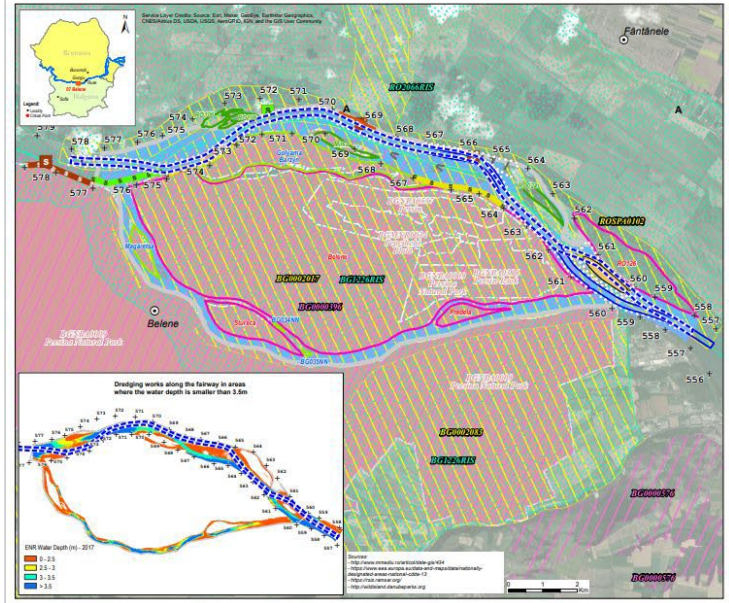


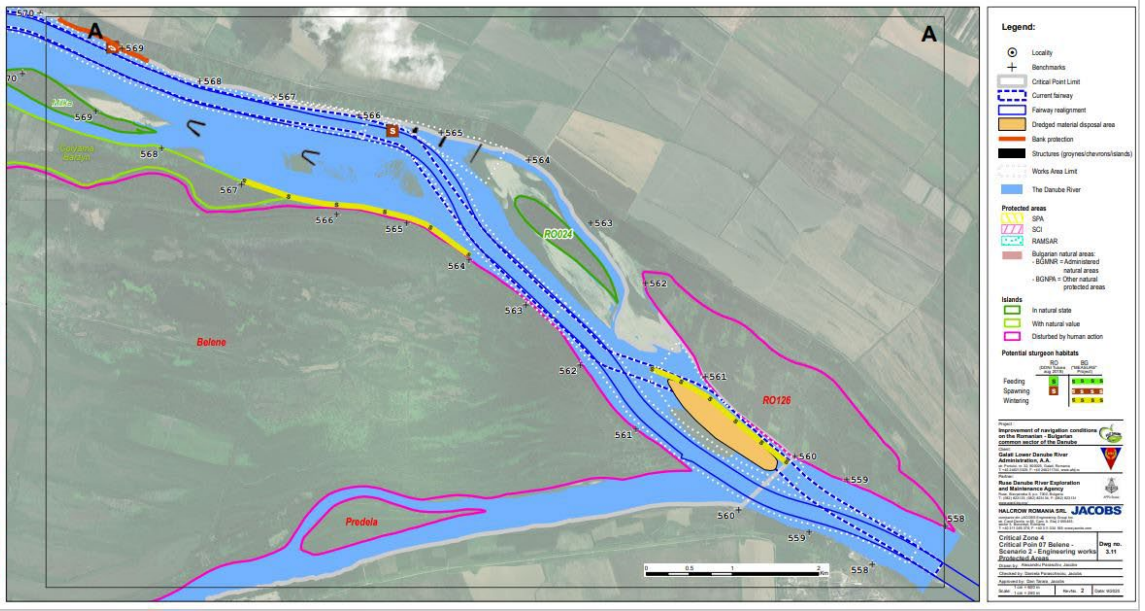

