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# Dike Realignments along the River Rhine

## GIS schematizations in BASELINE for SOBEK modelling



October 2001

10033.1 - 38682/WSR

Client:
Ministry of Transport, Public Works and Water Management
Institute for Inland Water Management and Waste Water Treatment (RWS/RIZA)

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## GIS schematizations in BASELINE for SOBEK modelling

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# 1.   Introduction

## 1.1   Background

In a joint venture, the German Federal Institute for Hydrology (BfG) and the Dutch Ministry of Transport, Public Works and Water Management (RWS/RIZA) are in the process of developing SOBEK models of the River Rhine and some of its tributaries (Mosel, Main, Neckar) as a part of the INTERREG Rhine-Meuse Activities programme (IRMA) within the LAHoR Project (Quantification of the Influence of the Land Surface and River Training on Flood Conditions in the Rhine Basin). The current geometry of the Rhine, Main, Mosel and Neckar has already been imported into the GIS database system BASELINE. Apart from the actual situation, some intended river interventions also have to be imported into BASELINE in order to investigate these measures with the 1D modelling system SOBEK.

Meander Consultancy and Research was assigned by RWS/RIZA to provide the schematizations of the river interventions with the GIS-application BASELINE that is operational within ArcInfo. The project was carried out by H.H. Rabbers (M.Sc.) and M.S. van Bemmel (M.A.) under supervision of P. Weidema (M.A.). D.G. Meijer (M.Sc.) was added to the team as a SOBEK expert and reviewer of the report.

## 1.2   Objectives

The objectives of this project are:
- to import the data of thirteen new river measures into BASELINE (seven measures for the Niederrhein and originally six measures for the Oberrhein);
- to construct SOBEK-profiles of the modified compartments;
- to report the activities and results, including a visual overview of the changes, an overview of the changed BASELINE files and a report of the activities and results;
- to develop and supply three new BASELINE datasets existing of:
  - o Reference situation with BASELINE basic data for the Niederrhein. This had to be done, as the initial situation for location Bischlicher Insel was not correct.
  - o BASELINE basic data for the Niederrhein containing dike realignments with SOBEK-schematization based on these data;
  - o BASELINE basic data for the Oberrhein containing dike realignments with SOBEK-schematization based on these data. Also the new reference situation is incorporated in these data.

In Annex 9 there is an overview of the project results forwarded to the counterpart.

## 1.3    Starting points and boundary conditions

- The GIS activities were carried out in Arnhem at RIZA with the current version of BASELINE (version 3.1 ß).
- The client provided the required data. BASELINE data was supposed to be available according to the BASELINE protocol. The required data for the new versions is supplied in digital format. In Annex 8 there is an overview of the supplies from the counterpart.
- Notified errors in the original schematization are not changed (Meijer, 2001a).
- One measure for the Oberrhein, Elisabethenwörth, was dropped (Ritter, 2001a), making the number of measures for the dike along the Oberrhein a total of five.

## 2.   BASELINE

BASELINE is a GIS database system for rivers and canals, operational in ArcInfo. The BASELINE functionalities consist of different tools for administration, query, processing and presentation. BASELINE serves as an interface to generate SOBEK and WAQUA model input. It was designed to give more insight into underlying data of various hydraulic models. BASELINE aims at keeping input data easily up-to-date, thus improving the quality of predictions and streamlining data between 1-D and 2-D models.

The following tools are available in BASELINE:
- Administration of data
- Plotting of geographical data
- Query and selection
- Preparation of basic data for models including SOBEK
- Conversion of data to model input including SOBEK
- Import/export facilities
- Presentation

In BASELINE six different groups of data can be distinguished:
- basic data,
- variants,
- project data,
- user data,
- administration data,
- subdirectory per data type.

For a detailed description of the BASELINE data structure, reference is made to the BASELINE manual (Van der Meulen, 1998). The relationship between SOBEK data and the GIS application is discussed in chapter 4.
The GIS application to generate the SOBEK cross-sections on the basis of GIS data is incorporated in BASELINE (Weidema, 1999).

# 3.    Approach

## 3.1    Introduction

This chapter discusses the activities to construct SOBEK cross-sections by using BASELINE. First, the Niederrhein and next the Oberrhein are discussed. The figures of the reference situations and the situations after the measures were taken are shown in Annex 1 (Niederrhein) and Annex 2 (Oberrhein). Figure 2.1 gives an overall view of the model area.
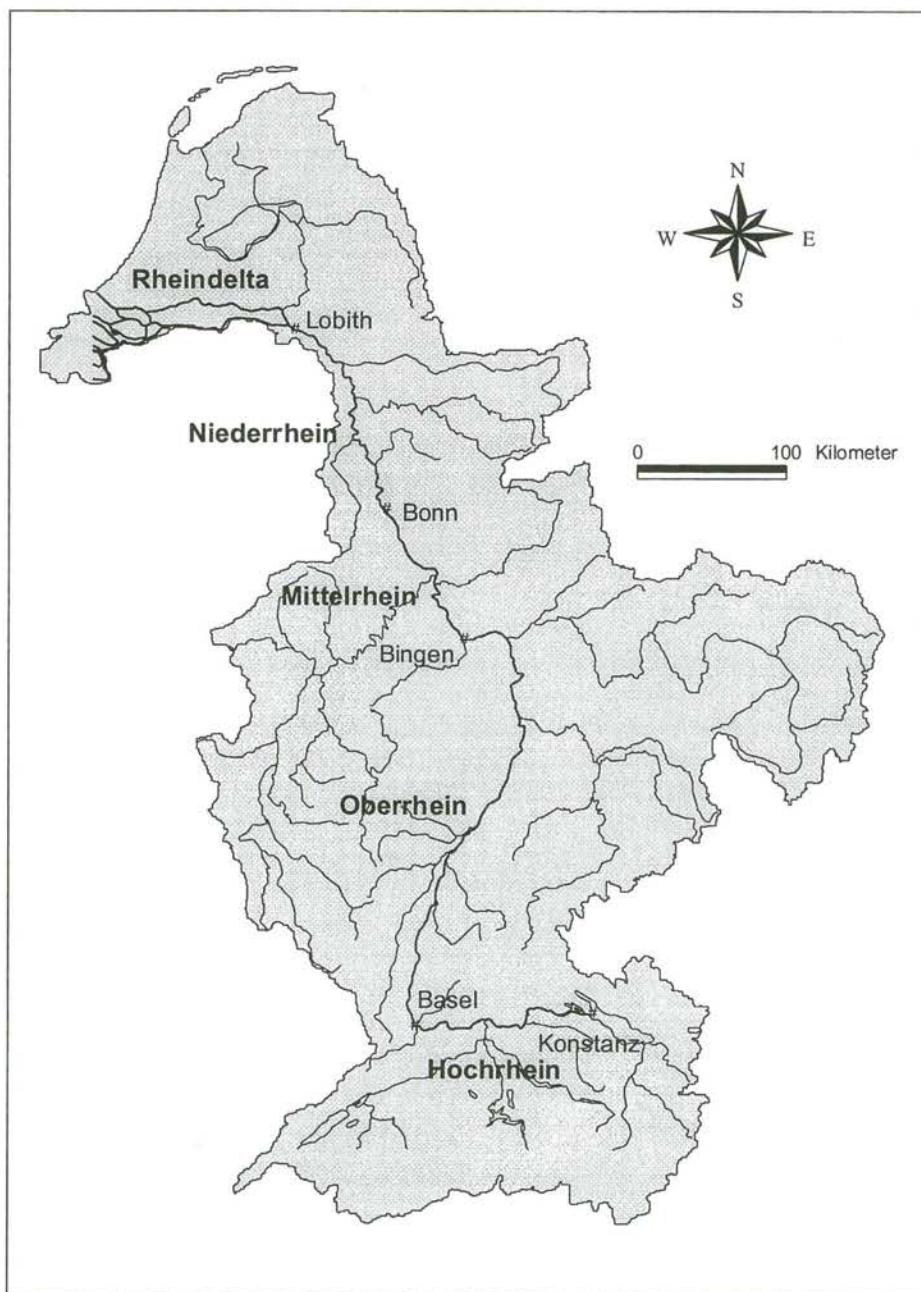


*Figure 2.1:    Overview of the river Rhine*

The data of the new river measures were imported into BASELINE by adapting the actual BASELINE data on the basis of digital provided maps of the changes and digitized lines. The BASELINE coverages SOBEKVAK, KADES, WINBED, SECTIES, STROVOER and PLASSEN, all Dutch words, are

carrying the data on SOBEK compartments, dike segments, heights, sections, flow conveyance and lakes respectively, were adapted on the basis of the supplied data. For the Oberrhein the coverage BRANCHES was also adapted. The coverages were stored according to the file structure of the BASELINE protocol (Van der Meulen, 1998).

## 3.2   Niederrhein

### 3.2.1   River measures along the Niederrhein

Along the Niederrhein seven measures were implemented. Table 3.1 gives an overview of these measures from north to south and the related figures in Annex 1.

*Table 3.1: Overview measures Niederrhein*

| Location | Type of Measure | Rhine kms (compartments) | Measure area [m$^2$] | Reported errors in original schematization | Figure in Annex |
|---|---|---|---|---|---|
| Grietherbusch | change of the heights of the summer dike for optimizing the retention effect | 837.5-847.5 (238-247) | 11,653,938 | - | A1.1A/B & A5.1A/B |
| Lohrwardt | dike realignment | 827.5-834.5 (227-233) | 2,945,286 | In compartments 228-230 lakes overlap dike elements. One dangle that occurred in the original data of the coverage SECTIES was removed. | A1.2A/B & A5.2 |
| Bislicher Insel | 1. correction of the original data 2. dike realignment | 818.5-823.5 (218-222) | ~9,900,000 | - | A1.3A/B/C & A5.3A/B |
| Orsoy | dike realignment | 801.5-803.5 (199-200) | 2,110,108 | In compartments 192-200 there are lakes and embanked areas overlapping each other. | A1.4A/B & A5.4 |
| Mündelheim | dike realignment | 761.5-768.5 (156-162) | 977,239 | In compartments 155-156 there are lakes and embanked areas overlapping each other. | A1.5A/B & A5.5 |
| Itter Himmelgeist | dike realignment | 723.5-729.5 (116-121) | 592,717 | - | A1.6A/B & A5.6 |
| Monheim | dike realignment | 711.5-713.5 (104-105) | 1,729,696 | - | A1.7 A/B & A5.7 |

## 3.2.2  Implementation of the river measures into BASELINE

### I. Grietherbusch (Rhine km 840.5-846.4)

At Grietherbusch, the heights of the summer dikes will be changed in order to optimize the flood-reducing effect of the polder. In the actual situation the summer dike is flooded along its whole length. The plans, as described by Roskamp (1998), prescribe four polders. Each polder has its own designed inlet of a few hundred metres width.

In the original situation the area behind the dikes is attributed to the compartments 238-247. In the new situation the area behind the summer dikes is only attributed to four compartments. The heights of the dikes are adapted according to calculated water levels at a certain discharge. These data were provided by the BfG (Ritter, 2001 (b)).

Table 3.2 shows an overview of the measure Grietherbusch. The dike elements between the Unterer Polder and Polder Grietherbusch and between Oberer Polder and Sporthafen were digitized.

*Table 3.2: Heights of the dike elements and corresponding discharges*

| polder | compartment | km | dike height [m+NN] | inundation discharge [m³/s] |
|---|---|---|---|---|
| Unterer Polder | 246 | 846.4 | 17.62 | 10,000 |
| Polder Grietherbusch | 245 | 845.8 | 17.77 | 10,200 |
| Oberer Polder | 244 | 844.5 | 18.02 | 10,400 |
| Sporthafen | 240 | 840.5 | 18.39 | 10,400 |

### II. Lohrwardt (Rhine km 828.5-834.5)

At Lohrwardt the river dike will be relocated in order to increase the retention capacity and consequently lower downstream water levels. The old river dike will be lowered to a height pertaining to a discharge of 12.065 m³/s corresponding to a return period of 90 years. This discharge corresponds to a water-level height of 20 m+NN at Rhine-km 834,2 and was given by the BfG according to the plans. At the most downstream part of the dike (approximately Rhine-km 834.2, compartment 227) an inlet will be built with the height of 19.50 m+NN. According to the BfG  this corresponds to a discharge of 10,935 m³/s and a 35 years' return period. Thus the whole area between the old, lowered dike and the new dike will first be flooded through this inlet. At discharges higher than 12,065 m³/s the area will be filled along the whole length of the dike.

*Table 3.3: Heights of the dike elements and corresponding discharges (Lohrwardt)*

| compartment | km | dike height [m+NN] | inundation discharge [m³/s] |
|---|---|---|---|
| 227 | 828.5 | 20.79 | 12,065 |
| 228 | 829.5 | 20.68 | 12,065 |
| 229 | 830.5 | 20.60 | 12,065 |
| 230 | 831.5 | 20.44 | 12,065 |
| 231 | 832.5 | 20.33 | 12,065 |
| 232 | 833.5 | 20.15 | 12,065 |
| 233 | 834.5 | 20.00 / 19.50 [1] | 10,935 |

[1] inlet height (the dike height of 20.00 m+NN was not used in the BASELINE data)

In order to schematize this situation in the 1D model SOBEK, the whole system is seen as a combination of a retention measure and a summer dike. The following three situations occur:

1. $Q < 10,935$ m³/s (inlet height 19.50 m+NN): no flooding of the new area occurs.
2. $10,935$ m³/s (inlet height 19.50 m+NN) $< Q < 12,065$ m³/s (summer-dike height 20.00 m+NN): only the inlet in the dike of compartment 233 will contribute to the flooding of the area behind the summer dike. There are two possibilities to implement this flooding effect of Lohrwardt. These options are discussed later in this section.
3. $Q > 12,065$ m³/s : the whole dike will be flooded. The storage of compartments 227-232 above 19.50 m+NN will be added to the profiles (in $dA_{tot}$), and these profiles will be flow conveying in Lohrwardt. This situation could be schematized correctly in BASELINE.

Table 3.4: Volume below 19.50 m+NN as function of the initial lake level in Lohrwardt

| h_lakes (t=0) | cross233[1] | SOBEK retention | |
| [m+NN] | dAtot [m²] | V (h<19.50 m+NN) [m³] | initial water level in SOBEK [m+NN] |
| --- | --- | --- | --- |
| 13.30 | 10,361.5 | 10,268,287.5 | 16.01 |
| 14.50 | 8,835.1 | 8,755,643.75 | 16.53 |
| 15.50 | 7,399.3 | 7,332,768.75 | 17.01 |
| 16.50 | 5,848.7 | 5,796,062.5 | 17.53 |
| 17.50 | 4,162.4 | 4,125,012.5 | 18.10 |
| 18.50 | 2,231.3 | 2,211,262.5 | 18.75 |
| 19.50 | 0 | 0 | 19.50 |

[1]) This option was not chosen

The flooding effect of Lohrwardt can be implemented in two ways. In the first option, the whole storage area could be added to profile 233 by expressing this volume as a storage area behind the summer dike (table 3.4: dAtot, this is the volume divided by the compartment length). The second option is using the SOBEK retention application. In a discussion with the BfG and RIZA (30 May 2001 in Arnhem) it was agreed to model the storage capacity below 19.50 m+NN as a retention measure using the retention option in SOBEK. Consequently, this retention capacity needs to be neglected in the SOBEK-cross sections. Therefore in BASELINE the retention area was defined as a lake with the height of 19.50 m+NN (i.e. already filled).

However, the real storage volume depends on the initial lake level. This volume was determined in ArcInfo for a few hypothetical initial lake levels (figure 3.1: yellow). Table 3.4 shows the storage volume below 19.50 m+NN as function of the initial lake level. The storage capacity between 19.50 m+NN and the summer-dike height of compartments 227-233 is not added to the profiles under the discharge conditions between 10,935 m³/s and 12,065 m³/s because of the summer dike. This will happen when the discharge gets higher than 12,065 m³/s.
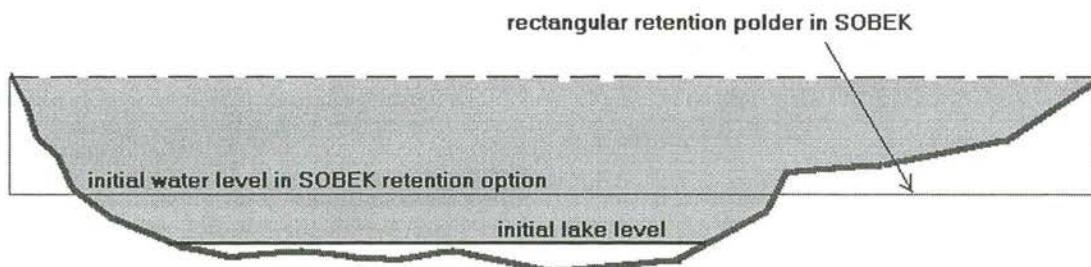
*Figure 3.1:   Retention option in SOBEK: adaptation of initial water level in Lohrwardt*

For the use of the SOBEK retention option, the following should be noted:
- The surface area of 2,945,286 m$^2$ should be applied (table 3.1).
- As retention polders in SOBEK are rectangular, the initial water level should be adapted (table 3.4: 4$^{th}$ column) in such a way that the retention volume will be correct (figure 3.1).
- The inlet height should be 19.50 m+NN. The structure should be closed by a controller, as soon as the water level in the retention polder reaches 19.50 m+NN. The additional storage (and flow) area is incorporated in the cross-section descriptions of profiles 227-233.

The following errors must be accepted by choosing this solution:
- The storage effect between 19.50 and 20.00 m+NN (10,935 m$^3$/s < Q < 12,065 m$^3$/s) is limited to profile 233, whereas in reality the whole area will be filled through profile 233.
- Consequently, once the summer-dike segments in profiles 227-232 get inundated (Q > 12,065 m$^3$/s), the water level is still 19.50 m+NN whereas in reality the water level will be already 20.00 m+NN.

Various options were considered and compared during the meetings at BfG and RIZA. This solution, although not ideal, was chosen for the complex geometry of the Lohrwardt right bank.


### III. Bislicher Insel  (Rhine km 818.5-823.5)

At Bislicher Insel (compartments 218-222) in the original schematization, the model boundary was not correct: Therefore this was corrected by digitizing the model boundary of compartments 218-222 more accurately, leading to an actualized reference situation. In this actualized reference situation the area called Niederweide with the Willikshof near Werrich (in compartment 218 and 219) lies in the flood plain.
Based on this new actualized reference situation the new situation due to the planned dike relocation at Bislicher Insel was implemented in BASELINE. Here the area Niederweide is excluded from the schematization due to the plans  where this area  is behind the winter dike.

Thus for the Bislicher Insel there are now three versions of schematizations:
1. Original schematization of the Bislicher Insel called "version 1999.1". This version includes Niederweide.
2. New reference schematization of the Bislicher Insel, called "version 2001.1bi". This schematization was made in order to be able to calculate the influence of the better-digitized model boundary. This version includes Niederweide.
3. Schematization of the dike relocation measures of the Bislicher Insel. This version is called "version 2001.1". It excludes the Niederweide.

### IV. Orsoy (Rhine km 801.5-803.5)

At Orsoy a part of the winter dike will be relocated.  As a result, the storage area at this location will increase. This measure intends to enlarge the storage width at Orsoy and, accordingly, reduce water levels at downstream locations. In the schematization, the retention area was added to the compartments 199-200 due to the fact that the old winter dike is only removed in compartment 195-200. Hence, only compartment 195-200 had to be changed.

### V. Mündelheim (Rhine km 761.5-768.5)

In order to enlarge the profile at Mündelheim, the winter dike on the right hand side of the river will be replaced outwardly. The bridge will be extended: the present abutment will be replaced by the bridge extension. In this way the flood plain will become flow conveying. In the assignment document this is referred to as "version 4 (b)". In the schematization the dikes in compartments 155-161 were removed completely. The flow conveying area of these compartments was enlarged.

### VI. Itter Himmelgeist (Rhine km 723.5–729.5)

At Itter Himmelgeist a part of the right hand embankment will be relocated (compartments 116-121). This measure intends to enlarge the storage width at Itter Himmelgeist and consequently reduce water levels at downstream locations. In the assignment document this is referred to as "version 58 ha". The compartment boundaries were extended to the new location of the embankment.
As agreed in a discussion with BfG and RIZA (30 May 2001 in Arnhem), the flow conveying area was not changed. However, the added area contains an old river branch. In reality a part of the added area could possibly be flow conveying.

### VII. Monheim (Rhine km 711.5-713.5)

At Monheim a part of the right hand embankment will be relocated outwards. The upstream section of the existing dike (Annex 1-8: Figure A1.7B compartments 100-103) gets the function of a flow-guiding structure. The lower existing dike section in compartments 104-105 will be removed completely. For this reason the storage area was added exclusively to compartments 104 and 105.

## 3.2.3  Construction of digital elevation model

After adapting the BASELINE coverages, the elevation model of the original schematization was adapted within ArcInfo instead of constructing a new TIN with BASELINE, because this would have been too time-consuming. The elevation model was extended at places were the original elevation model did not cover the whole area. This was the case at Bislicher Insel, Orsoy, Mündelheim, Itter Himmelgeist and Monheim. At these locations the grid HOOGWIN was adapted using a digital terrain model (DGM50g_ed) provided by the BfG. This digital terrain model covers the whole area and has a grid resolution of 50x50 $m^2$. In order to get the same grid resolution as the grid HOOGWIN, a grid of 25x25 $m^2$ was made by resampling DGM50g_ed. Subsequently, an actualized HOOGWIN including retention measure elevation data was created by concatenating these two grids.

### 3.2.4   Construction of cross-sections

Next, the BASELINE application "SOBEK cross-sections" was run to create SOBEK cross-sections. The schematization representing these cross-sections has version number 2001.1. The situation including the polder Bislicher Insel is represented by version 2001.1bi. In order to be able to import these cross-sections into SOBEK, heights have to be ascending and the widths of storage and flow conveyance may not descend with ascending heights. The data format of SOBEK cross-sections is shown in Annex 10 (see also Annex 3 Niederrhein and Annex 4 Oberrhein).

Because these conditions were not always satisfied, the following changes were made within ArcInfo:
- In compartments 120, 231 and 232 the elevation of one pixel per compartment was changed in the flood plain in the grid HOOGWIN. Also a change was made in the settings within BASELINE. The area below the highest level in the flood plain section was set to 100 % instead of the default value 99 %.

In the output of the BASELINE application "SOBEK cross-sections" the following changes were made:
- In the cross-section of compartment 246 (see Annex 3-18, version 2001.1), 1 cm had to be added to the heights h14 and h15 in order to make the heights ascending.

## 3.2.5  Verification of cross-sections

During the project a spreadsheet was developed to be able to check cross-sections on their characteristics. Next, within the same spreadsheet a cross-section comparison tool was developed. With this tool, graphs are made in which the effect of measures on the geometry of a cross-sections are clearly visualized (see Annex 5 and 6). With this tool the following characteristics can be seen:
- Rectangles started from h10 indicating the presence of a dike or lake or both.
- Situations where dA_tot > dA_flow at h1 indicate the presence of a lake.

In Annex 5 (Niederrhein) examples of compartment numbers 244, 241, 229, 221, 219, 199, 158, 120, 104 are shown. For each measure they are considered to be the most representative one for each river measure. Note at figure A5.6, cross-section 120, the rectangle from h10 is so small that it looks like h15 < h14. The locations at the CD-Roms of these Excel-spreadsheets are:
- For the 2001.1 schematization:
  Profilkontrolle\Delivery_profilkontrolle_niederrhein_20011.xls, worksheet *kontrolle*
- For the 2001.1bi schematization:
  Profilkontrolle\Delivery_profilkontrolle_niederrhein_20011bi.xls, worksheet *kontrolle*

With the keys Ctrl-L and Ctrl-K it is possible to jump through the cross-sections. With respect to the described data-format of a SOBEK cross-section in Annex 10 the abbreviations in the worksheet *Kontrolle* can be interpreted as:
- $w_{main}$ → B_main
- $w_{sub1}$ → B_sub1
- WS → B_sed
- $h_{top}$ → H_dike
- $\Delta A_f$ → dA_flow
- $\Delta A_t$ → dA_tot

In the first column (column B and P) the elevations are displayed, the second column (column C and R) contains total widths and the third column (column D and S) contains the flow-conveying widths all in metres. Column two and three are the opposite as described in Section 3.2.4.

### 3.2.6 Importing into SOBEK

In order to be able to import the generated cross-sections with BASELINE into SOBEK, a conversion of the ASCII version to the User Interface had to be made. Two User Interface files were created: one with Umlaut for locations (cities), and one without Umlaut. This was done because in the past the SOBEK model for the Niederrhein was build with Umlauts, but during testing at RIZA in Arnhem, the descriptions of the cross-sections did not contain Umlauts. The files are located at the ui-subdirectory in the directory *profielen*.

## 3.3 Oberrhein

### 3.3.1 River measures in the Oberrhein

When the project started, six measures had to be implemented in the Oberrhein. During the project it was decided by the BfG not to implement the measure Elisabethenwörth into the BASELINE schematization and use the retention option within SOBEK for this measure instead (Ritter, 2001a). Table 3.5 gives an overview of the measures of the Oberrhein from north to south and the related figures in Annex 2. In all the cases the left embankment will be relocated outwards.

*Table 3.5: Overview measures Oberrhein*

| Location | Type of Measure | Rhine kms (compartments) | Measure area [m$^2$] | Reported errors in original schematization | Figure in Annex |
|---|---|---|---|---|---|
| Worms Bürgerweide | Dike realignment | 440.3-441.4 (144-145) | 913,669 | | A2.1A/B & A6.1 |
| Worms Mittlerer Busch | Dike realignment | 437.5-440.3 (142) | 771,690[1] 322,681[2] | | A2.2A/B & A6.2 |
| Petersau Bannen | Dike realignment | 435.8-437.5 (136-138) | 542,245 | In the compartments 137-143 the following subjects might need an update:<br><br>• The flow conveying boundary excludes the embanked areas on the right hand side of the river in compartments 137-141, while the embanked areas on the right side of the river are lower and flow conveying.<br><br>• The embanked area on the left side of compartments 137-140 is secondary, while the embanked area on the right hand side is higher and primary. | A2.3A/B & A6.3 |

[1] total area
[2] area behind dike

| Location | Type of Measure | Rhine kms (compartments) | Measure area [m²] | Reported errors in original schematization | Figure in Annex |
|---|---|---|---|---|---|
| | | | | • In compartment 140 there are two primary dikes. | |
| | | | | • In reality the area of compartments 138-142 which is not embanked seem to inundate through compartments 141-142. In the present schematization this area will inundate from compartments 138-142. | |
| Waldsee Altrip Neuhofen | Dike realignment | 410.9-413.1 (90-93) | 546,057 | | A2.4A/B & A6.4 |
| Wörth Jockgrim | Dike realignment | 366.4-370.0 (9) | 1,524,726 | | A2.5A/B & A6.5 |

## 3.3.2  Implementation of the measures into BASELINE

### VIII. Worms Bürgerweide (Rhine km 440.3-441.4)

At Worms Bürgerweide the left embankment will be relocated outwardly. In this situation the new river dike (an existing road) becomes the new model boundary. The storage area was added to profiles 144-145.

### IX. Worms Mittlerer Busch (Rhine km 437.5-440.3)

At Worms Mittlerer Busch the left embankment will be relocated outwardly as a part of the same project described above. The existing dike will only partly be removed. A part of the new inundation area is behind the remaining part of the actual river dike. This dike section now becomes a summer dike (height 92.00 m+NN) which separates the river from the extended part of the flood plain. The whole area was added to compartment 142. Another summer-dike segment in compartment 142 (right bank), which was primary in the original schematization, was converted into a secondary dike segment.

### X. Petersau Bannen (Rhine km 435.8-437.5)

At Petersau Bannen, just upstream of Worms Mittlerer Busch, the left embankment will be relocated outwards as a part of the same project described above. The new flood plain area was added to compartments 136-138. In the existing situation the areas embanked by a summerdike on the left side of the river were split into a flow conveying area and a storing area. In compartment 136 the embanked area within flow conveyance was primary, the other part secondary. In compartment 137 and 138 both the embanked areas within a compartment were secondary. In the new schematization the embanked area in compartment 136 is completely primary; in both compartments 137 and 138 the embanked areas are secondary.

### XI. Waldsee Altrip Neuhofen (Rhine km 410.9-413.1)

At Waldsee Altrip Neuhofen the left embankment will be relocated outwardly. A part of the new area can be flooded freely, the other part can be flooded through an inlet construction. It was

decided by the BfG and RIZA to model the latter area using the retention-module in SOBEK (not visible in figure A2.4B). Therefore only the free floodable area was schematized in BASELINE by adding this area to the compartments 91-92.

### XII. Wörth Jockgrim (Rhine km 366.4-370.0)

The situation at Wörth Jockgrim is very similar to the one at Waldsee Altrip Neuhofen: after relocating the left dike outwards, a part of the new area can be flooded freely, the other part can be flooded through an inlet construction. It was decided by the BfG and RIZA to model the latter area using the retention-module in SOBEK. Therefore only the free floodable area had to be schematized in BASELINE.

### XIII. Elisabethenwörth (Rhine km 380.0-384.0)

As described earlier, this measure was not implemented into the BASELINE schematization.

## 3.3.3   Construction of digital elevation model

The original TIN did not cover the new retention areas. Accordingly a new TIN between Maxau and Worms was created that included these areas. With this new TIN the BASELINE application "conversion to SOBEK" was run. The new TIN was expected to give the same results as the old TIN in areas where no adaptations were made. However, due to some changes in the supplied basic data the original grid HOOGWIN could not be reproduced, so it was decided to concatenate the parts of the retention areas of the newly build HOOGWIN to the original HOOGWIN.
By doing so, the resulting grid HOOGWIN is exactly the same as the supplied one, except for the added areas.

The grid resolution of both the main channel and the flood plain were kept to 10x10 m$^2$.

## 3.3.4   Construction of cross-sections

The BASELINE application "SOBEK cross-section" was run. The schematization representing these cross-sections has version number 2001.ret. In Annex 10 a description is made how to read these cross-sections.

## 3.3.5   Verification of cross-sections

In Annex 6 (Oberrhein) examples of compartment numbers 145, 142, 137, 92, 9 are shown. For each measure they are considered to be the most representative for each dike measure. On the CD-Rom the location of the EXCEL-spreadsheet, which checks the cross-sections is:

   2001.ret schematization: Profilkontrolle\Delivery_profilkontrolle_oberrhein_2001ret.xls, worksheet *kontrolle*

The verification procedure of the cross-sections is explained in Section 3.2.5. An error with respect to descending heights in cross-section 93 was changed by hand in version 2001.ret (see Annex 4-2).

### 3.3.6  Importing into SOBEK

The cross-sections were imported into SOBEK CMT version 2.50.039. Umlauts for locations (cities) did not occur for this part of the Rhine.

# 4.    Results

## 4.1    Introduction

In this chapter the resulting cross-sections are summarized. The resulting cross-sections are shown as charts in Annex 5 (Niederrhein) and Annex 6 (Oberrhein).

## 4.2    Results Niederrhein

Table 4.1 shows an overview of the results of the implemented dike realignments for the Niederrhein.

*Table 4.1: Overview of results dike realignments Niederrhein with reference to Annex 5*

| Location | compartments | SOBEK-schematization version number | map overviews (Annex 1) | cross-sections | Graphs* |
|---|---|---|---|---|---|
| Grietherbusch | 238-247 | 1999.1 | figure A1.1A | Annex 3, | Annex 5: figure A5.1A |
|  |  | 2001.1 | figure A1.1B | 3-14 ~ 3-18 | (244), Annex 5: figure A5.1B (241) |
| Lohrwardt | 227-233 | 1999.1 | figure A1.2A | Annex 3, | Annex 5: figure A5.2 |
|  |  | 2001.1 | figure A1.2B | 3-12 ~ 3-14 | (229) |
| Bislicher Insel | 218-222 | 1999.1 | figure A1.3A | Annex 3, | Annex 5: figure A5.3A |
|  |  | 2001.1 | figure A1.3B | 3-10 ~ 3-12 | (221), Annex 5: figure A5.3B1(219), Annex 5: |
|  |  | 2001.bi | figure A1.3C |  | figure A5.3B2 (219) |
| Orsoy | 199-200 | 1999.1 | figure A1.4A | Annex 3, | Annex 5: figure A5.4 |
|  |  | 2001.1 | figure A1.4B | 3-8 ~ 3-10 | (199) |
| Mündelheim | 156-162 | 1999.1 | figure A1.5A | Annex 3, | Annex 5: figure A5.5 |
|  |  | 2001.1 | figure A1.5B | 3-5 ~ 3-8 | (158) |
| Itter Himmelgeist | 116-121 | 1999.1 | figure A1.5A | Annex 3, | Annex 5: figure A5.6 |
|  |  | 2001.1 | figure A1.5B | 3-3 ~ 3-5 | (120) |
| Monheim | 104-105 | 1999.1 | figure A1.6A | Annex 3, | Annex 5: figure A5.7 |
|  |  | 2001.1 | figure A1.6B | 3-1 ~ 3-3 | (104) |

*numbers in brackets represent cross-section number

## 4.3    Results Oberrhein

Table 4.2 shows an overview of the results of the implemented dike realignments for the Niederrhein.

*Table 4.2: Overview of results dike realignments Oberrhein  with reference to Annex 6*

| Location | compartments | SOBEK-schematization version number | map overviews (Annex 2) | cross-sections | Graphs* |
|---|---|---|---|---|---|
| Worms Bürgerweide | 144-145 | 2001.3 2001.ret | figure A2.1A figure A2.1B | Annex 4, 4-4 | Annex 6: figure A6.1 (145) |
| Worms Mittlerer Busch | 142 | 2001.3 2001.ret | figure A2.2A figure A2.2B | Annex 4, 4-3 ~ 4-4 | Annex 6: figure A6.2 (142) |
| Petersau Bannen | 136-138 | 2001.3 2001.ret | figure A2.3A figure , A2.3B | Annex 4, 4-2 ~ 4-3 | Annex 6: figure A6.3  (137) |
| Waldsee Altrip Neuhofen | 90- 93 | 2001.3 2001.ret | figure A2.4A figure A2.4B | Annex 4, 4-1 ~ 4-2 | Annex 6: figure A6.4 (92) |
| Wörth Jockrim | 9 | 2001.3 2001.ret | figure A2.5A figure A2.5B | Annex 4, 4-1 | Annex 6: figure A6.5 (9) |

* numbers in brackets represent cross-section number

# 5.    Conclusions and recommendations

## 5.1    Findings

- With the basic data from BfG it was not possible to regenerate their original cross-sections for the Oberrhein.
- Errors in coverage STROVOER and grid STROVOER (value 0) were corrected (reference situation); with respect to the Oberrhein this implies that cross-sections 33 - 44 were regenerated for the new reference situation.
- There seem to be some errors in the existing schematization of the Niederrhein. At some places there are lakes and embanked areas overlapping each other. In compartments 137-142 among others boundaries the compartment boundaries seem to be wrongly schematized.
- The basic data in BASELINE and the SOBEK models of the Oberrhein did not always appear to be well documented.

## 5.2    Conclusions

- The data for 12 changes in the Niederrhein and Oberrhein were successfully implemented into BASELINE. For the Niederrhein a new reference situation was built with respect to Bislicher Insel.
- The SOBEK cross-section for the compartments within these changes was successfully constructed.
- Some handmade changes in the results of BASELINE for the Niederrhein were necessary for compartments 120, 231, 232 and 246.

## 5.3    Recommendations

- For some areas a one-dimensional model is not sophisticated enough to schematize the situation in an appropriate way. Especially at Lohrwardt (Niederrhein) this is the case.
- At Itter Himmelgeist the flow conveying area was not changed. However, in the added area an old river branch was found. In reality possibly a part of the added area will be flow-conveying.
- The basic data and the SOBEK models of the Niederrhein and Oberrhein should be improved. It is recommended to use names rather than numbers to identify branches, nodes, profiles, lateral inflows, weirs, controllers, triggers and cases.

# 6.   References

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# Annex

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Figure A1.1B: Map overview of river measure Grietherbusch version 2001.1

Figure A1.2A: Map overview of Lohrwardt version 1999.1



Figure A1.2B: Map overview of river measure Lohrwardt version 2001.1
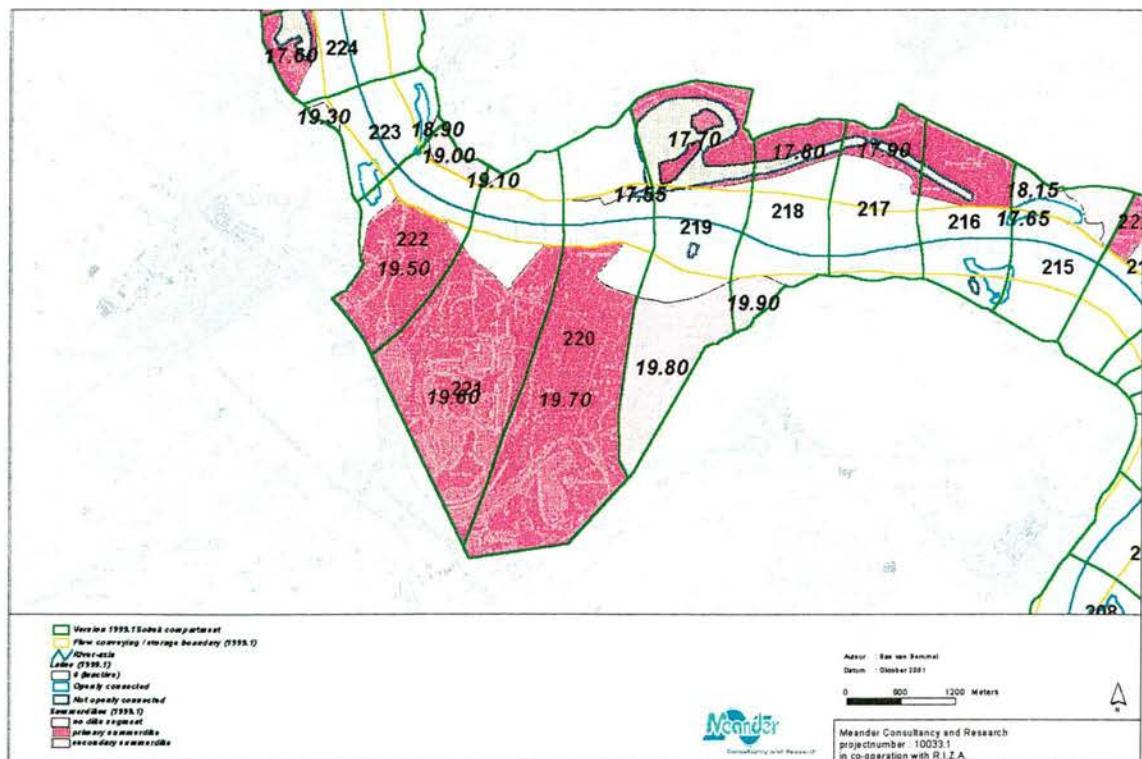
Figure A1.3A: Map overview of Bislicher Insel version 1999.1
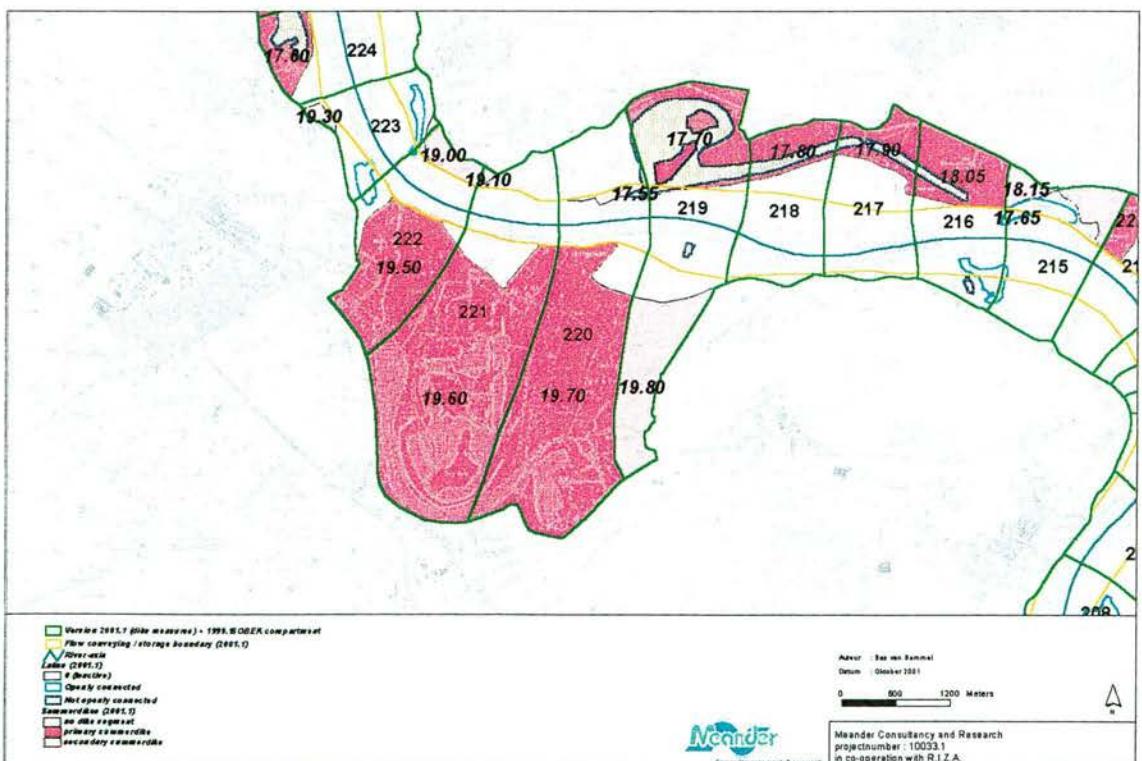