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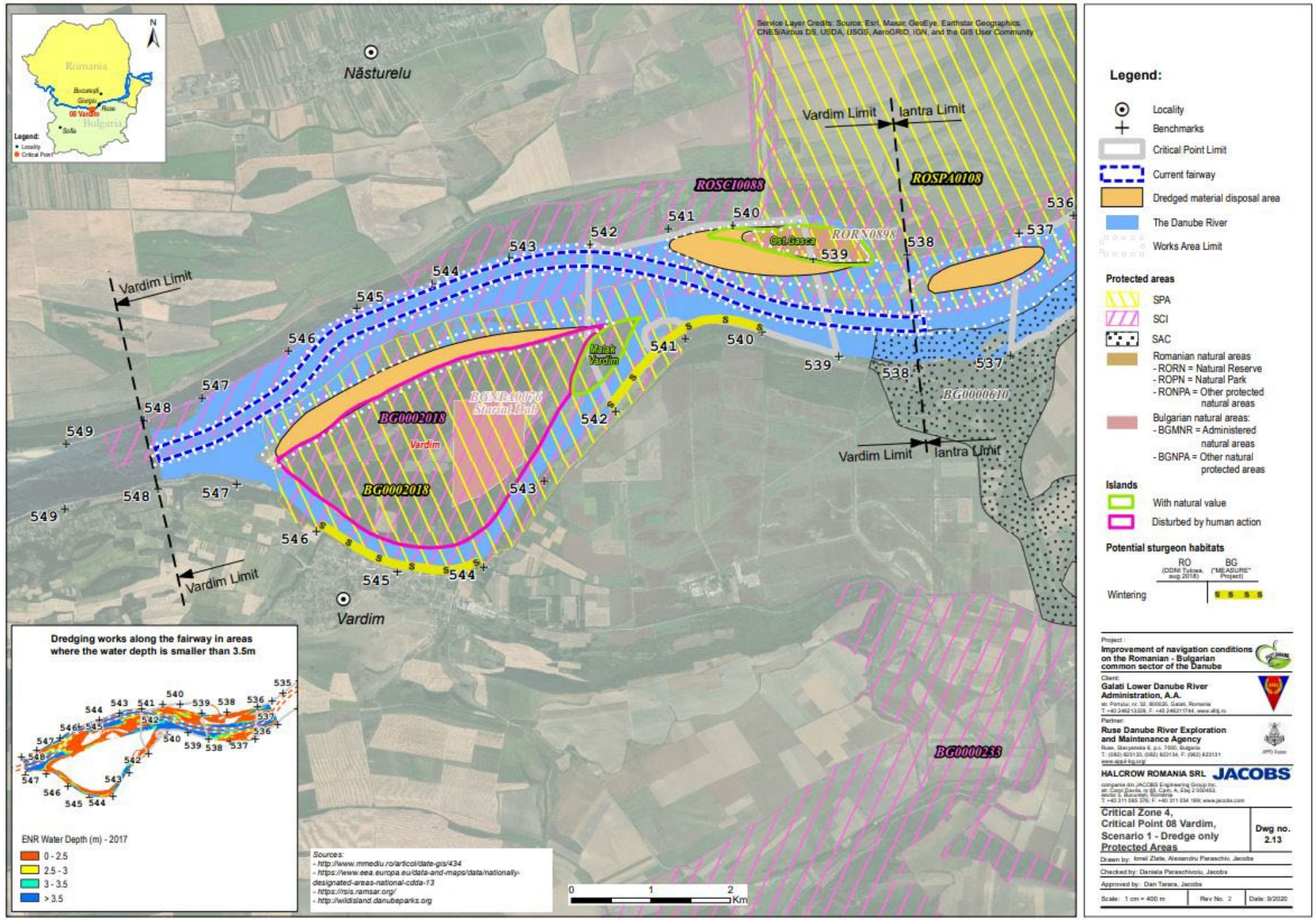