Figure A1.3B: Map overview of river measure Bislicher Insel version 2001.1
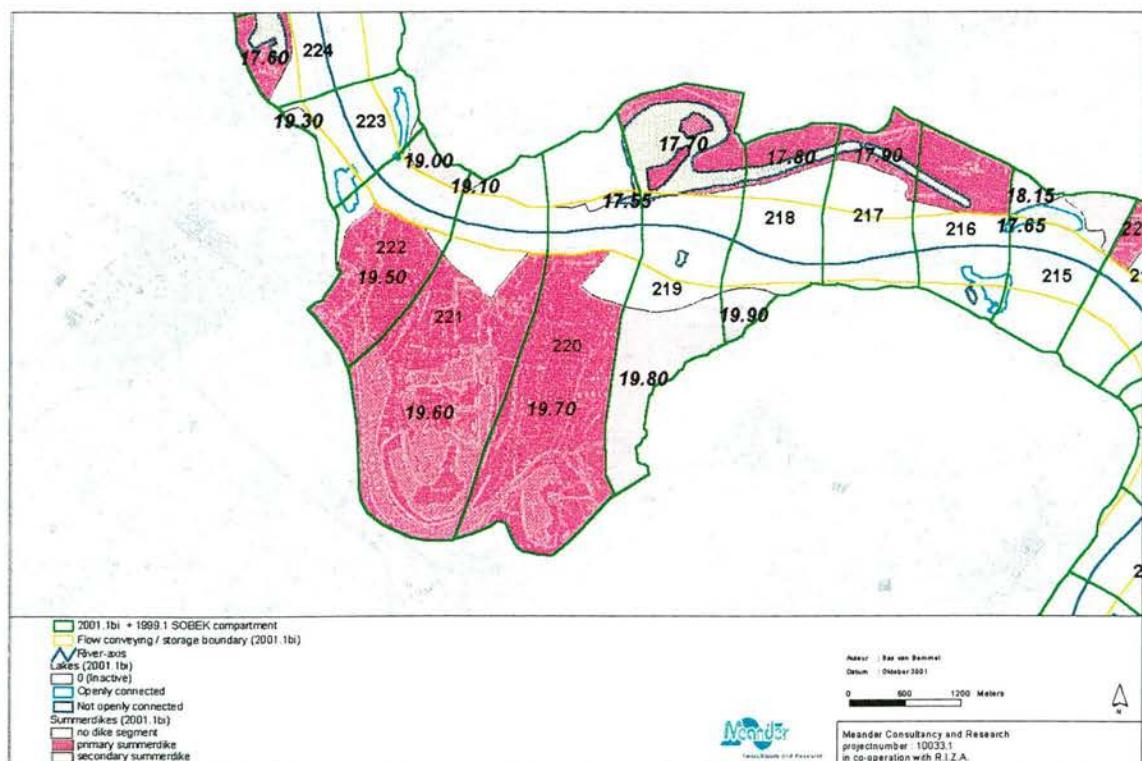
Figure A1.3C: Map overview of river measure Bislicher Insel version 2001.1bi
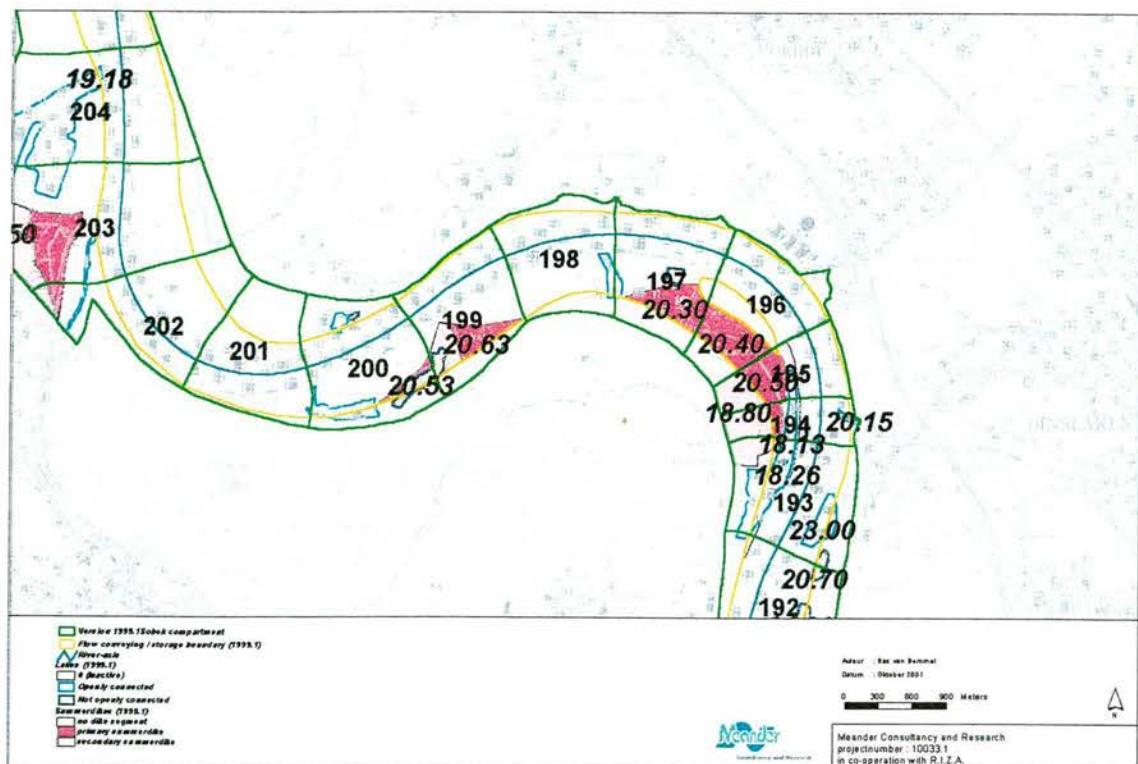
Figure A1.4A: Map overview of Orsoy version 1999.1
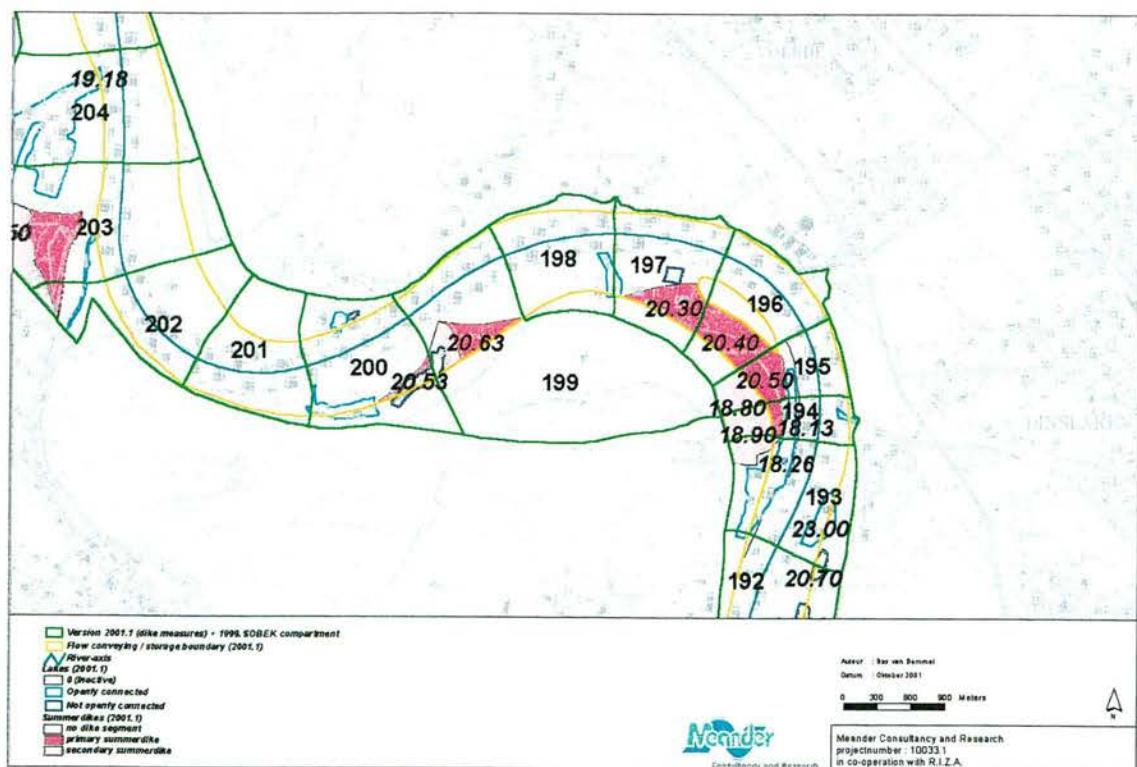


Figure A1.4B: Map overview of river measure Orsoy version 2001.1
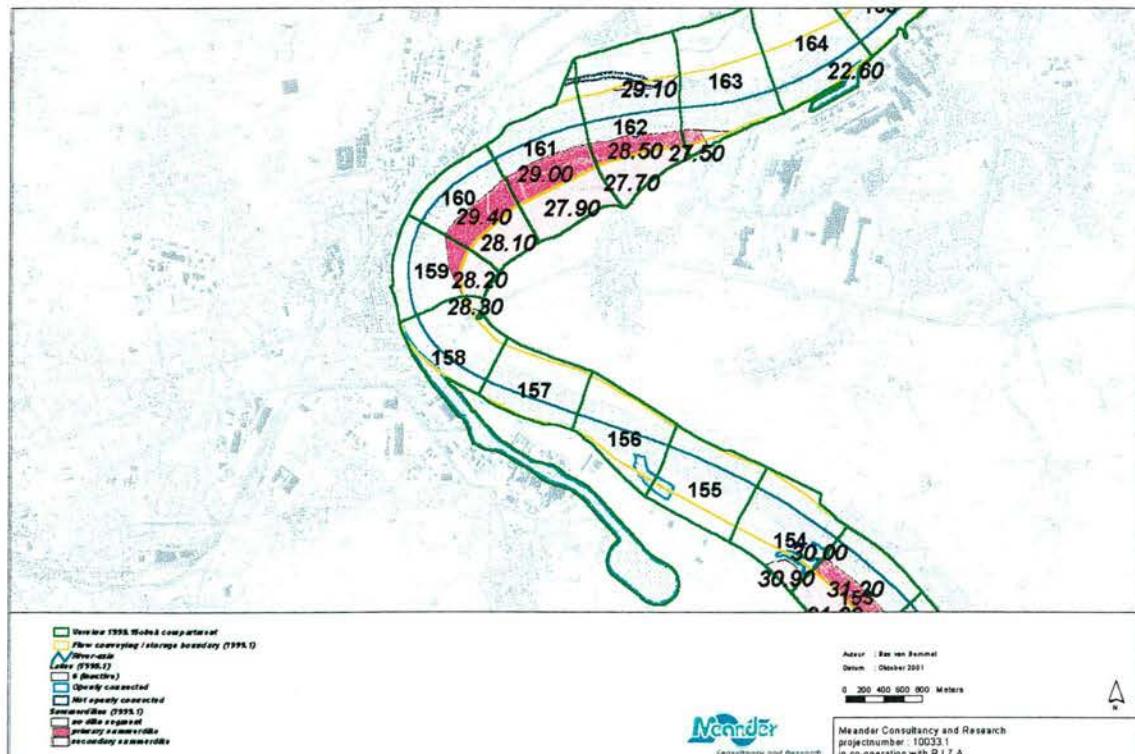
Figure A1.5A: Map overview of Mündelheim version 1999.1
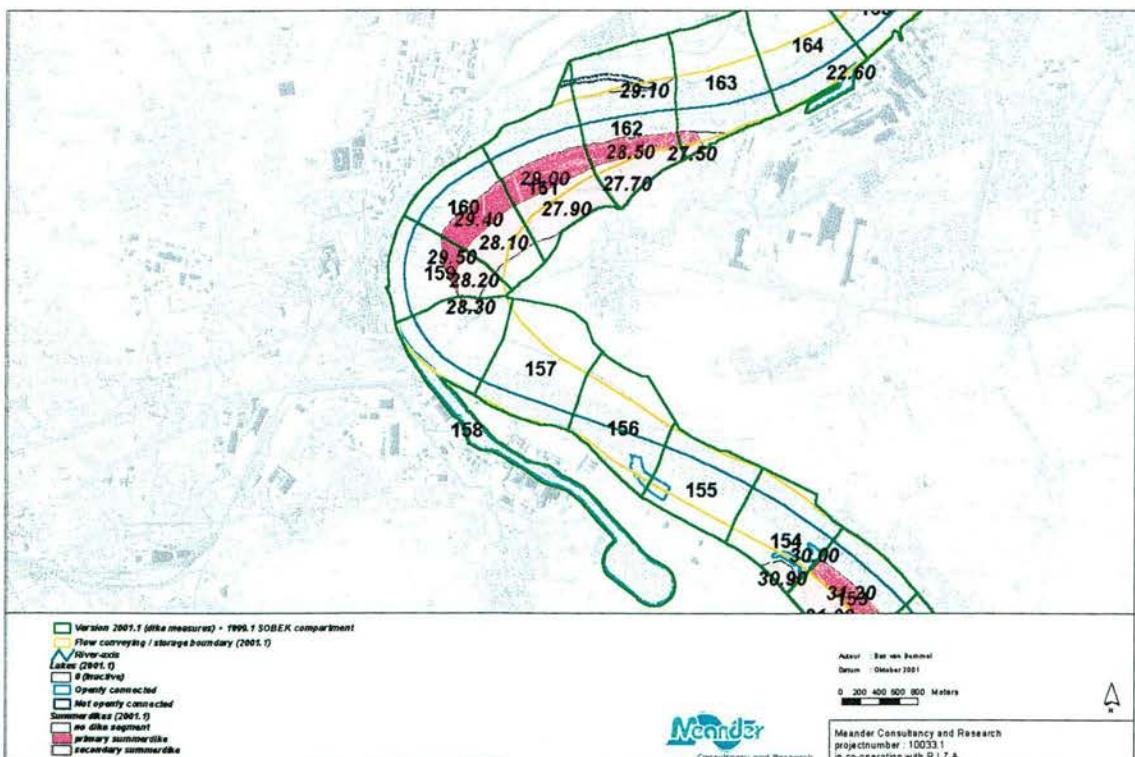


Figure A1.5B: Map overview of river measure Mündelheim version 2001.1
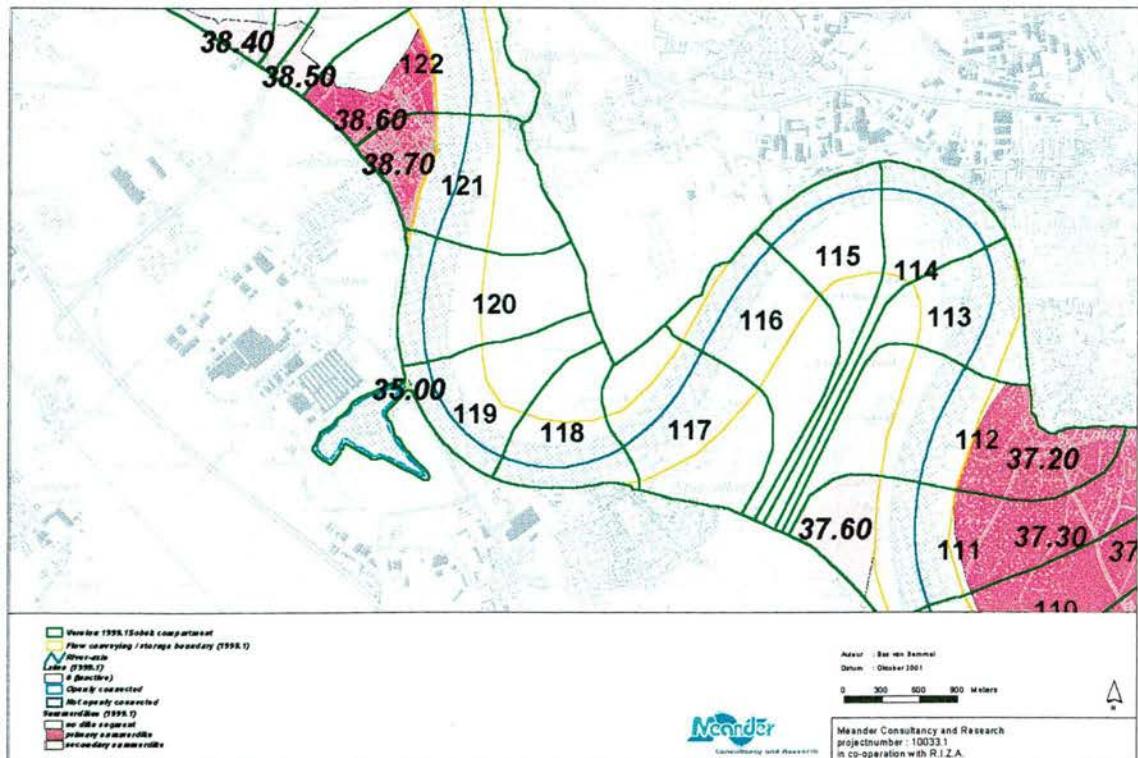
Figure A1.6A: Map overview of Itter Himmelgeist version 1999.1
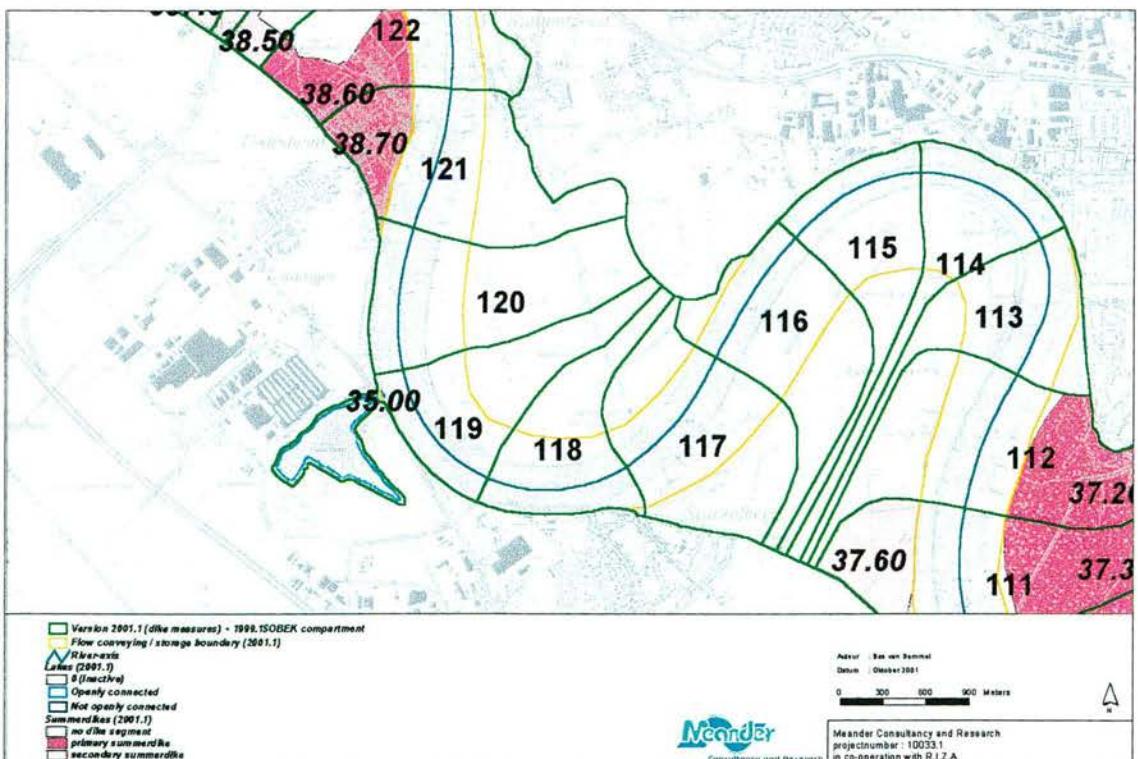


Figure A1.6B: Map overview of river measure Itter Himmelgeist version 2001.1
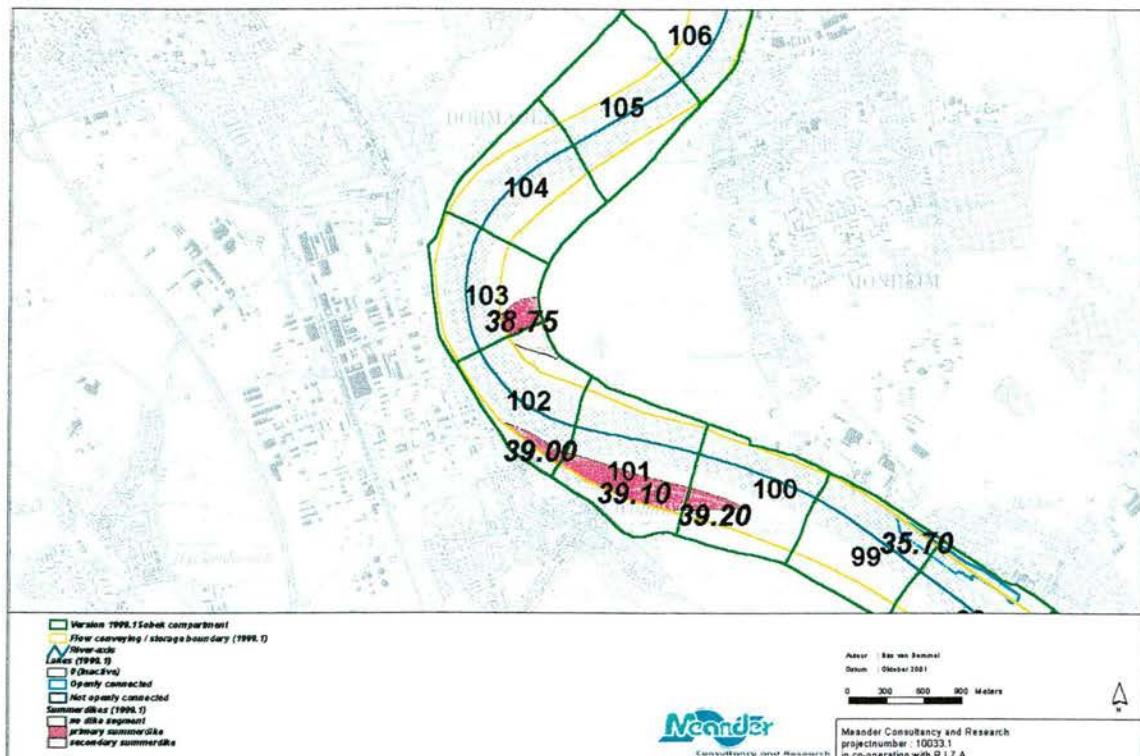
Figure A1.7A: Map overview of Monheim version 1999.1
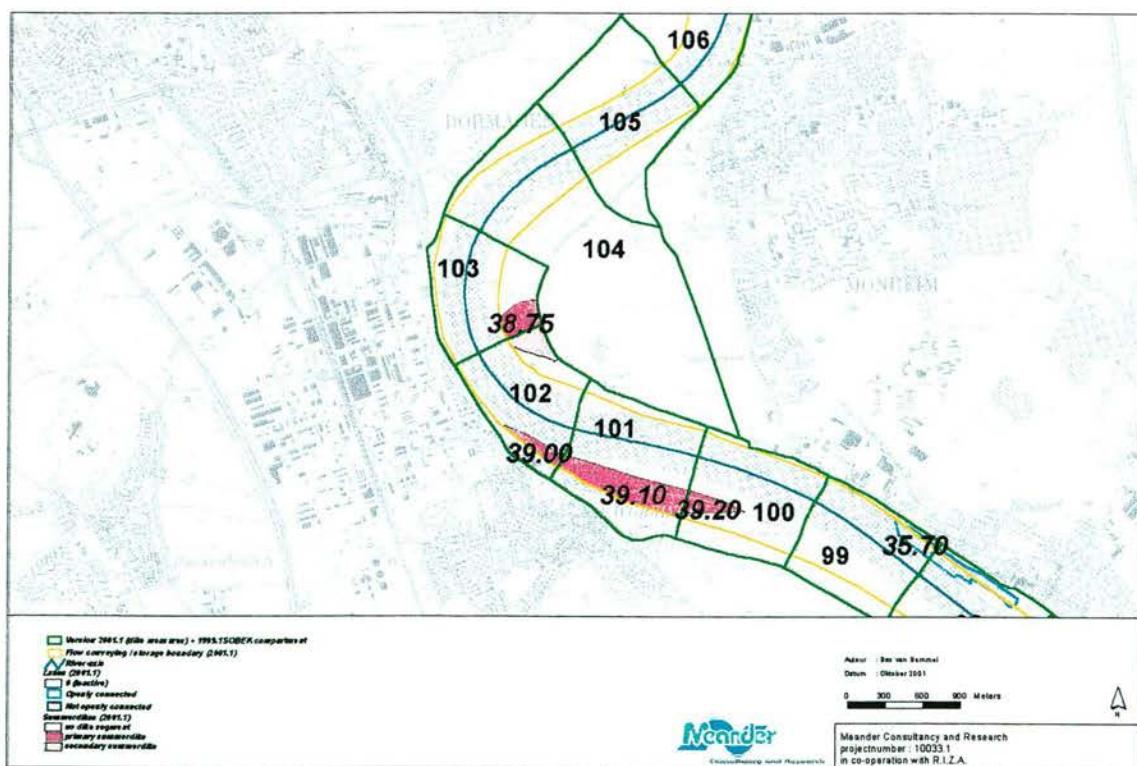


Figure A1.7B: Map overview of river measure Monheim version 2001.1

# Annex 2　　　Map overviews measures Oberrhein
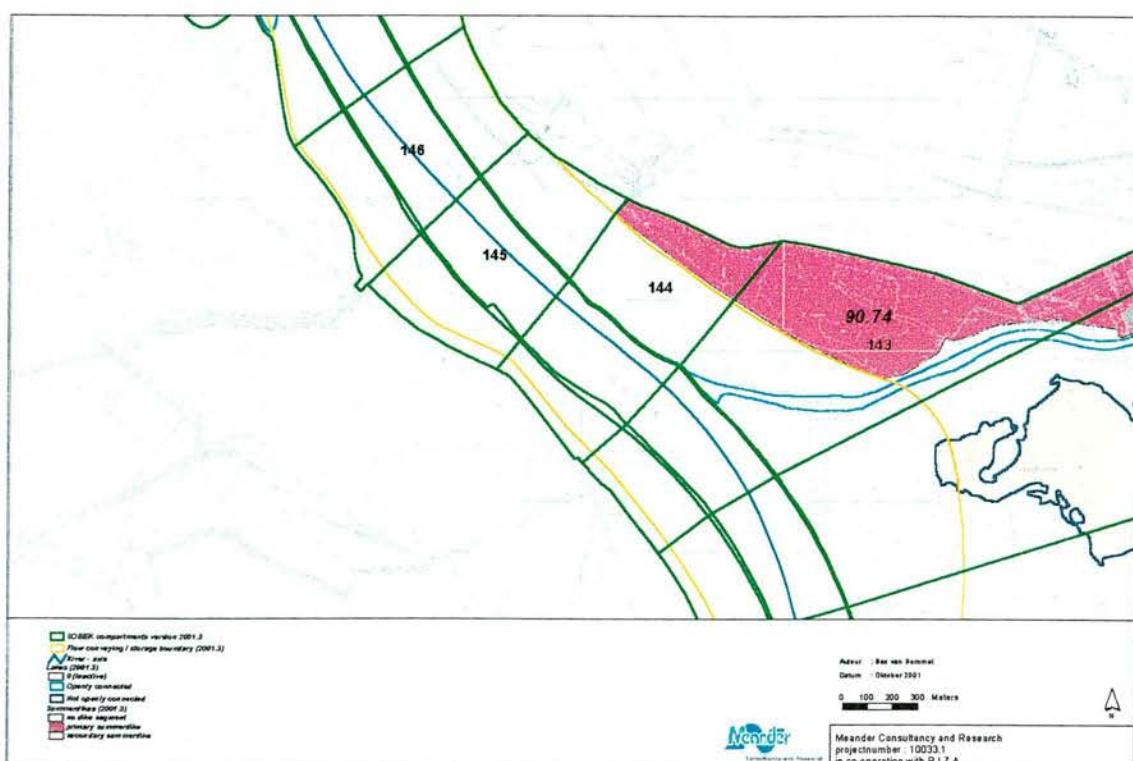


Figure A2.1A: Map overview of Worms Bürgerweide version 2001.3
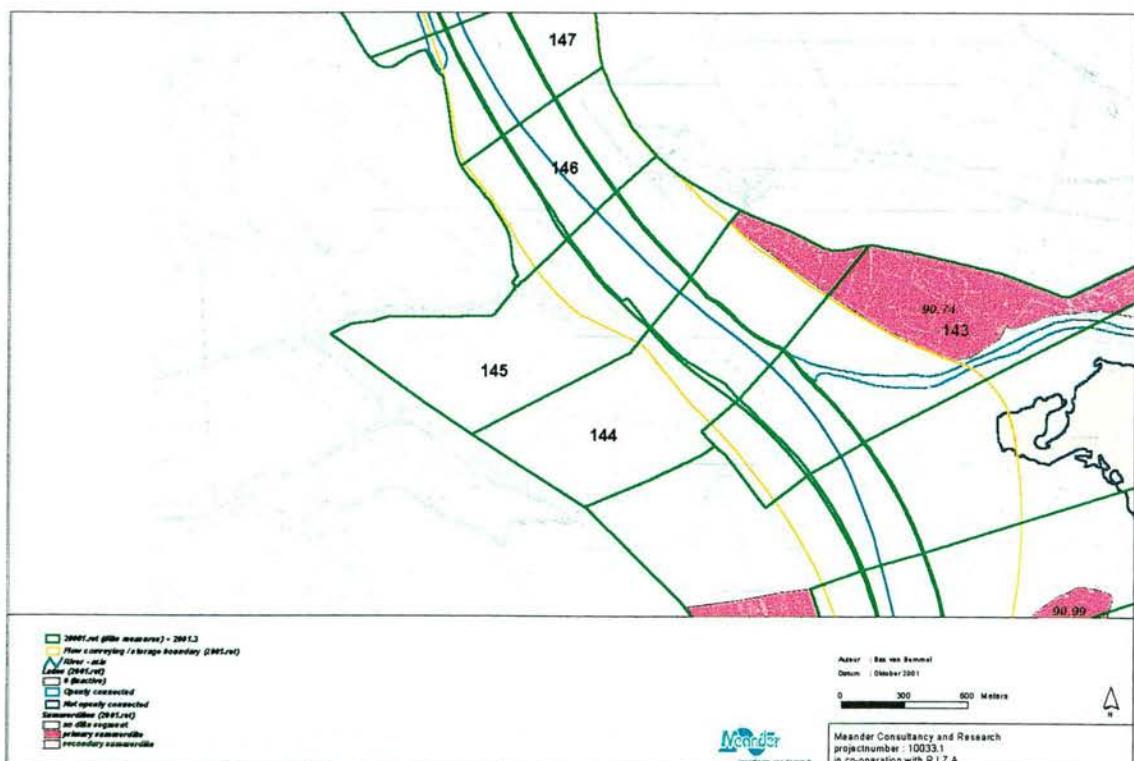


Figure A2.1B: Map overview of river measure Worms Bürgerweide version 2001.ret
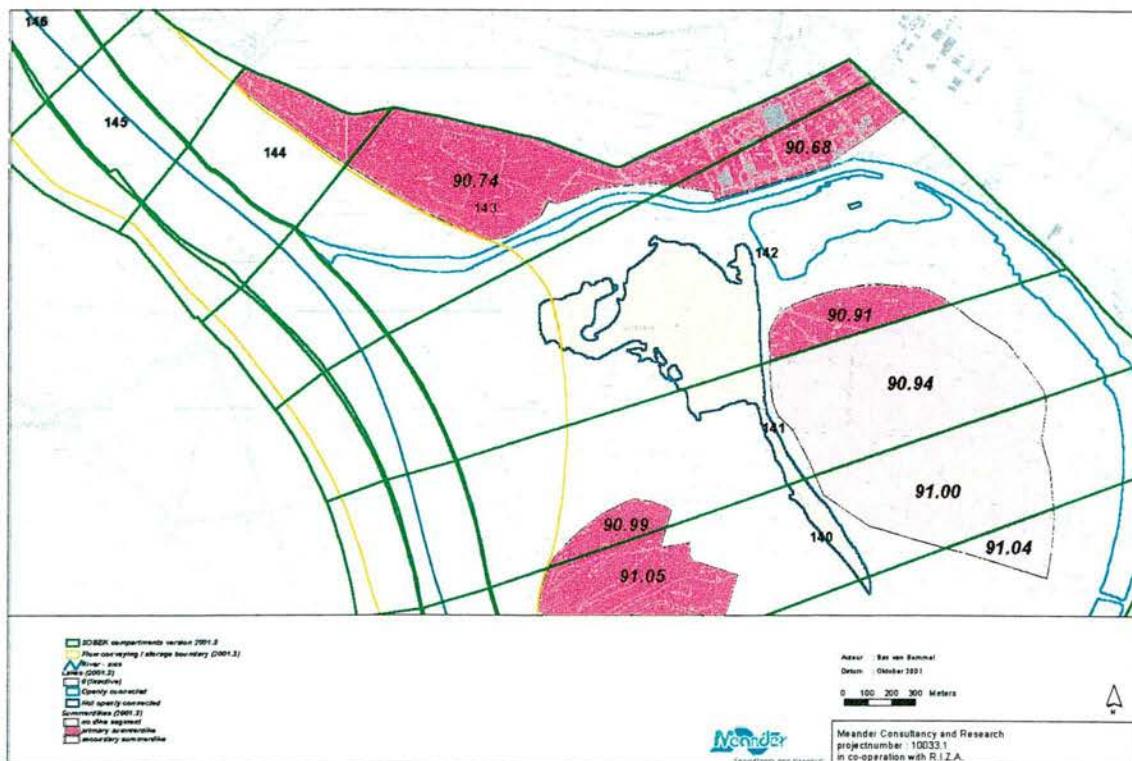
Figure A2.2A: Map overview of Worms Mittlerer Busch version 2001.3
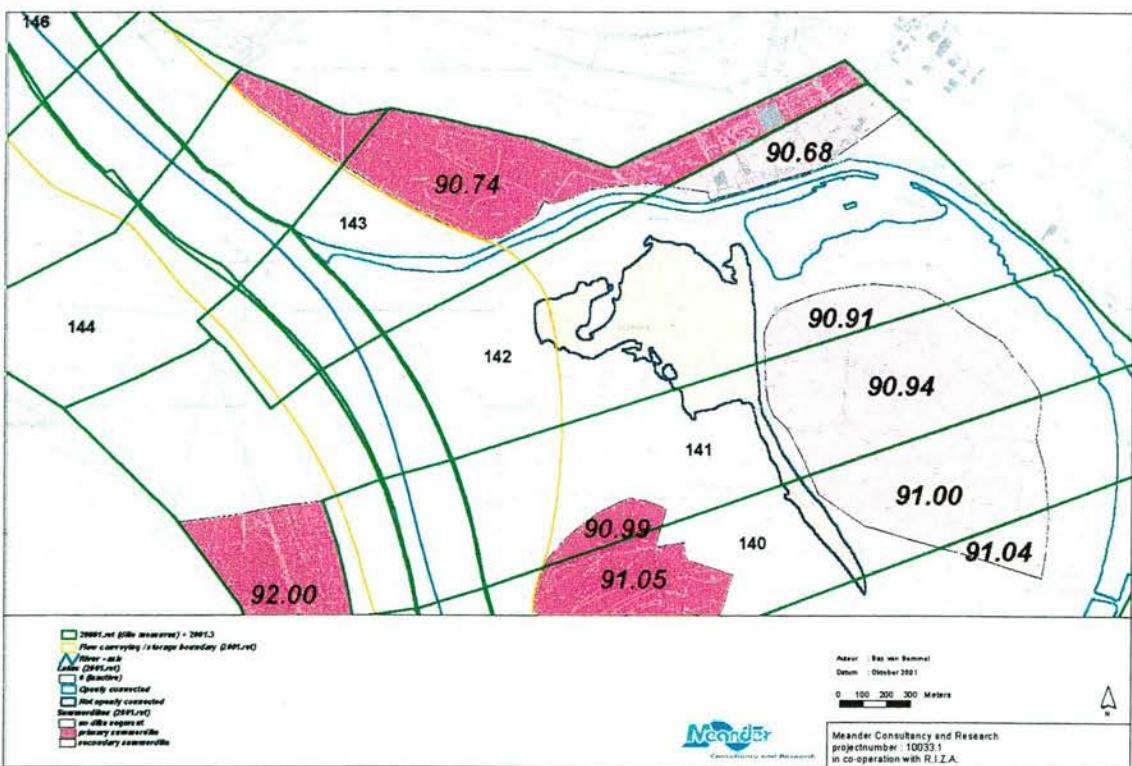