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Corabia
Gârcov
Zagrajden
Wintering
Batoku
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RO051
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Romania
Bulgaria
Bucuresti
Giurgiu
Ruse
06 Corabia
Sofia
N
Legend:
Locality
Critical Point
Dredging works along the fairway in areas where the water depth is smaller than 3.5m
ENR Water Depth (m) - 2017
0 - 2.5
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- https://rsis.ramsar.org/
- http://wildisland.danubeparks.org
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Km
Legend:
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Port access branch (proiect SWIM)
Dredged material disposal area
The Danube River
Works Area Limit
Protected areas
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RAMSAR
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In natural state
With natural value
Disturbed by human action
Potential sturgeon habitats
RO (DDNI Tulcea, aug 2018)
BG ("MEASURE" Project)
Feeding
Spawning
Project:
Improvement of navigation conditions on the Romanian - Bulgarian common sector of the Danube
Client:
Galati Lower Danube River Administration, A.A.
Partner:
Ruse Danube River Exploration and Maintenance Agency
HALCROW ROMANIA SRL
JACOBS
Critical Zone 3,
Critical Point 06 Corabia,
Scenario 1 - Dredge only
Protected Areas
Dwg no. 2.10
Drawn by: Alexandru Panaschiv, Jacobs
Checked by: Daniela Panaschivoiu, Jacobs
Approved by: Dan Tanara, Jacobs
Scale: 1 cm = 300 m
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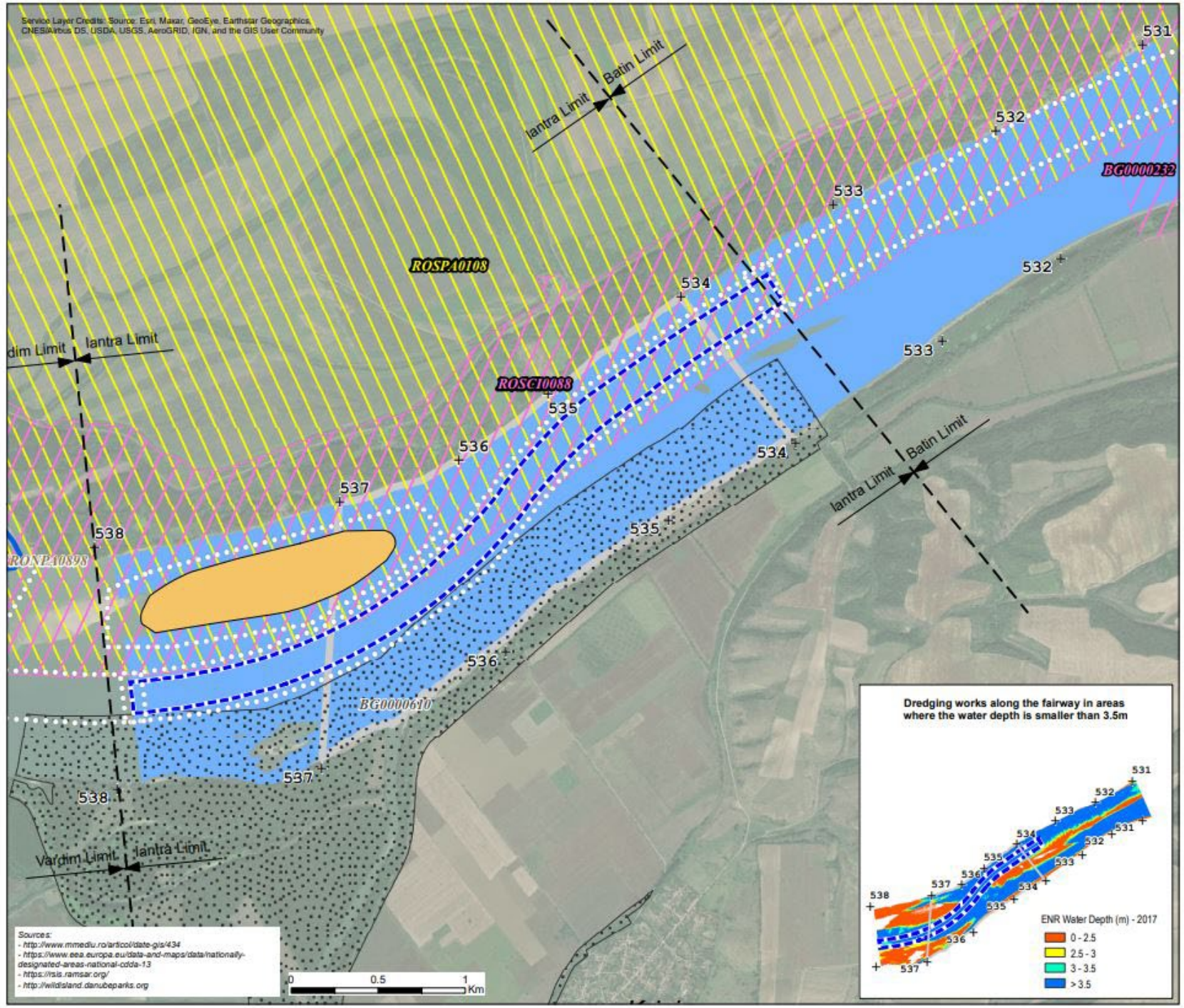
# Preferred options - Bulgarian Sector

| Location | | Second preference |
|---|---|---|
| Belene | | Morpho-engineering - groynes, chevrons, with fairway realignment |