Figure A2.2B: Map overview of of river measure Worms Mittlerer Busch version 2001.ret
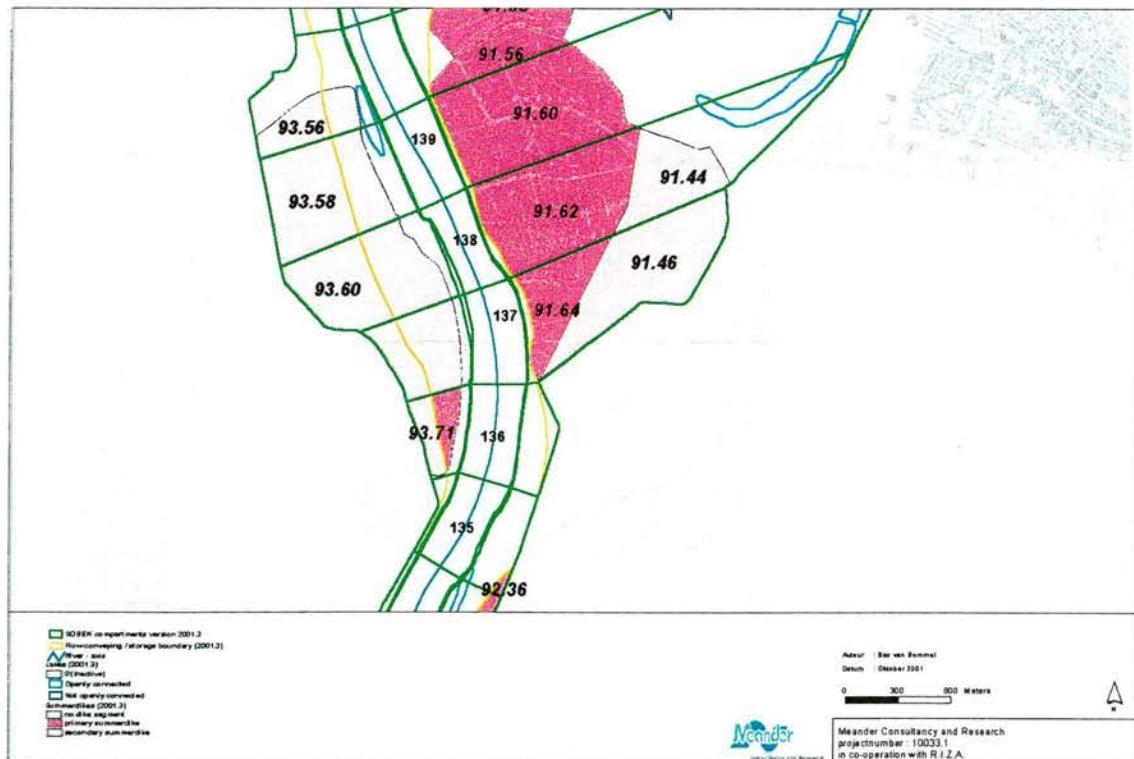
Figure A2.3A: Map overview of Petersau Bannen version 2001.3
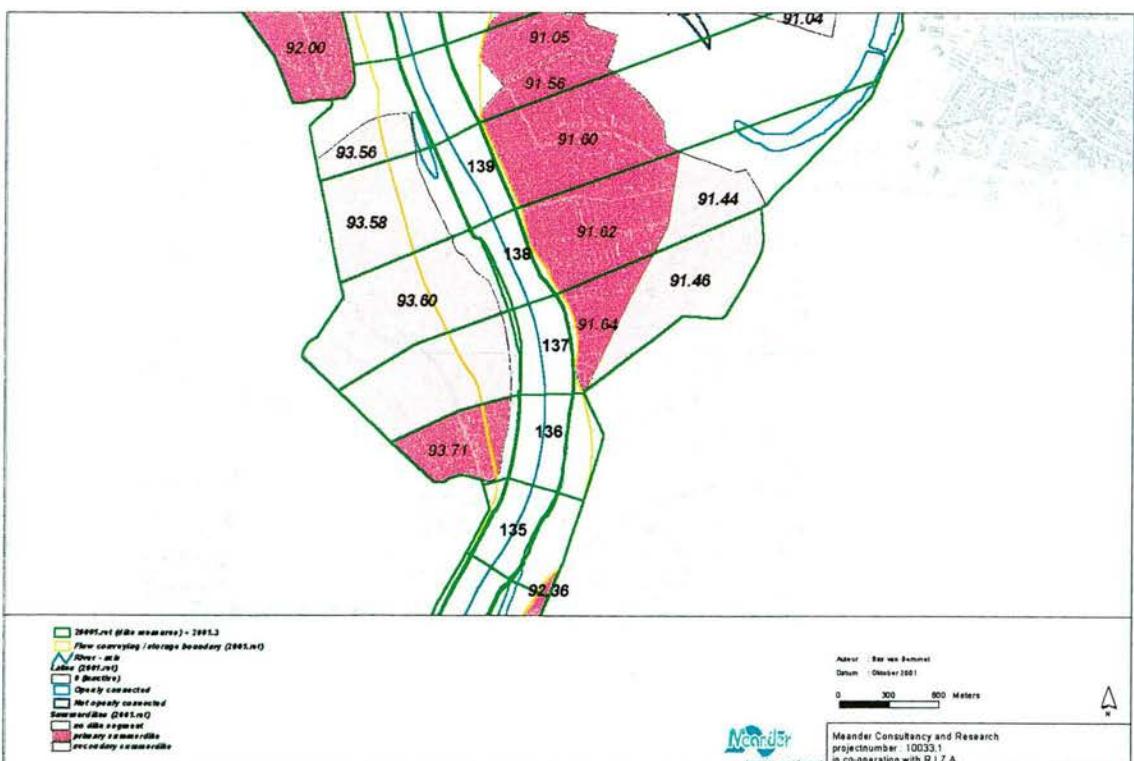
Figure A2.3B: Map overview of river measure Petersau Bannen version 2001.ret
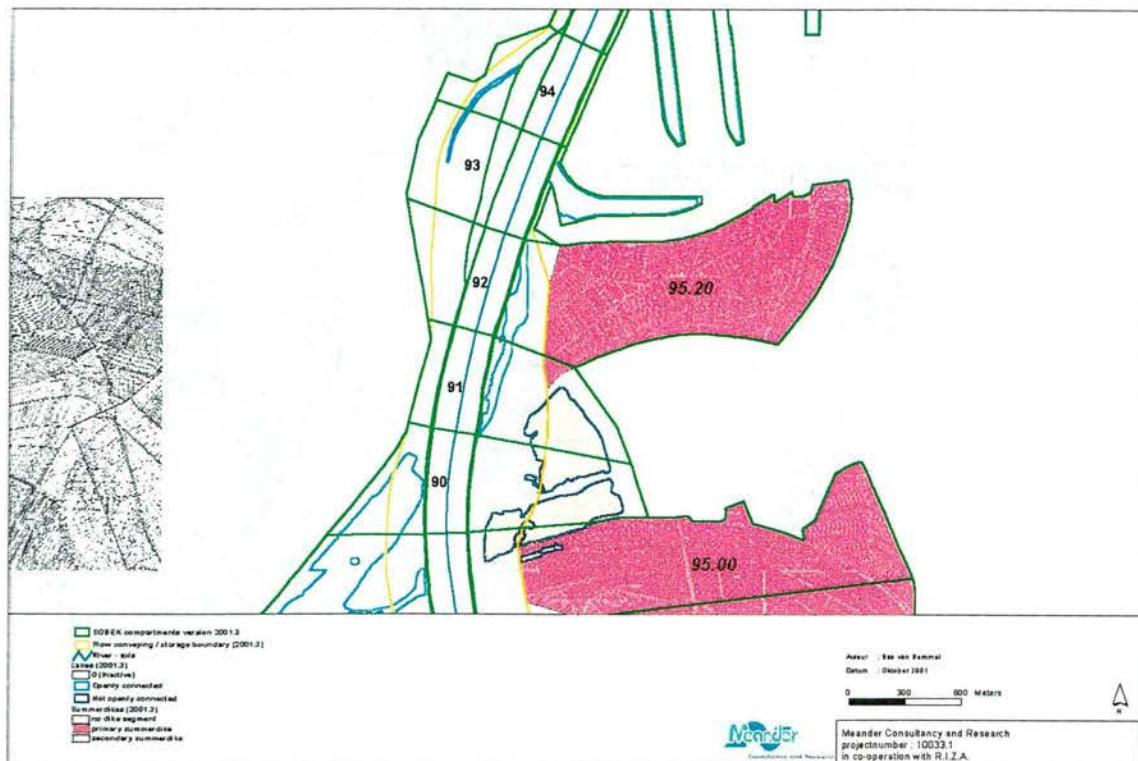
Figure A2.4A: Map overview of Waldsee Altrip Neuhofen version 2001.3
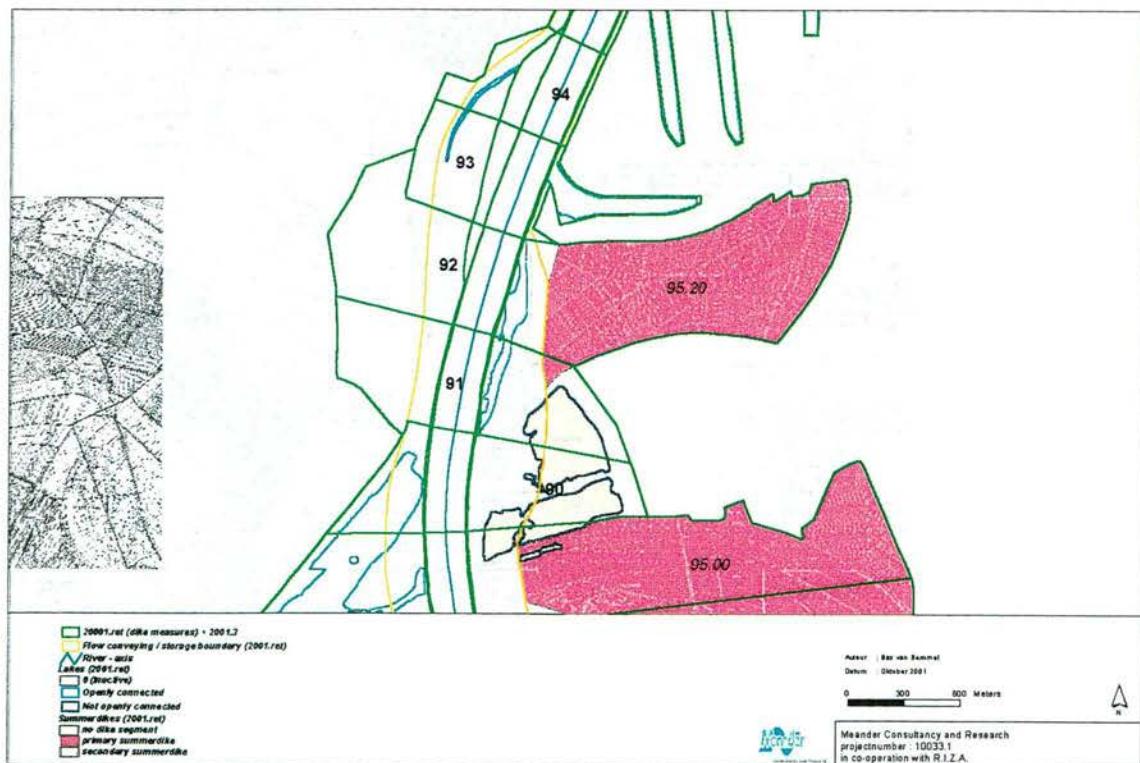


Figure A2.4B: Map overview of river measure Waldsee Altrip Neuhofen version 2001.ret
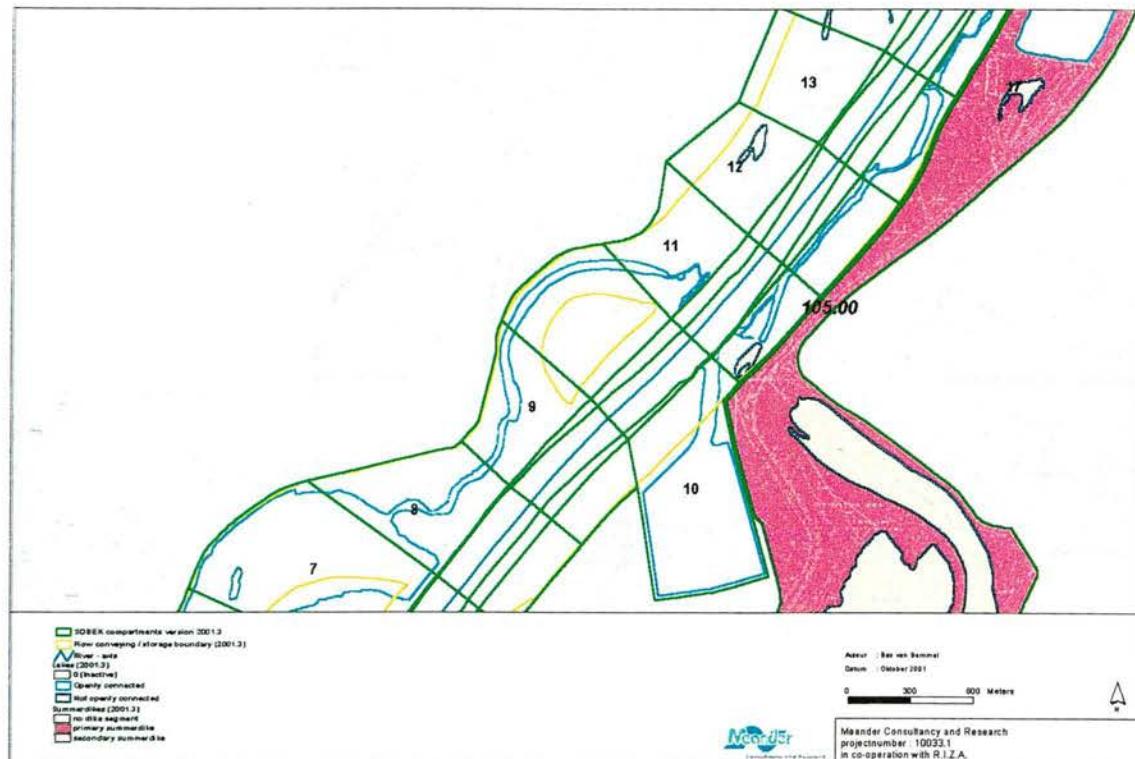
Figure A2.5A: Map overview of Wörth Jockgrim version 2001.3
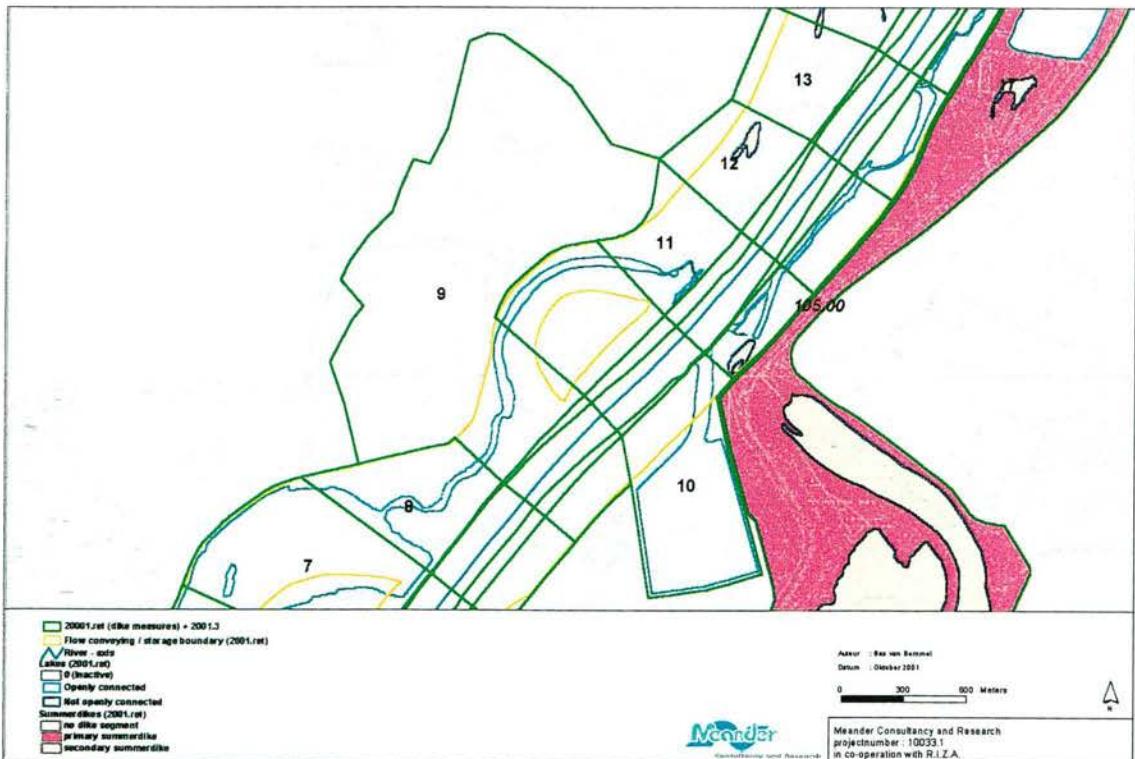


Figure A2.5B: Map overview of river measure Wörth Jockgrim version 2001.ret

# Annex 3     SOBEK cross-sections dike realignments Niederrhein

| ! Rhein. 707.5-708.5. Worringen. versie 1999.1 | ! Rhein, 707.5-708.5, Worringen, versie 2001.1 |
|---|---|
| $CROSS 100 TABULATED 260 370 WS 260 DA 39.20 38.52 22 22 | $CROSS 100 TABULATED 260 370 WS 260 DA 39.20 38.52 22 22 |
| 28.73   0    0 !#MAIN | 28.73   0    0 !#MAIN |
| 29.86   198   198 | 29.86   198   198 |
| 31.21   251   251 | 31.21   251   251 |
| 32.56   259   259 | 32.56   259   259 |
| 33.91   260   260 !#SUB0 | 33.91   260   260 !#SUB0 |
| 34.55   261   367 | 34.55   261   367 |
| 34.65   262   369 !#KRIB | 34.65   262   369 !#KRIB |
| 34.75   370   370 !#SUB1 | 34.75   370   370 !#SUB1 |
| 36.98   419   420 | 36.98   419   420 |
| 39.20   530   606 !#DIKE1 | 39.20   530   606 !#DIKE1 |
| 39.22   564   643 !#DIKE2 | 39.22   564   643 !#DIKE2 |
| 40.11   666   813 | 40.11   666   815 |
| 41.00   670   827 | 41.00   670   826 |
| 41.89   671   831 | 41.89   671   831 |
| 42.78   672   836 !#SUB2 | 42.78   672   836 !#SUB2 |
| ! Rhein. 708.5-709.5. Worringen. versie 1999.1 | ! Rhein, 708.5-709.5, Worringen, versie 2001.1 |
| $CROSS 101 TABULATED 263 353 WS 263 DA 39.09 38.03 191 191 | $CROSS 101 TABULATED 263 353 WS 263 DA 39.09 38.03 191 191 |
| 28.30   0    0 !#MAIN | 28.30   0    0 !#MAIN |
| 28.80   93   93 | 28.80   93   93 |
| 30.43   221   221 | 30.43   221   221 |
| 32.07   261   261 | 32.07   261   261 |
| 33.70   263   263 !#SUB0 | 33.70   263   263 !#SUB0 |
| 34.34   264   352 | 34.34   264   352 |
| 34.44   265   353 !#KRIB | 34.44   265   353 !#KRIB |
| 34.54   353   354 !#SUB1 | 34.54   353   354 !#SUB1 |
| 36.82   431   460 | 36.82   431   460 |
| 39.09   502   724 !#DIKE1 | 39.09   502   724 !#DIKE1 |
| 39.18   683   907 !#DIKE2 | 39.18   683   908 !#DIKE2 |
| 39.74   700   940 | 39.72   700   944 |
| 40.29   701   949 | 40.25   701   955 |
| 40.85   702   956 | 40.79   702   957 |
| 41.40   703   962 !#SUB2 | 41.32   703   961 !#SUB2 |
| ! Rhein. 709.5-710.5. Worringen. versie 1999.1 | ! Rhein, 709.5-710.5, Worringen, versie 2001.1 |
| $CROSS 102 TABULATED 276 335 WS 276 DA 39.00 36.25 124 238 | $CROSS 102 TABULATED 276 335 WS 276 DA 39.00 36.25 124 238 |
| 27.95   0    0 !#MAIN | 27.95   0    0 !#MAIN |
| 28.58   144   144 | 28.58   144   144 |
| 30.24   246   246 | 30.24   246   246 |
| 31.90   269   269 | 31.90   269   269 |
| 33.56   276   276 !#SUB0 | 33.56   276   276 !#SUB0 |
| 34.20   277   334 | 34.20   277   334 |
| 34.30   278   335 !#KRIB | 34.30   278   335 !#KRIB |
| 34.40   335   336 !#SUB1 | 34.40   335   336 !#SUB1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 36.70 | 380 | 387 | | 36.70 | 380 | 387 |
| 39.00 | 427 | 545 !#DIKE1 | | 39.00 | 427 | 546 !#DIKE1 |
| 39.02 | 462 | 581 !#DIKE2 | | 39.02 | 462 | 581 !#DIKE2 |
| 39.85 | 497 | 651 | | 39.81 | 497 | 652 |
| 40.67 | 500 | 672 | | 40.59 | 500 | 672 |
| 41.50 | 501 | 689 | | 41.38 | 501 | 687 |
| 42.33 | 502 | 717 !#SUB2 | | 42.17 | 502 | 707 !#SUB2 |

! Rhein. 710.5-711.5. Dormagen. versie 1999.1          ! Rhein, 710.5-711.5, Dormagen, versie 2001.1

$CROSS 103 TABULATED 277 311 WS 277 DA 38.75 36.64 0 132      $CROSS 103 TABULATED 277 311 WS 277 DA 38.75 36.64 0 132

| | | | | | | |
|---|---|---|---|---|---|---|
| 26.91 | 0 | 0 !#MAIN | | 26.91 | 0 | 0 !#MAIN |
| 28.34 | 149 | 149 | | 28.34 | 149 | 149 |
| 30.01 | 199 | 199 | | 30.01 | 199 | 199 |
| 31.68 | 241 | 241 | | 31.68 | 241 | 241 |
| 33.35 | 277 | 277 !#SUB0 | | 33.35 | 277 | 277 !#SUB0 |
| 33.99 | 278 | 310 | | 33.99 | 278 | 310 |
| 34.09 | 279 | 311 !#KRIB | | 34.09 | 279 | 311 !#KRIB |
| 34.19 | 311 | 312 !#SUB1 | | 34.19 | 311 | 312 !#SUB1 |
| 36.47 | 364 | 376 | | 36.47 | 364 | 376 |
| 38.75 | 462 | 577 !#DIKE1 | | 38.75 | 462 | 577 !#DIKE1 |
| 38.76 | 463 | 641 !#DIKE2 | | 38.76 | 463 | 641 !#DIKE2 |
| 39.52 | 487 | 698 | | 39.59 | 487 | 699 |
| 40.27 | 488 | 710 | | 40.42 | 488 | 711 |
| 41.03 | 489 | 714 | | 41.24 | 489 | 719 |
| 41.78 | 490 | 724 !#SUB2 | | 42.07 | 490 | 727 !#SUB2 |

! Rhein. 711.5-712.5. Dormagen. versie 1999.1          ! Rhein, 711.5-712.5, Dormagen, versie 2001.1

$CROSS 104 TABULATED 272 309 WS 272 DA 37.37 37.37 0 0      $CROSS 104 TABULATED 272 309 WS 272 DA 37.32 37.32 0 0

| | | | | | | |
|---|---|---|---|---|---|---|
| 27.03 | 13 | 13 !#MAIN | | 27.03 | 13 | 13 !#MAIN |
| 28.54 | 145 | 145 | | 28.54 | 145 | 145 |
| 30.05 | 193 | 193 | | 30.05 | 193 | 193 |
| 31.55 | 236 | 236 | | 31.55 | 236 | 236 |
| 33.06 | 272 | 272 !#SUB0 | | 33.06 | 272 | 272 !#SUB0 |
| 33.70 | 273 | 304 | | 33.70 | 273 | 304 |
| 33.80 | 274 | 307 !#KRIB | | 33.80 | 274 | 307 !#KRIB |
| 33.90 | 309 | 309 !#SUB1 | | 33.90 | 309 | 309 !#SUB1 |
| 35.06 | 343 | 343 | | 35.04 | 343 | 362 |
| 36.21 | 380 | 392 | | 36.18 | 379 | 419 |
| 37.37 | 431 | 572 !#LEV1 | | 37.32 | 429 | 600 !#LEV1 |
| 38.52 | 516 | 824 | | 38.46 | 514 | 1353 |
| 39.68 | 528 | 866 | | 39.60 | 528 | 2309 |
| 40.83 | 529 | 871 | | 40.74 | 529 | 2466 |
| 41.99 | 530 | 881 !#SUB2 | | 41.88 | 530 | 2492 !#SUB2 |

! Rhein. 712.5-713.5. Monheim. versie 1999.1          ! Rhein, 712.5-713.5, Monheim, versie 2001.1

$CROSS 105 TABULATED 286 346 WS 286 DA 37.16 37.16 0 0      $CROSS 105 TABULATED 286 346 WS 286 DA 37.14 37.14 0 0

| | | | | | | |
|---|---|---|---|---|---|---|
| 26.89 | 0 | 0 !#MAIN | | 26.89 | 0 | 0 !#MAIN |
| 28.19 | 123 | 123 | | 28.19 | 123 | 123 |
| 29.74 | 229 | 229 | | 29.74 | 229 | 229 |
| 31.29 | 273 | 273 | | 31.29 | 273 | 273 |
| 32.84 | 286 | 286 !#SUB0 | | 32.84 | 286 | 286 !#SUB0 |
| 33.48 | 287 | 345 | | 33.48 | 287 | 345 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 33.58 | 288 | 346 !#KRIB | | 33.58 | 288 | 346 !#KRIB |
| 33.68 | 346 | 347 !#SUB1 | | 33.68 | 346 | 347 !#SUB1 |
| 34.84 | 366 | 376 | | 34.83 | 366 | 375 |
| 36.00 | 379 | 426 | | 35.99 | 379 | 425 |
| 37.16 | 392 | 513 !#LEV1 | | 37.14 | 392 | 518 !#LEV1 |
| 38.33 | 405 | 584 | | 38.30 | 405 | 621 |
| 39.49 | 419 | 935 | | 39.45 | 419 | 1010 |
| 40.65 | 420 | 959 | | 40.61 | 420 | 1038 |
| 41.81 | 421 | 969 !#SUB2 | | 41.76 | 421 | 1049 !#SUB2 |

| | | |
|---|---|---|
| ! Rhein. 723.5-724.5. Sturzelberg. versie 1999.1 | | ! Rhein, 723.5-724.5, Sturzelberg, versie 2001.1 |
| $CROSS 116 TABULATED 272 310 WS 272 DA 35.03 35.03 0 0 | | $CROSS 116 TABULATED 272 310 WS 272 DA 35.03 35.03 0 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 24.72 | 11 | 11 !#MAIN | | 24.72 | 11 | 11 !#MAIN |
| 26.21 | 162 | 162 | | 26.21 | 162 | 162 |
| 27.70 | 201 | 201 | | 27.70 | 201 | 201 |
| 29.18 | 235 | 235 | | 29.18 | 235 | 235 |
| 30.67 | 272 | 272 !#SUB0 | | 30.67 | 272 | 272 !#SUB0 |
| 31.31 | 273 | 308 | | 31.31 | 273 | 308 |
| 31.41 | 274 | 310 !#KRIB | | 31.41 | 274 | 310 !#KRIB |
| 31.51 | 310 | 311 !#SUB1 | | 31.51 | 310 | 311 !#SUB1 |
| 32.68 | 349 | 349 | | 32.68 | 349 | 349 |
| 33.86 | 386 | 386 | | 33.86 | 386 | 386 |
| 35.03 | 450 | 450 !#LEV1 | | 35.03 | 450 | 450 !#LEV1 |
| 36.21 | 551 | 566 | | 36.21 | 551 | 568 |
| 37.38 | 684 | 1151 | | 37.38 | 684 | 1160 |
| 38.56 | 690 | 1211 | | 38.56 | 690 | 1228 |
| 39.73 | 692 | 1243 !#SUB2 | | 39.73 | 691 | 1253 !#SUB2 |

| | | |
|---|---|---|
| ! Rhein. 724.5-725.5. Sturzelberg. versie 1999.1 | | ! Rhein, 724.5-725.5, Sturzelberg, versie 2001.1 |
| $CROSS 117 TABULATED 298 338 WS 298 DA 34.72 34.72 0 0 | | $CROSS 117 TABULATED 298 338 WS 298 DA 34.70 34.70 0 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25.12 | 0 | 0 !#MAIN | | 25.12 | 0 | 0 !#MAIN |
| 25.73 | 159 | 159 | | 25.73 | 159 | 159 |
| 27.30 | 252 | 252 | | 27.30 | 252 | 252 |
| 28.86 | 285 | 285 | | 28.86 | 285 | 285 |
| 30.43 | 298 | 298 !#SUB0 | | 30.43 | 298 | 298 !#SUB0 |
| 31.07 | 299 | 337 | | 31.07 | 299 | 337 |
| 31.17 | 300 | 338 !#KRIB | | 31.17 | 300 | 338 !#KRIB |
| 31.27 | 338 | 339 !#SUB1 | | 31.27 | 338 | 339 !#SUB1 |
| 32.42 | 361 | 361 | | 32.41 | 361 | 361 |
| 33.57 | 401 | 410 | | 33.56 | 399 | 408 |
| 34.72 | 529 | 555 !#LEV1 | | 34.70 | 527 | 551 !#LEV1 |
| 35.87 | 595 | 675 | | 35.84 | 594 | 674 |
| 37.02 | 677 | 1094 | | 36.98 | 675 | 1112 |
| 38.17 | 692 | 1339 | | 38.13 | 692 | 1391 |
| 39.32 | 693 | 1378 !#SUB2 | | 39.27 | 693 | 1434 !#SUB2 |

| | | |
|---|---|---|
| ! Rhein. 725.5-726.5. Sturzelberg. versie 1999.1 | | ! Rhein, 725.5-726.5, Sturzelberg, versie 2001.1 |
| $CROSS 118 TABULATED 276 290 WS 276 DA 33.88 33.88 0 0 | | $CROSS 118 TABULATED 276 290 WS 276 DA 34.05 34.05 0 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 21.86 | 0 | 0 !#MAIN | | 21.86 | 0 | 0 !#MAIN |
| 23.50 | 65 | 65 | | 23.50 | 65 | 65 |
| 25.77 | 167 | 167 | | 25.77 | 167 | 167 |
| 28.05 | 229 | 229 | | 28.05 | 229 | 229 |

| | | |
|---|---|---|
| 30.32 | 276 | 276 !#SUB0 |
| 30.96 | 277 | 290 |
| 31.06 | 278 | 291 !#KRIB |
| 31.16 | 290 | 292 !#SUB1 |
| 32.07 | 308 | 308 |
| 32.97 | 320 | 320 |
| 33.88 | 340 | 340 !#LEV1 |
| 34.79 | 358 | 358 |
| 35.70 | 384 | 385 |
| 36.60 | 449 | 549 |
| 37.51 | 497 | 760 !#SUB2 |

| | | |
|---|---|---|
| 30.32 | 276 | 276 !#SUB0 |
| 30.96 | 277 | 290 |
| 31.06 | 278 | 291 !#KRIB |
| 31.16 | 290 | 292 !#SUB1 |
| 32.12 | 309 | 309 |
| 33.09 | 325 | 325 |
| 34.05 | 344 | 344 !#LEV1 |
| 35.02 | 366 | 367 |
| 35.98 | 389 | 396 |
| 36.95 | 487 | 707 |
| 37.91 | 491 | 839 !#SUB2 |

! Rhein. 726.5-727.5. Uedesheim. versie 1999.1

$CROSS 119 TABULATED 246 261 WS 246 DA 34.77 34.77 0 0

| | | |
|---|---|---|
| 20.65 | 0 | 219 !#LAKE |
| 22.23 | 46 | 265 |
| 24.88 | 130 | 349 |
| 27.52 | 197 | 416 |
| 30.16 | 246 | 465 !#SUB0 |
| 30.80 | 247 | 480 |
| 30.90 | 248 | 481 !#KRIB |
| 31.00 | 261 | 482 !#SUB1 |
| 32.26 | 307 | 526 |
| 33.51 | 323 | 543 |
| 34.77 | 371 | 596 !#LEV1 |
| 36.03 | 481 | 786 |
| 37.29 | 525 | 1108 |
| 38.54 | 526 | 1130 |
| 39.80 | 527 | 1155 !#SUB2 |

! Rhein, 726.5-727.5, Uedesheim, versie 2001.1

$CROSS 119 TABULATED 246 261 WS 246 DA 34.77 34.77 0 0

| | | |
|---|---|---|
| 20.65 | 0 | 219 !#LAKE |
| 22.23 | 46 | 265 |
| 24.88 | 130 | 349 |
| 27.52 | 197 | 416 |
| 30.16 | 246 | 465 !#SUB0 |
| 30.80 | 247 | 480 |
| 30.90 | 248 | 481 !#KRIB |
| 31.00 | 261 | 482 !#SUB1 |
| 32.26 | 307 | 526 |
| 33.51 | 323 | 544 |
| 34.77 | 371 | 597 !#LEV1 |
| 36.03 | 481 | 788 |
| 37.29 | 525 | 1198 |
| 38.54 | 526 | 1224 |
| 39.80 | 527 | 1246 !#SUB2 |

! Rhein. 727.5-728.5. Uedesheim. versie 1999.1

$CROSS 120 TABULATED 269 306 WS 269 DA 38.75 36.62 0 9

| | | |
|---|---|---|
| 21.85 | 0 | 0 !#MAIN |
| 23.58 | 79 | 79 |
| 25.71 | 152 | 152 |
| 27.83 | 210 | 210 |
| 29.96 | 269 | 269 !#SUB0 |
| 30.60 | 270 | 306 |
| 30.70 | 271 | 307 !#KRIB |
| 30.80 | 306 | 308 !#SUB1 |
| 34.78 | 466 | 509 |
| 38.75 | 596 | 1112 !#DIKE1 |
| 38.76 | 597 | 1116 !#DIKE2 |
| 38.77 | 598 | 1117 |
| 38.78 | 599 | 1118 |
| 38.79 | 600 | 1119 |
| 38.80 | 601 | 1120 !#SUB2 |

! Rhein, 727.5-728.5, Uedesheim, versie 2001.1

$CROSS 120 TABULATED 269 306 WS 269 DA 38.75 36.62 0 9

| | | |
|---|---|---|
| 21.85 | 0 | 0 !#MAIN |
| 23.58 | 79 | 79 |
| 25.71 | 152 | 152 |
| 27.83 | 210 | 210 |
| 29.96 | 269 | 269 !#SUB0 |
| 30.60 | 270 | 306 |
| 30.70 | 271 | 307 !#KRIB |
| 30.80 | 306 | 308 !#SUB1 |
| 34.78 | 466 | 510 |
| 38.75 | 596 | 1317 !#DIKE1 |
| 38.76 | 597 | 1321 !#DIKE2 |
| 38.79 | 598 | 1322 |
| 38.81 | 599 | 1323 |
| 38.84 | 600 | 1324 |
| 38.86 | 601 | 1325 !#SUB2 |

! Rhein. 728.5-729.5. Uedesheim. versie 1999.1

$CROSS 121 TABULATED 292 365 WS 292 DA 38.70 37.05 0 484

| | | |
|---|---|---|
| 24.08 | 0 | 0 !#MAIN |
| 25.07 | 122 | 122 |

! Rhein, 728.5-729.5, Uedesheim, versie 2001.1

$CROSS 121 TABULATED 292 365 WS 292 DA 38.70 37.05 0 484

| | | |
|---|---|---|
| 24.08 | 0 | 0 !#MAIN |
| 25.07 | 122 | 122 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 26.63 | 228 | 228 | | 26.63 | 228 | 228 |
| 28.18 | 285 | 285 | | 28.18 | 285 | 285 |
| 29.73 | 292 | 292 !#SUB0 | | 29.73 | 292 | 292 !#SUB0 |
| 30.37 | 293 | 364 | | 30.37 | 293 | 364 |
| 30.47 | 294 | 365 !#KRIB | | 30.47 | 294 | 365 !#KRIB |
| 30.57 | 365 | 366 !#SUB1 | | 30.57 | 365 | 366 !#SUB1 |
| 34.64 | 502 | 650 | | 34.64 | 502 | 652 |
| 38.70 | 552 | 961 !#DIKE1 | | 38.70 | 552 | 1073 !#DIKE1 |
| 38.76 | 553 | 1254 !#DIKE2 | | 38.76 | 553 | 1367 !#DIKE2 |
| 38.87 | 554 | 1257 | | 38.86 | 554 | 1368 |
| 38.98 | 555 | 1259 | | 38.97 | 555 | 1370 |
| 39.08 | 556 | 1261 | | 39.07 | 556 | 1371 |
| 39.19 | 557 | 1264 !#SUB2 | | 39.17 | 557 | 1373 !#SUB2 |

! Rhein. 760.5-761.5. Serm. versie 1999.1      ! Rhein, 760.5-761.5, Serm, versie 2001.1

$CROSS 155 TABULATED 325 352 WS 325 DA 28.50 28.50 25 0     $CROSS 155 TABULATED 325 352 WS 325 DA 28.50 28.50 25 0

| | | | | | | |
|---|---|---|---|---|---|---|
| 18.60 | 37 | 68 !#LAKE | | 18.60 | 37 | 68 !#LAKE |
| 19.80 | 208 | 240 | | 19.80 | 208 | 240 |
| 21.01 | 282 | 313 | | 21.01 | 282 | 313 |
| 22.21 | 317 | 348 | | 22.21 | 317 | 348 |
| 23.41 | 325 | 357 !#SUB0 | | 23.41 | 325 | 357 !#SUB0 |
| 24.01 | 326 | 382 | | 24.01 | 326 | 382 |
| 24.11 | 327 | 383 !#KRIB | | 24.11 | 327 | 383 !#KRIB |
| 24.21 | 352 | 384 !#SUB1 | | 24.21 | 352 | 384 !#SUB1 |
| 26.36 | 396 | 436 | | 26.36 | 396 | 436 |
| 28.50 | 592 | 717 !#DIKE1 | | 28.50 | 592 | 717 !#DIKE1 |
| 28.51 | 605 | 718 !#DIKE2 | | 28.51 | 605 | 718 !#DIKE2 |
| 29.50 | 613 | 745 | | 29.50 | 613 | 745 |
| 30.50 | 618 | 778 | | 30.50 | 618 | 779 |
| 31.49 | 619 | 790 | | 31.49 | 619 | 790 |
| 32.48 | 621 | 801 !#SUB2 | | 32.48 | 620 | 796 !#SUB2 |