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Năsturelu
Vardim
Vardim Limit
Iantra Limit
ROSCI0088
ROSPA0108
RORN0898
Ost Casca
Malak Vardim
BG0002018
BGNPA0076 Sturist Dab
BG0000610
BG0000233
Romania
Bucuresti
Giurgiu
Ruse
08 Vardim
Bulgaria
Sofia
Legend:
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0 1 2 Km
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RO (DDNI Tulcea, aug 2018)
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Wintering
Project:
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Client:
Galati Lower Danube River Administration, A.A.
Partner:
Ruse Danube River Exploration and Maintenance Agency
HALCROW ROMANIA SRL
JACOBS
Critical Zone 4,
Critical Point 08 Vardim,
Scenario 1 - Dredge only
Protected Areas
Dwg no. 2.13
Drawn by: Ionel Zlate, Alexandru Paraschiv, Jacobs
Checked by: Daniela Paraschivoiu, Jacobs
Approved by: Dan Tarara, Jacobs
Scale: 1 cm = 400 m
Rev No. 2
Date: 9/2020







**Legend:**

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- Current fairway
- Dredged material disposal area
- The Danube River
- Works Area Limit

**Protected areas**

- SPA
- SCI
- SAC




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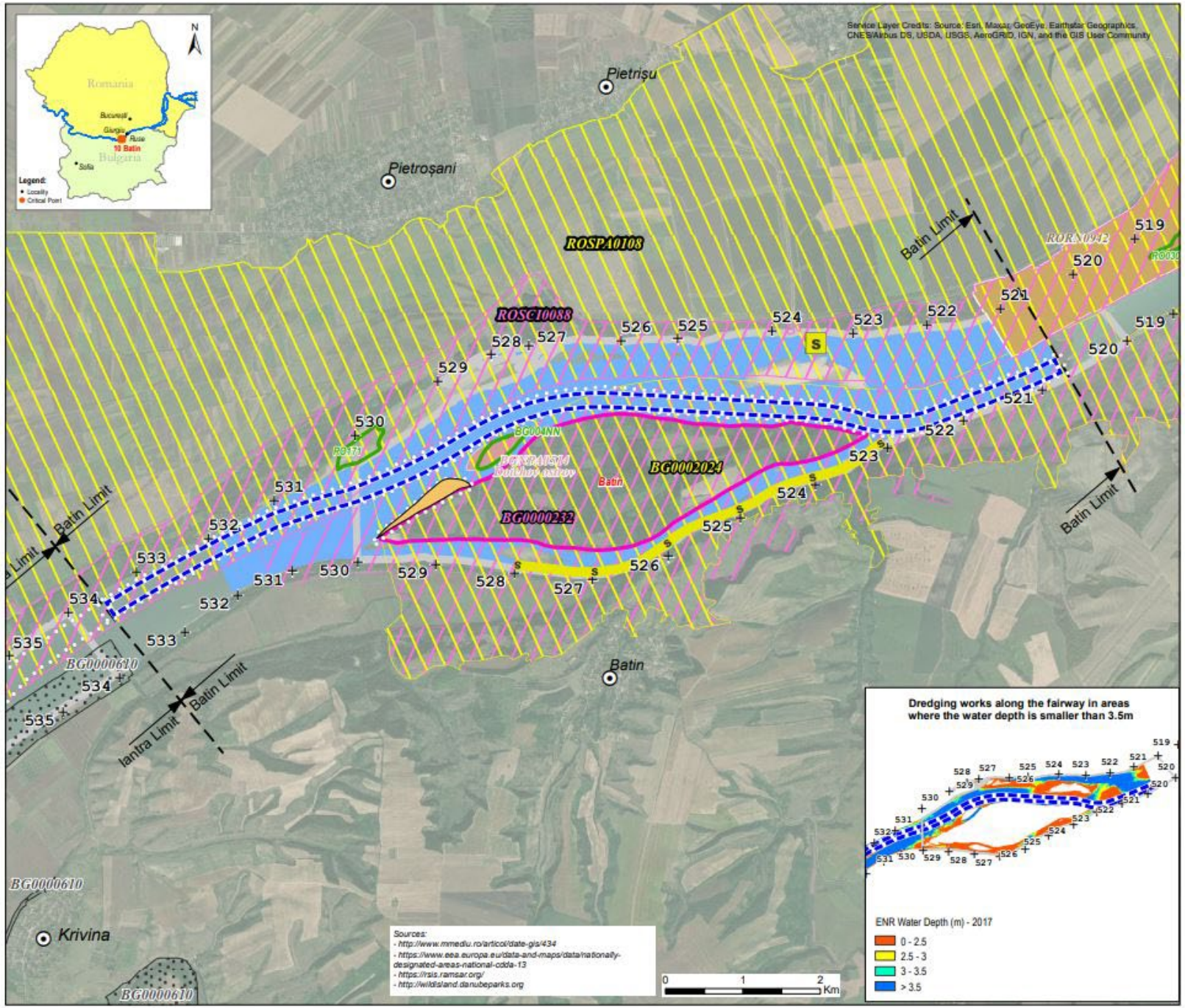
Partner:
**Ruse Danube River Exploration and Maintenance Agency**
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T.: (082) 823133, (082) 823134, F: (082) 823131
www.appd-bg.org