! Rhein. 761.5-762.5. Serm. versie 1999.1      ! Rhein, 761.5-762.5, Serm, versie 2001.1

$CROSS 156 TABULATED 294 364 WS 294 DA 28.50 28.50 55 0     $CROSS 156 TABULATED 294 364 WS 294 DA 28.50 28.50 55 0

| | | | | | | |
|---|---|---|---|---|---|---|
| 18.27 | 0 | 36 !#LAKE | | 18.27 | 0 | 36 !#LAKE |
| 19.32 | 242 | 278 | | 19.32 | 242 | 278 |
| 20.60 | 278 | 314 | | 20.60 | 278 | 314 |
| 21.87 | 292 | 328 | | 21.87 | 292 | 328 |
| 23.15 | 294 | 330 !#SUB0 | | 23.15 | 294 | 330 !#SUB0 |
| 23.75 | 295 | 398 | | 23.75 | 295 | 398 |
| 23.85 | 296 | 400 !#KRIB | | 23.85 | 296 | 400 !#KRIB |
| 23.95 | 364 | 401 !#SUB1 | | 23.95 | 364 | 401 !#SUB1 |
| 26.23 | 413 | 460 | | 26.23 | 413 | 460 |
| 28.50 | 573 | 636 !#DIKE1 | | 28.50 | 578 | 664 !#DIKE1 |
| 28.51 | 601 | 637 !#DIKE2 | | 28.51 | 606 | 665 !#DIKE2 |
| 29.74 | 615 | 681 | | 29.68 | 621 | 793 |
| 30.96 | 616 | 698 | | 30.84 | 622 | 900 |
| 32.18 | 617 | 712 | | 32.00 | 623 | 909 |
| 33.40 | 618 | 726 !#SUB2 | | 33.16 | 624 | 920 !#SUB2 |

! Rhein. 762.5-763.5. Gellep. versie 1999.1      ! Rhein, 762.5-763.5, Gellep, versie 2001.1

$CROSS 157 TABULATED 277 350 WS 277 DA 27.09 27.09 0 0     $CROSS 157 TABULATED 277 350 WS 277 DA 26.56 26.56 0 0

| | | | | | |
|---|---|---|---|---|---|
| 17.71 | 0 | 0 !#MAIN | 17.71 | 0 | 0 !#MAIN |
| 18.53 | 207 | 207 | 18.53 | 207 | 207 |
| 20.00 | 258 | 258 | 20.00 | 258 | 258 |
| 21.47 | 268 | 268 | 21.47 | 268 | 268 |
| 22.94 | 277 | 277 !#SUB0 | 22.94 | 277 | 277 !#SUB0 |
| 23.54 | 278 | 349 | 23.54 | 278 | 349 |
| 23.64 | 279 | 350 !#KRIB | 23.64 | 279 | 350 !#KRIB |
| 23.74 | 350 | 351 !#SUB1 | 23.74 | 350 | 351 !#SUB1 |
| 24.86 | 363 | 363 | 24.68 | 361 | 361 |
| 25.97 | 372 | 372 | 25.62 | 368 | 368 |
| 27.09 | 382 | 384 !#LEV1 | 26.56 | 378 | 380 !#LEV1 |
| 28.20 | 586 | 598 | 27.49 | 385 | 392 |
| 29.32 | 591 | 623 | 28.43 | 603 | 642 |
| 30.43 | 592 | 637 | 29.37 | 641 | 743 |
| 31.55 | 593 | 646 !#SUB2 | 30.31 | 748 | 1088 !#SUB2 |

| | | | | | |
|---|---|---|---|---|---|
| ! Rhein. 763.5-764.5. Uerdingen. versie 1999.1 | | | ! Rhein, 763.5-764.5, Uerdingen, versie 2001.1 | | |
| $CROSS 158 TABULATED 270 336 WS 270 DA 24.50 24.50 22 0 | | | $CROSS 158 TABULATED 270 336 WS 270 DA 24.50 24.50 22 0 | | |
| 17.02 | 47 | 641 !#LAKE | 17.02 | 47 | 641 !#LAKE |
| 18.48 | 207 | 801 | 18.48 | 207 | 801 |
| 19.93 | 239 | 833 | 19.93 | 239 | 833 |
| 21.39 | 263 | 857 | 21.39 | 263 | 857 |
| 22.84 | 270 | 865 !#SUB0 | 22.84 | 270 | 865 !#SUB0 |
| 23.44 | 271 | 930 | 23.44 | 271 | 930 |
| 23.54 | 272 | 931 !#KRIB | 23.54 | 272 | 931 !#KRIB |
| 23.64 | 336 | 932 !#SUB1 | 23.64 | 336 | 932 !#SUB1 |
| 24.07 | 348 | 943 | 24.07 | 348 | 943 |
| 24.50 | 357 | 952 !#DIKE1 | 24.50 | 357 | 952 !#DIKE1 |
| 24.51 | 368 | 953 !#DIKE2 | 24.51 | 368 | 953 !#DIKE2 |
| 26.88 | 443 | 1030 | 26.88 | 443 | 1030 |
| 29.26 | 529 | 1149 | 29.26 | 544 | 1148 |
| 31.63 | 588 | 1253 | 31.63 | 733 | 1349 |
| 34.00 | 589 | 1300 !#SUB2 | 34.00 | 746 | 1400 !#SUB2 |

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|---|---|---|---|---|---|
| ! Rhein. 764.5-765.5. Uerdingen. versie 1999.1 | | | ! Rhein, 764.5-765.5, Uerdingen, versie 2001.1 | | |
| $CROSS 159 TABULATED 287 300 WS 287 DA 29.50 29.13 24 27 | | | $CROSS 159 TABULATED 287 300 WS 287 DA 29.50 29.13 27 27 | | |
| 16.85 | 19 | 19 !#MAIN | 16.85 | 19 | 19 !#MAIN |
| 18.30 | 175 | 175 | 18.30 | 175 | 175 |
| 19.75 | 218 | 218 | 19.75 | 218 | 218 |
| 21.19 | 266 | 266 | 21.19 | 266 | 266 |
| 22.64 | 287 | 287 !#SUB0 | 22.64 | 287 | 287 !#SUB0 |
| 22.84 | 294 | 294 | 22.84 | 294 | 294 |
| 23.04 | 297 | 297 | 23.04 | 297 | 297 |
| 23.24 | 300 | 300 !#SUB1 | 23.24 | 300 | 300 !#SUB1 |
| 26.37 | 373 | 373 | 26.37 | 373 | 373 |
| 29.50 | 444 | 555 !#DIKE1 | 29.50 | 557 | 558 !#DIKE1 |
| 29.53 | 513 | 624 !#DIKE2 | 29.53 | 626 | 627 !#DIKE2 |
| 29.71 | 536 | 654 | 29.72 | 663 | 667 |
| 29.88 | 561 | 678 | 29.90 | 701 | 708 |
| 30.06 | 576 | 696 | 30.08 | 729 | 736 |
| 30.23 | 581 | 702 !#SUB2 | 30.26 | 741 | 748 !#SUB2 |

| ! Rhein. 765.5-766.5. Hohenbudberg. versie 1999.1 | ! Rhein, 765.5-766.5, Hohenbudberg, versie 2001.1 |
|---|---|
| $CROSS 160 TABULATED 267 327 WS 267 DA 29.40 28.46 232 266 | $CROSS 160 TABULATED 267 327 WS 267 DA 29.40 28.46 250 266 |

| 16.49 | 14 | 14 !#MAIN | 16.49 | 14 | 14 !#MAIN |
|---|---|---|---|---|---|
| 17.97 | 156 | 156 | 17.97 | 156 | 156 |
| 19.45 | 201 | 201 | 19.45 | 201 | 201 |
| 20.92 | 243 | 243 | 20.92 | 243 | 243 |
| 22.40 | 267 | 267 !#SUB0 | 22.40 | 267 | 267 !#SUB0 |
| 23.00 | 268 | 319 | 23.00 | 268 | 319 |
| 23.10 | 269 | 324 !#KRIB | 23.10 | 269 | 324 !#KRIB |
| 23.20 | 327 | 327 !#SUB1 | 23.20 | 327 | 327 !#SUB1 |
| 26.30 | 379 | 379 | 26.30 | 379 | 379 |
| 29.40 | 429 | 661 !#DIKE1 | 29.40 | 624 | 743 !#DIKE1 |
| 29.51 | 640 | 872 !#DIKE2 | 29.51 | 836 | 955 !#DIKE2 |
| 29.67 | 656 | 892 | 29.67 | 855 | 1005 |
| 29.84 | 657 | 893 | 29.84 | 856 | 1007 |
| 30.01 | 658 | 894 | 30.01 | 857 | 1008 |
| 30.18 | 659 | 895 !#SUB2 | 30.18 | 858 | 1009 !#SUB2 |

| ! Rhein. 766.5-767.5. Hohenbudberg. versie 1999.1 | ! Rhein, 766.5-767.5, Hohenbudberg, versie 2001.1 |
|---|---|
| $CROSS 161 TABULATED 264 336 WS 264 DA 29.00 27.71 422 535 | $CROSS 161 TABULATED 264 336 WS 264 DA 29.00 27.71 428 535 |

| 16.48 | 0 | 0 !#MAIN | 16.48 | 0 | 0 !#MAIN |
|---|---|---|---|---|---|
| 17.78 | 188 | 188 | 17.78 | 188 | 188 |
| 19.24 | 249 | 249 | 19.24 | 249 | 249 |
| 20.69 | 263 | 263 | 20.69 | 263 | 263 |
| 22.14 | 264 | 264 !#SUB0 | 22.14 | 264 | 264 !#SUB0 |
| 22.74 | 265 | 335 | 22.74 | 265 | 335 |
| 22.84 | 266 | 336 !#KRIB | 22.84 | 266 | 336 !#KRIB |
| 22.94 | 336 | 337 !#SUB1 | 22.94 | 336 | 337 !#SUB1 |
| 25.97 | 397 | 409 | 25.97 | 397 | 409 |
| 29.00 | 446 | 843 !#DIKE1 | 29.00 | 544 | 851 !#DIKE1 |
| 29.14 | 722 | 1119 !#DIKE2 | 29.14 | 820 | 1127 !#DIKE2 |
| 29.67 | 729 | 1142 | 29.67 | 834 | 1176 |
| 30.20 | 732 | 1148 | 30.20 | 837 | 1182 |
| 30.74 | 733 | 1153 | 30.74 | 838 | 1187 |
| 31.27 | 734 | 1160 !#SUB2 | 31.27 | 839 | 1193 !#SUB2 |

| ! Rhein. 767.5-768.5. Huttenheim. versie 1999.1 | ! Rhein, 767.5-768.5, Huttenheim, versie 2001.1 |
|---|---|
| $CROSS 162 TABULATED 283 336 WS 283 DA 28.50 26.41 604 796 | $CROSS 162 TABULATED 283 336 WS 283 DA 28.50 26.41 604 796 |

| 16.52 | 0 | 0 !#MAIN | 16.52 | 0 | 0 !#MAIN |
|---|---|---|---|---|---|
| 17.55 | 222 | 222 | 17.55 | 222 | 222 |
| 19.02 | 270 | 270 | 19.02 | 270 | 270 |
| 20.48 | 280 | 280 | 20.48 | 280 | 280 |
| 21.94 | 283 | 283 !#SUB0 | 21.94 | 283 | 283 !#SUB0 |
| 22.54 | 284 | 335 | 22.54 | 284 | 335 |
| 22.64 | 285 | 336 !#KRIB | 22.64 | 285 | 336 !#KRIB |
| 22.74 | 336 | 337 !#SUB1 | 22.74 | 336 | 337 !#SUB1 |
| 25.62 | 384 | 457 | 25.62 | 384 | 457 |
| 28.50 | 474 | 959 !#DIKE1 | 28.50 | 486 | 959 !#DIKE1 |
| 28.59 | 646 | 1133 !#DIKE2 | 28.59 | 658 | 1133 !#DIKE2 |
| 29.12 | 709 | 1381 | 29.12 | 735 | 1380 |
| 29.66 | 718 | 1421 | 29.66 | 744 | 1420 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 30.19 | 720 | 1428 | | 30.19 | 746 | 1427 |
| 30.73 | 722 | 1433 !#SUB2 | | 30.73 | 747 | 1430 !#SUB2 |

| | |
|---|---|
| ! Rhein. 768.5-769.5. Huttenheim. versie 1999.1 | ! Rhein, 768.5-769.5, Huttenheim, versie 2001.1 |
| $CROSS 163 TABULATED 296 346 WS 296 DA 28.00 26.13 94 98 | $CROSS 163 TABULATED 296 346 WS 296 DA 28.00 26.13 94 98 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16.47 | 77 | 77 !#MAIN | | 16.47 | 77 | 77 !#MAIN |
| 17.79 | 232 | 232 | | 17.79 | 232 | 232 |
| 19.12 | 273 | 273 | | 19.12 | 273 | 273 |
| 20.44 | 288 | 288 | | 20.44 | 288 | 288 |
| 21.76 | 296 | 296 !#SUB0 | | 21.76 | 296 | 296 !#SUB0 |
| 22.36 | 297 | 344 | | 22.36 | 297 | 344 |
| 22.46 | 298 | 345 !#KRIB | | 22.46 | 298 | 345 !#KRIB |
| 22.56 | 346 | 346 !#SUB1 | | 22.56 | 346 | 346 !#SUB1 |
| 25.28 | 380 | 380 | | 25.28 | 380 | 380 |
| 28.00 | 490 | 650 !#DIKE1 | | 28.00 | 490 | 650 !#DIKE1 |
| 28.02 | 534 | 694 !#DIKE2 | | 28.02 | 534 | 694 !#DIKE2 |
| 28.91 | 653 | 1015 | | 28.91 | 653 | 1015 |
| 29.81 | 665 | 1092 | | 29.81 | 665 | 1090 |
| 30.70 | 666 | 1100 | | 30.70 | 666 | 1094 |
| 31.59 | 667 | 1106 !#SUB2 | | 31.59 | 667 | 1099 !#SUB2 |

| | |
|---|---|
| ! Rhein. 797.5-797.9. Eppinghoven. versie 1999.1 | ! Rhein, 797.5-797.9, Eppinghoven, versie 2001.1 |
| $CROSS 194 TABULATED 291 338 WS 291 DA 20.60 19.72 367 289 | $CROSS 194 TABULATED 291 338 WS 291 DA 20.60 19.72 367 289 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11.36 | 0 | 89 !#LAKE | | 11.36 | 0 | 89 !#LAKE |
| 12.25 | 263 | 352 | | 12.25 | 263 | 352 |
| 13.82 | 285 | 373 | | 13.82 | 285 | 373 |
| 15.38 | 291 | 379 | | 15.38 | 291 | 379 |
| 16.94 | 291 | 380 !#SUB0 | | 16.94 | 291 | 380 !#SUB0 |
| 17.73 | 292 | 426 | | 17.73 | 292 | 426 |
| 17.83 | 293 | 427 !#KRIB | | 17.83 | 293 | 427 !#KRIB |
| 17.93 | 338 | 428 !#SUB1 | | 17.93 | 338 | 428 !#SUB1 |
| 19.27 | 527 | 782 | | 19.27 | 527 | 782 |
| 20.60 | 589 | 850 !#DIKE1 | | 20.60 | 589 | 850 !#DIKE1 |
| 20.64 | 664 | 925 !#DIKE2 | | 20.64 | 664 | 925 !#DIKE2 |
| 21.57 | 667 | 937 | | 22.24 | 667 | 945 |
| 22.49 | 668 | 947 | | 23.83 | 668 | 961 |
| 23.42 | 669 | 961 | | 25.43 | 669 | 970 |
| 24.35 | 670 | 965 !#SUB2 | | 27.03 | 670 | 972 !#SUB2 |

| | |
|---|---|
| ! Rhein. 797.9-798.5. Eppinghoven. versie 1999.1 | ! Rhein, 797.9-798.5, Eppinghoven, versie 2001.1 |
| $CROSS 195 TABULATED 297 362 WS 297 DA 20.49 19.62 214 169 | $CROSS 195 TABULATED 297 362 WS 297 DA 20.49 19.62 214 169 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11.36 | 0 | 28 !#LAKE | | 11.36 | 0 | 28 !#LAKE |
| 12.54 | 245 | 273 | | 12.54 | 245 | 273 |
| 13.98 | 286 | 315 | | 13.98 | 286 | 315 |
| 15.41 | 297 | 325 | | 15.41 | 297 | 325 |
| 16.85 | 297 | 326 !#SUB0 | | 16.85 | 297 | 326 !#SUB0 |
| 17.64 | 298 | 389 | | 17.64 | 298 | 389 |
| 17.74 | 299 | 390 !#KRIB | | 17.74 | 299 | 390 !#KRIB |
| 17.84 | 362 | 391 !#SUB1 | | 17.84 | 362 | 391 !#SUB1 |
| 19.17 | 477 | 531 | | 19.17 | 477 | 531 |
| 20.49 | 495 | 655 !#DIKE1 | | 20.49 | 495 | 655 !#DIKE1 |
| 20.50 | 496 | 656 !#DIKE2 | | 20.50 | 496 | 656 !#DIKE2 |

| | | |
|---|---|---|
| 21.66 | 689 | 860 |
| 22.82 | 721 | 907 |
| 23.98 | 722 | 913 |
| 25.14 | 723 | 922 !#SUB2 |

| | | |
|---|---|---|
| 21.61 | 686 | 857 |
| 22.72 | 721 | 907 |
| 23.82 | 722 | 914 |
| 24.93 | 723 | 919 !#SUB2 |

! Rhein. 798.5-799.5. Eppinghoven. versie 1999.1

$CROSS 196 TABULATED 301 343 WS 301 DA 20.40 20.31 0 0

| | | |
|---|---|---|
| 11.05 | 0 | 0 !#MAIN |
| 12.19 | 196 | 196 |
| 13.70 | 244 | 244 |
| 15.21 | 282 | 282 |
| 16.72 | 301 | 301 !#SUB0 |
| 17.51 | 302 | 341 |
| 17.61 | 303 | 342 !#KRIB |
| 17.71 | 343 | 343 !#SUB1 |
| 19.06 | 378 | 378 |
| 20.40 | 414 | 417 !#DIKE1 |
| 20.41 | 416 | 419 !#DIKE2 |
| 21.93 | 538 | 638 |
| 23.46 | 665 | 858 |
| 24.98 | 666 | 904 |
| 26.50 | 667 | 938 !#SUB2 |

! Rhein, 798.5-799.5, Eppinghoven, versie 2001.1

$CROSS 196 TABULATED 301 343 WS 301 DA 20.40 20.31 0 0

| | | |
|---|---|---|
| 11.05 | 0 | 0 !#MAIN |
| 12.19 | 196 | 196 |
| 13.70 | 244 | 244 |
| 15.21 | 282 | 282 |
| 16.72 | 301 | 301 !#SUB0 |
| 17.51 | 302 | 341 |
| 17.61 | 303 | 342 !#KRIB |
| 17.71 | 343 | 343 !#SUB1 |
| 19.06 | 378 | 378 |
| 20.40 | 414 | 417 !#DIKE1 |
| 20.41 | 416 | 419 !#DIKE2 |
| 21.94 | 540 | 640 |
| 23.46 | 665 | 858 |
| 24.99 | 666 | 904 |
| 26.51 | 667 | 951 !#SUB2 |