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company din JACOBS Engineering Group Inc.
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sector 5, Bucuresti, Romania
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**Critical Zone 4, Critical Point 09 Iantra, Scenario 1 - Dredge only Protected Areas**

**Dwg no. 2.14**

Drawn by: Alexandru Parascchiv, Jacobs
Checked by: Daniela Parascchivoiu, Jacobs
Approved by: Dan Tarara, Jacobs
Scale: 1 cm = 300 m | Rev No. 2 | Date: 8/2020




## Legend:

- Locality
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**Islands**

- In natural state
- Disturbed by human action

**Potential sturgeon habitats**

| | RO (DDNI Tulcea, aug.2018) | BG ("MEASURE" Project) |
|---|---|---|
| Wintering | S | S S S S |

Project:
**Improvement of navigation conditions on the Romanian - Bulgarian common sector of the Danube**

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str. Portului, nr. 32, 800025, Galati, Romania
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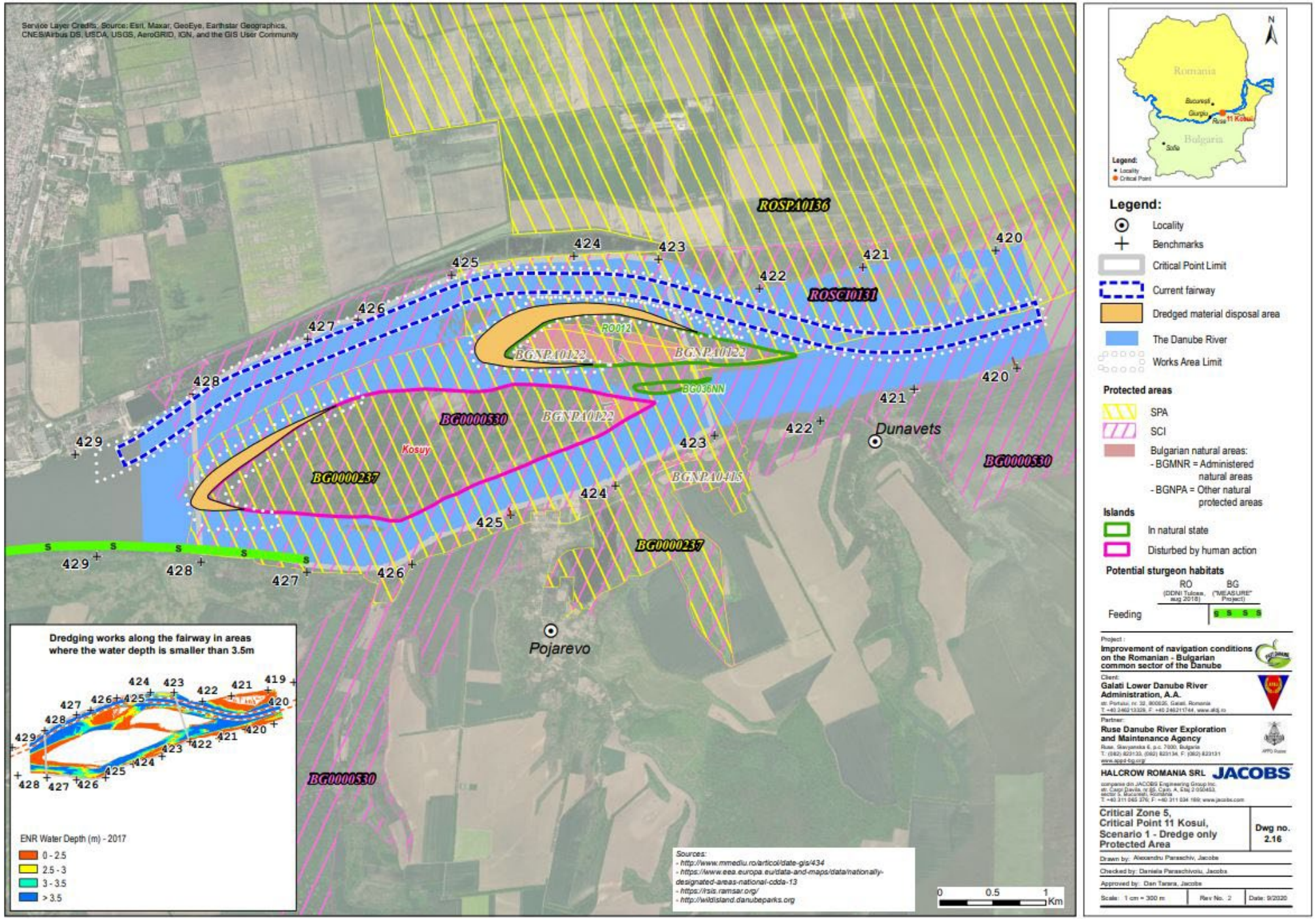
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T: (082) 823133, (082) 823134, F: (082) 823131
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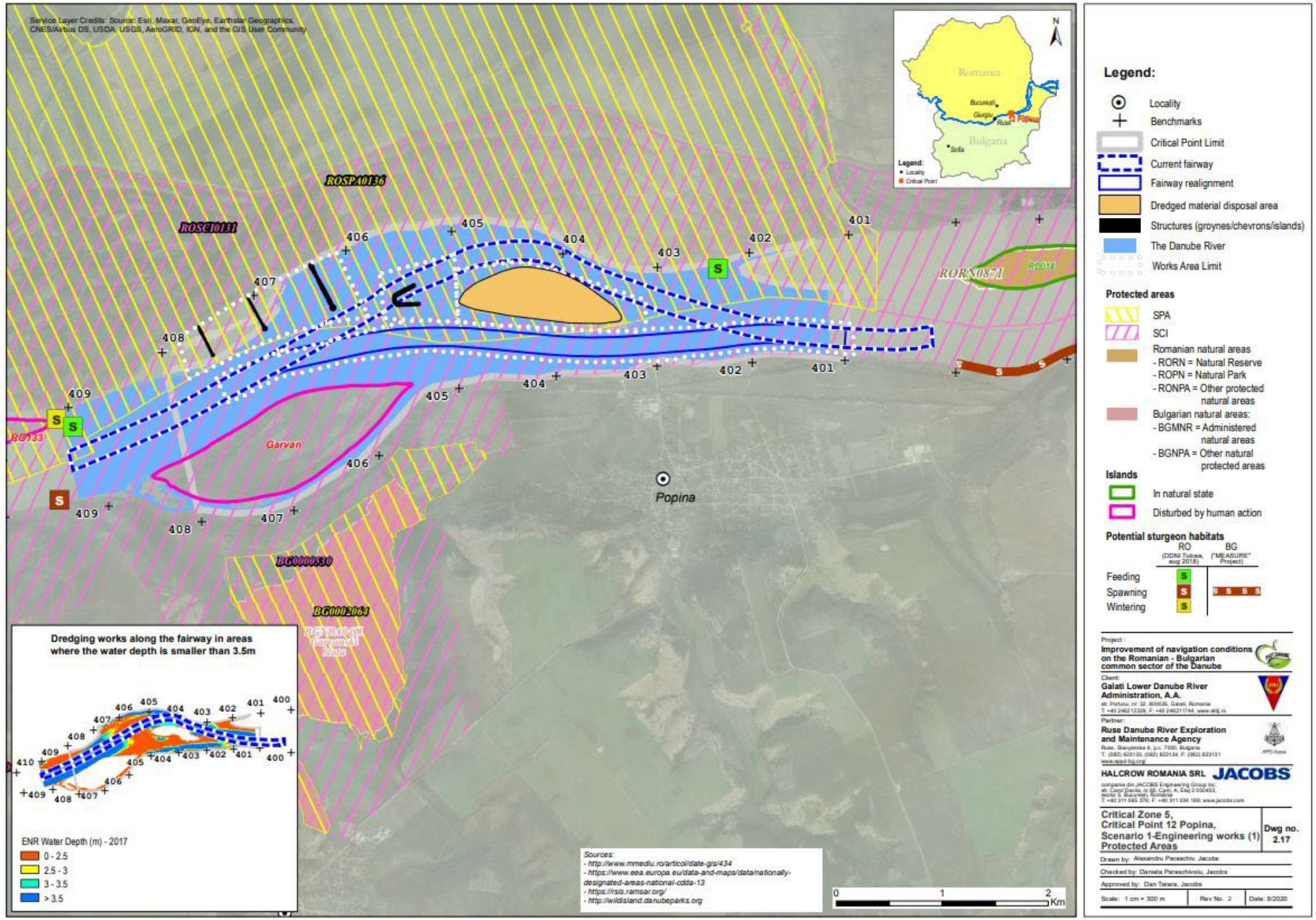
HALCROW ROMANIA SRL JACOBS
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T: +40 311 045 276, F: +40 311 034 169, www.jacobs.com

**Critical Zone 4, Critical Point 10 Batin, Scenario 1 - Dredge only Protected Areas**

Dwg no. 2.15

Drawn by: Alexandru Paraschiv, Jacobs
Checked by: Daniela Parascchivoiu, Jacobs
Approved by: Dan Tarara, Jacobs
Scale: 1 cm = 450 m | Rev No. 2 | Date: 9/2020


Service Layer Credits, Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
ROSPA0136
ROSCI0131
RO012
BGNPA0122
BGNPA0122
BG036NN
BG0000530
BGNPA0122
BGNPA0415
BG0000237
BG0000237
BG0000530
BG0000530
Kosuy
Dunavets
Pojarevo
424
423
425
422
421
420
427
426
428
429
Dredging works along the fairway in areas where the water depth is smaller than 3.5m
ENR Water Depth (m) - 2017
0 - 2.5
2.5 - 3
3 - 3.5
> 3.5
Sources:
- http://www.mmediu.ro/articol/date-gis/434
- https://www.eea.europa.eu/data-and-maps/data/nationally-designated-areas-national-cdda-13
- https://rsis.ramsar.org/
- http://wildisland.danubeparks.org
0 0.5 1 Km
Romania
Bucuresti
Giurgiu
Ruse
11 Kosui
Bulgaria
Sofia
Legend:
Locality
Critical Point
Legend:
Locality
Benchmarks
Critical Point Limit
Current fairway
Dredged material disposal area
The Danube River
Works Area Limit
Protected areas
SPA
SCI
Bulgarian natural areas:
- BGMNR = Administered natural areas
- BGNPA = Other natural protected areas
Islands
In natural state
Disturbed by human action
Potential sturgeon habitats
RO (DDNI Tulcea, aug 2018)
BG ("MEASURE" Project)
Feeding
Project :
Improvement of navigation conditions on the Romanian - Bulgarian common sector of the Danube
Client:
Galati Lower Danube River Administration, A.A.
Partner:
Ruse Danube River Exploration and Maintenance Agency
HALCROW ROMANIA SRL
JACOBS
Critical Zone 5, Critical Point 11 Kosui, Scenario 1 - Dredge only Protected Area
Dwg no. 2.16
Drawn by: Alexandru Paraschiv, Jacobs
Checked by: Daniela Paraschivoiu, Jacobs
Approved by: Dan Tarara, Jacobs
Scale: 1 cm = 300 m
Rev No. 2
Date: 9/2020


Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
ROSPA0136
ROSCI0131
RORN0871
RO014
RO133
Garvan
BG0000530
BG0002064
Popina
Romania
Bulgaria
Bucuresti
Giurgiu
Ruse
12 Popina
Sofia
Legend:
Locality
Critical Point
Dredging works along the fairway in areas where the water depth is smaller than 3.5m
ENR Water Depth (m) - 2017
0 - 2.5
2.5 - 3
3 - 3.5
> 3.5
Sources:
- http://www.mmediu.ro/articol/date-gis/434
- https://www.eea.europa.eu/data-and-maps/data/nationally-designated-areas-national-cdda-13
- https://rsis.ramsar.org/
- http://wildisland.danubeparks.org
0
1
2
Km
Legend:
Locality
Benchmarks
Critical Point Limit
Current fairway
Fairway realignment
Dredged material disposal area
Structures (groynes/chevrons/islands)
The Danube River
Works Area Limit
Protected areas
SPA
SCI
Romanian natural areas
- RORN = Natural Reserve
- ROPN = Natural Park
- RONPA = Other protected natural areas
Bulgarian natural areas:
- BGMNR = Administered natural areas
- BGNPA = Other natural protected areas
Islands
In natural state
Disturbed by human action
Potential sturgeon habitats
RO (DDNI Tulcea, aug 2018)
BG ("MEASURE" Project)
Feeding
Spawning
Wintering
Project:
Improvement of navigation conditions on the Romanian - Bulgarian common sector of the Danube
Client:
Galati Lower Danube River Administration, A.A.
Partner:
Ruse Danube River Exploration and Maintenance Agency
HALCROW ROMANIA SRL
JACOBS
Critical Zone 5,
Critical Point 12 Popina,
Scenario 1-Engineering works (1)
Protected Areas
Dwg no. 2.17
Drawn by: Alexandru Paraschiv, Jacobs
Checked by: Daniela Paraschivoiu, Jacobs
Approved by: Dan Tarara, Jacobs
Scale: 1 cm = 300 m
Rev No. 2
Date: 8/2020

# Types of intervention considered at all critical locations

***Key considerations:***

- *Recognition that dredging can be an important intervention – requires technical, institutional and financial sustainability;*
- *Restricting rigid engineering as initial works to the most problematic critical locations – Bechet, Belene and Popina;*
- *Preliminary environmental impact assessment at site and downstream;*
- *Introducing morphological engineering measures on a trial, monitor and adaptive basis;*
- *Implement using a phased programme, with intensive monitoring/ re-assessment as part of a strategy for adaptive management;*
- *River training with maximum use of natural (hydro-morphological) processes;*
- *Planning/conducting of detailed geotechnical surveys during the next phases (technical design/construction) of the project, to substantiate the technical solutions, in order to obtain the construction permit.*

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# Mitigating measures

| Measure code | Measures |
|---|---|
| M1 | *For the implementation of the project, an **Environmental Management Plan** (EMP) should be developed, which details all measures to avoid and reduce the impact.* |
| M2 | *At the start of an activity, an inspection is carried out by a team of biodiversity experts in order to assess the presence of conservation-significant species in the area and to **confirm that all measures have been taken to avoid or reduce the impact on these species**, including relocation operations (when applicable). It is recommended that the presence of experts be ensured throughout the entire period of activity implementation.* |
| M3 | *In order to mitigate the risk of pollution of the Danube River, a **Pollution Prevention and Response Plan** will be developed and implemented during both the construction and operational phases. The implementation of this plan will be guided by a comprehensive monitoring program, which will outline the necessary activities to prevent contamination of the river's waters.* |

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# Mitigating measures

| Measure code | Measures |
|---|---|
| M7 | *If hazardous substances (such as oils or petroleum products) are stored within the construction site setup, **floating protective barriers** must be installed around the site **to prevent water pollution** resulting from potential leaks of hazardous materials from equipment located on-site.* |
| M10 | *With the exception of works at the critical point Bechet (bank reinforcement, groynes, and deforestation), the critical point Popina (groynes, chevrons, and deforestation), the critical point Belene (chevrons, groynes, bank reinforcement, and deforestation), and the designated deposition zones located on the islands at the critical points of Corabia, Vardim, and Kosui, **the project owner shall not undertake any other permanent interventions that could result in the loss of habitat areas or species habitats subject to protection within the Natura 2000 sites**, either during construction or operation phases, along the Danube riverbank in the vicinity of these critical points. This is to ensure that no further loss occurs of habitat type 92A0 or habitats of community-protected species (e.g., Lutra lutra, or nesting bird species along the riverbank).* |

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# Mitigating measures

| Measure code | Measures |
|---|---|
| M11 | *It is recommended to **limit or avoid the use of auditory warning devices**, such as horns, sirens, and similar equipment, by vessels involved in construction activities, workers, or any other project-related machinery during both the construction and operational phases. This measure aims to prevent disturbance or displacement of birds and mammals from the project area.* |
| M13 | *In order to avoid a decline in fish population numbers due to mortality at sensitive developmental stages (eggs or juvenile specimens), **dredging activities should be avoided** during the period from March to the second half of July, which is considered a critical spawning period for fish.*<br>*To prevent disturbance to breeding birds, dredging activities should also be avoided during the same period — from March to the second half of July — as this is a sensitive time for bird reproduction.* |

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# Thank you for your attention!

Claudiu Dutu - AFDJ Galati

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