! Rhein. 799.5-800.5. Gotterswickerhamm. versie 1999.1

$CROSS 197 TABULATED 305 335 WS 305 DA 20.30 19.00 186 118

| | | |
|---|---|---|
| 10.73 | 0 | 16 !#LAKE |
| 12.17 | 183 | 199 |
| 13.63 | 251 | 267 |
| 15.08 | 290 | 306 |
| 16.53 | 305 | 321 !#SUB0 |
| 17.32 | 306 | 351 |
| 17.42 | 307 | 352 !#KRIB |
| 17.52 | 335 | 353 !#SUB1 |
| 18.91 | 419 | 441 |
| 20.30 | 553 | 569 !#DIKE1 |
| 20.34 | 626 | 642 !#DIKE2 |
| 21.60 | 692 | 769 |
| 22.87 | 756 | 896 |
| 24.14 | 774 | 948 |
| 25.41 | 775 | 968 !#SUB2 |

! Rhein, 799.5-800.5, Gotterswickerhamm, versie 2001.1

$CROSS 197 TABULATED 305 335 WS 305 DA 20.30 19.00 186 118

| | | |
|---|---|---|
| 10.73 | 0 | 16 !#LAKE |
| 12.17 | 183 | 199 |
| 13.63 | 251 | 267 |
| 15.08 | 290 | 306 |
| 16.53 | 305 | 321 !#SUB0 |
| 17.32 | 306 | 351 |
| 17.42 | 307 | 352 !#KRIB |
| 17.52 | 335 | 353 !#SUB1 |
| 18.91 | 419 | 441 |
| 20.30 | 553 | 569 !#DIKE1 |
| 20.34 | 626 | 642 !#DIKE2 |
| 21.60 | 692 | 769 |
| 22.87 | 756 | 896 |
| 24.14 | 774 | 946 |
| 25.41 | 775 | 959 !#SUB2 |

! Rhein. 800.5-801.5. Gotterswickerhamm. versie 1999.1

$CROSS 198 TABULATED 307 382 WS 307 DA 19.00 19.00 44 0

| | | |
|---|---|---|
| 10.88 | 37 | 61 !#LAKE |
| 12.25 | 225 | 249 |
| 13.62 | 276 | 300 |
| 14.99 | 297 | 320 |
| 16.36 | 307 | 331 !#SUB0 |
| 17.15 | 308 | 401 |
| 17.25 | 309 | 403 !#KRIB |
| 17.35 | 382 | 406 !#SUB1 |
| 18.18 | 422 | 447 |

! Rhein, 800.5-801.5, Gotterswickerhamm, versie 2001.1

$CROSS 198 TABULATED 307 382 WS 307 DA 19.00 19.00 44 0

| | | |
|---|---|---|
| 10.88 | 37 | 61 !#LAKE |
| 12.25 | 225 | 249 |
| 13.62 | 276 | 300 |
| 14.99 | 297 | 320 |
| 16.36 | 307 | 331 !#SUB0 |
| 17.15 | 308 | 401 |
| 17.25 | 309 | 403 !#KRIB |
| 17.35 | 382 | 406 !#SUB1 |
| 18.18 | 422 | 447 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 19.00 | 464 | 490 !#DIKE1 | | 19.00 | 464 | 490 !#DIKE1 |
| 19.01 | 488 | 492 !#DIKE2 | | 19.01 | 488 | 492 !#DIKE2 |
| 20.74 | 699 | 719 | | 20.78 | 700 | 720 |
| 22.47 | 727 | 812 | | 22.55 | 729 | 815 |
| 24.19 | 731 | 888 | | 24.31 | 731 | 891 |
| 25.92 | 732 | 916 !#SUB2 | | 26.08 | 732 | 919 !#SUB2 |

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|---|---|
| ! Rhein. 801.5-802.5. Mehrum. versie 1999.1 | ! Rhein, 801.5-802.5, Mehrum, versie 2001.1 |
| $CROSS 199 TABULATED 303 379 WS 303 DA 20.63 19.09 292 255 | $CROSS 199 TABULATED 303 379 WS 303 DA 20.63 19.09 292 255 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10.49 | 6 | 6 !#MAIN | | 10.49 | 6 | 6 !#MAIN |
| 11.91 | 209 | 209 | | 11.91 | 209 | 209 |
| 13.33 | 275 | 275 | | 13.33 | 275 | 275 |
| 14.75 | 300 | 300 | | 14.75 | 300 | 300 |
| 16.17 | 303 | 303 !#SUB0 | | 16.17 | 303 | 303 !#SUB0 |
| 16.96 | 304 | 368 | | 16.96 | 304 | 368 |
| 17.06 | 305 | 373 !#KRIB | | 17.06 | 305 | 373 !#KRIB |
| 17.16 | 379 | 379 !#SUB1 | | 17.16 | 379 | 379 !#SUB1 |
| 18.90 | 465 | 493 | | 18.90 | 465 | 783 |
| 20.63 | 583 | 633 !#DIKE1 | | 20.63 | 583 | 1622 !#DIKE1 |
| 20.71 | 749 | 798 !#DIKE2 | | 20.71 | 749 | 1792 !#DIKE2 |
| 22.29 | 778 | 851 | | 21.90 | 776 | 2416 |
| 23.87 | 780 | 892 | | 23.09 | 779 | 2803 |
| 25.44 | 781 | 914 | | 24.28 | 780 | 2850 |
| 27.02 | 782 | 921 !#SUB2 | | 25.47 | 781 | 2874 !#SUB2 |

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|---|---|
| ! Rhein. 802.5-803.5. Mehrum. versie 1999.1 | ! Rhein, 802.5-803.5, Mehrum, versie 2001.1 |
| $CROSS 200 TABULATED 295 346 WS 295 DA 20.53 17.89 294 141 | $CROSS 200 TABULATED 295 346 WS 295 DA 20.53 17.89 294 141 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10.32 | 4 | 89 !#LAKE | | 10.32 | 4 | 89 !#LAKE |
| 11.75 | 226 | 311 | | 11.75 | 226 | 311 |
| 13.18 | 279 | 364 | | 13.18 | 279 | 364 |
| 14.61 | 294 | 379 | | 14.61 | 294 | 379 |
| 16.04 | 295 | 381 !#SUB0 | | 16.04 | 295 | 381 !#SUB0 |
| 16.83 | 296 | 430 | | 16.83 | 296 | 430 |
| 16.93 | 297 | 431 !#KRIB | | 16.93 | 297 | 431 !#KRIB |
| 17.03 | 346 | 432 !#SUB1 | | 17.03 | 346 | 432 !#SUB1 |
| 18.78 | 489 | 647 | | 18.78 | 489 | 647 |
| 20.53 | 721 | 888 !#DIKE1 | | 20.53 | 721 | 892 !#DIKE1 |
| 20.56 | 775 | 942 !#DIKE2 | | 20.56 | 775 | 946 !#DIKE2 |
| 21.80 | 779 | 988 | | 21.83 | 779 | 1064 |
| 23.04 | 780 | 1052 | | 23.10 | 780 | 1155 |
| 24.28 | 781 | 1114 | | 24.37 | 781 | 1217 |
| 25.52 | 782 | 1155 !#SUB2 | | 25.64 | 782 | 1256 !#SUB2 |

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|---|---|
| ! Rhein. 818.5-819.5. Fluren. versie 1999.1 | ! Rhein, 818.5-819.5, Fluren, versie 2001.1 |
| $CROSS 218 TABULATED 302 373 WS 302 DA 17.80 15.77 0 1036 | $CROSS 218 TABULATED 302 373 WS 302 DA 17.80 15.61 0 828 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7.74 | 0 | 0 !#MAIN | | 7.74 | 0 | 0 !#MAIN |
| 8.87 | 199 | 199 | | 8.87 | 199 | 199 |
| 10.43 | 270 | 270 | | 10.43 | 270 | 270 |
| 11.99 | 302 | 302 | | 11.99 | 302 | 302 |
| 13.55 | 302 | 303 !#SUB0 | | 13.55 | 302 | 303 !#SUB0 |
| 14.80 | 303 | 369 | | 14.80 | 303 | 369 |
| 14.90 | 304 | 371 !#KRIB | | 14.90 | 304 | 371 !#KRIB |

| | | |
|---|---|---|
| 15.00 | 373 | 373 !#SUB1 |
| 16.40 | 482 | 482 |
| 17.80 | 762 | 913 !#DIKE1 |
| 17.81 | 763 | 1294 !#DIKE2 |
| 19.02 | 815 | 1451 |
| 20.22 | 841 | 1704 |
| 21.43 | 845 | 1773 |
| 22.63 | 846 | 1820 !#SUB2 |

| | | |
|---|---|---|
| 15.00 | 373 | 373 !#SUB1 |
| 16.40 | 482 | 482 |
| 17.80 | 762 | 913 !#DIKE1 |
| 17.81 | 763 | 1294 !#DIKE2 |
| 18.84 | 808 | 1436 |
| 19.88 | 837 | 1549 |
| 20.91 | 843 | 1589 |
| 21.94 | 845 | 1609 !#SUB2 |

! Rhein. 819.5-820.5. Fluren. versie 1999.1

$CROSS 219 TABULATED 292 361 WS 292 DA 17.70 15.29 142 5368

| | | |
|---|---|---|
| 7.26 | 0 | 0 !#MAIN |
| 8.63 | 184 | 184 |
| 10.23 | 256 | 256 |
| 11.83 | 291 | 291 |
| 13.43 | 292 | 292 !#SUB0 |
| 14.68 | 293 | 352 |
| 14.78 | 294 | 357 !#KRIB |
| 14.88 | 361 | 361 !#SUB1 |
| 16.29 | 688 | 728 |
| 17.70 | 887 | 1112 !#DIKE1 |
| 17.71 | 888 | 2201 !#DIKE2 |
| 18.94 | 889 | 2304 |
| 20.17 | 890 | 3536 |
| 21.39 | 891 | 3763 |
| 22.62 | 892 | 3869 !#SUB2 |

! Rhein, 819.5-820.5, Fluren, versie 2001.1

$CROSS 219 TABULATED 292 361 WS 292 DA 17.70 15.22 142 4900

| | | |
|---|---|---|
| 7.26 | 0 | 0 !#MAIN |
| 8.63 | 184 | 184 |
| 10.23 | 256 | 256 |
| 11.83 | 291 | 291 |
| 13.43 | 292 | 292 !#SUB0 |
| 14.68 | 293 | 352 |
| 14.78 | 294 | 357 !#KRIB |
| 14.88 | 361 | 361 !#SUB1 |
| 16.29 | 688 | 728 |
| 17.70 | 887 | 1112 !#DIKE1 |
| 17.71 | 888 | 2201 !#DIKE2 |
| 18.79 | 889 | 2294 |
| 19.86 | 890 | 3239 |
| 20.94 | 891 | 3447 |
| 22.01 | 892 | 3531 !#SUB2 |

! Rhein. 820.5-821.5. Fluren. versie 1999.1

$CROSS 220 TABULATED 306 382 WS 306 DA 19.70 18.04 296 5331

| | | |
|---|---|---|
| 6.42 | 0 | 0 !#MAIN |
| 6.43 | 39 | 39 |
| 8.72 | 196 | 196 |
| 11.01 | 299 | 299 |
| 13.30 | 306 | 306 !#SUB0 |
| 14.55 | 307 | 374 |
| 14.65 | 308 | 376 !#KRIB |
| 14.75 | 382 | 382 !#SUB1 |
| 17.23 | 466 | 994 |
| 19.70 | 595 | 1384 !#DIKE1 |
| 20.01 | 596 | 4507 !#DIKE2 |
| 20.76 | 600 | 4869 |
| 21.51 | 601 | 4968 |
| 22.25 | 602 | 5033 |
| 23.00 | 603 | 5090 !#SUB2 |

! Rhein, 820.5-821.5, Fluren, versie 2001.1

$CROSS 220 TABULATED 306 382 WS 306 DA 19.70 18.08 296 4855

| | | |
|---|---|---|
| 6.42 | 0 | 0 !#MAIN |
| 6.43 | 39 | 39 |
| 8.72 | 196 | 196 |
| 11.01 | 299 | 299 |
| 13.30 | 306 | 306 !#SUB0 |
| 14.55 | 307 | 374 |
| 14.65 | 308 | 376 !#KRIB |
| 14.75 | 382 | 382 !#SUB1 |
| 17.23 | 466 | 994 |
| 19.70 | 595 | 1384 !#DIKE1 |
| 19.99 | 596 | 4294 !#DIKE2 |
| 20.57 | 599 | 4597 |
| 21.16 | 600 | 4663 |
| 21.74 | 601 | 4697 |
| 22.32 | 602 | 4720 !#SUB2 |

! Rhein. 821.5-822.5. Bislich. versie 1999.1

$CROSS 221 TABULATED 298 370 WS 298 DA 19.60 17.68 0 5519

| | | |
|---|---|---|
| 5.99 | 0 | 0 !#MAIN |
| 7.03 | 162 | 162 |
| 9.09 | 239 | 239 |
| 11.14 | 292 | 292 |
| 13.20 | 298 | 298 !#SUB0 |

! Rhein, 821.5-822.5, Bislich, versie 2001.1

$CROSS 221 TABULATED 298 370 WS 298 DA 19.60 17.59 0 6522

| | | |
|---|---|---|
| 5.99 | 0 | 0 !#MAIN |
| 7.03 | 162 | 162 |
| 9.09 | 239 | 239 |
| 11.14 | 292 | 292 |
| 13.20 | 298 | 298 !#SUB0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14.45 | 299 | 367 | | 14.45 | 299 | 367 |
| 14.55 | 300 | 369 !#KRIB | | 14.55 | 300 | 369 !#KRIB |
| 14.65 | 370 | 370 !#SUB1 | | 14.65 | 370 | 370 !#SUB1 |
| 17.13 | 445 | 497 | | 17.13 | 445 | 497 |
| 19.60 | 504 | 799 !#DIKE1 | | 19.60 | 504 | 799 !#DIKE1 |
| 19.89 | 505 | 3667 !#DIKE2 | | 19.92 | 505 | 4044 !#DIKE2 |
| 20.65 | 506 | 4167 | | 22.14 | 506 | 4752 |
| 21.41 | 507 | 4275 | | 24.36 | 507 | 4867 |
| 22.18 | 508 | 4334 | | 26.58 | 508 | 4901 |
| 22.94 | 509 | 4381 !#SUB2 | | 28.80 | 509 | 4915 !#SUB2 |

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|---|---|---|---|---|---|---|
| ! Rhein. 822.5-823.5. Bislich. versie 1999.1 | | | | ! Rhein, 822.5-823.5, Bislich, versie 2001.1 | | |
| $CROSS 222 TABULATED 309 340 WS 309 DA 19.50 17.35 6 2220 | | | | $CROSS 222 TABULATED 309 340 WS 309 DA 19.50 17.35 6 2220 | | |
| 5.79 | 0 | 24 !#LAKE | | 5.79 | 0 | 24 !#LAKE |
| 6.92 | 107 | 131 | | 6.92 | 107 | 131 |
| 9.00 | 238 | 262 | | 9.00 | 238 | 262 |
| 11.07 | 307 | 330 | | 11.07 | 307 | 330 |
| 13.14 | 309 | 333 !#SUB0 | | 13.14 | 309 | 333 !#SUB0 |
| 14.39 | 310 | 362 | | 14.39 | 310 | 362 |
| 14.49 | 311 | 364 !#KRIB | | 14.49 | 311 | 364 !#KRIB |
| 14.59 | 340 | 365 !#SUB1 | | 14.59 | 340 | 365 !#SUB1 |
| 17.05 | 425 | 494 | | 17.05 | 425 | 494 |
| 19.50 | 485 | 760 !#DIKE1 | | 19.50 | 485 | 760 !#DIKE1 |
| 19.60 | 486 | 1723 !#DIKE2 | | 19.60 | 486 | 1723 !#DIKE2 |
| 20.50 | 488 | 1943 | | 20.53 | 488 | 1948 |
| 21.41 | 491 | 2040 | | 21.47 | 491 | 2045 |
| 22.32 | 492 | 2101 | | 22.41 | 492 | 2104 |
| 23.23 | 493 | 2134 !#SUB2 | | 23.35 | 493 | 2134 !#SUB2 |

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|---|---|---|---|---|---|---|
| ! Rhein. 827.5-828.5. Wardt. versie 1999.1 | | | | ! Rhein, 827.5-828.5, Wardt, versie 2001.1 | | |
| $CROSS 227 TABULATED 332 397 WS 332 DA 17.30 16.15 0 763 | | | | $CROSS 227 TABULATED 332 397 WS 332 DA 17.30 16.12 8 845 | | |
| 5.83 | 0 | 0 !#MAIN | | 5.83 | 0 | 0 !#MAIN |
| 7.01 | 130 | 130 | | 7.01 | 130 | 130 |
| 8.82 | 255 | 255 | | 8.82 | 255 | 255 |
| 10.63 | 327 | 327 | | 10.63 | 327 | 327 |
| 12.44 | 332 | 332 !#SUB0 | | 12.44 | 332 | 332 !#SUB0 |
| 13.69 | 333 | 393 | | 13.69 | 333 | 393 |
| 13.79 | 334 | 395 !#KRIB | | 13.79 | 334 | 395 !#KRIB |
| 13.89 | 397 | 397 !#SUB1 | | 13.89 | 397 | 397 !#SUB1 |
| 15.60 | 448 | 448 | | 15.60 | 448 | 448 |
| 17.30 | 576 | 578 !#DIKE1 | | 17.30 | 576 | 578 !#DIKE1 |
| 17.37 | 577 | 1242 !#DIKE2 | | 17.37 | 577 | 1242 !#DIKE2 |
| 18.37 | 597 | 1339 | | 18.76 | 611 | 1366 |
| 19.37 | 615 | 1384 | | 20.15 | 628 | 1417 |
| 20.38 | 627 | 1419 | | 21.55 | 637 | 1503 |
| 21.38 | 633 | 1439 !#SUB2 | | 22.94 | 640 | 1537 !#SUB2 |

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|---|---|---|---|---|---|---|
| ! Rhein. 828.5-829.5. Wardt. versie 1999.1 | | | | ! Rhein, 828.5-829.5, Wardt, versie 2001.1 | | |
| $CROSS 228 TABULATED 305 352 WS 305 DA 17.20 15.95 16 569 | | | | $CROSS 228 TABULATED 305 352 WS 305 DA 17.20 15.91 381 722 | | |
| 4.24 | 0 | 116 !#LAKE | | 4.24 | 0 | 116 !#LAKE |
| 5.91 | 80 | 196 | | 5.91 | 80 | 196 |
| 8.05 | 178 | 294 | | 8.05 | 178 | 294 |

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|---|---|---|---|---|---|---|
| 10.19 | 299 | 415 | | 10.19 | 299 | 415 |
| 12.33 | 305 | 421 !#SUB0 | | 12.33 | 305 | 421 !#SUB0 |
| 13.58 | 306 | 464 | | 13.58 | 306 | 464 |
| 13.68 | 307 | 466 !#KRIB | | 13.68 | 307 | 466 !#KRIB |
| 13.78 | 352 | 468 !#SUB1 | | 13.78 | 352 | 468 !#SUB1 |
| 15.49 | 461 | 603 | | 15.49 | 461 | 603 |
| 17.20 | 555 | 795 !#DIKE1 | | 17.20 | 555 | 795 !#DIKE1 |
| 17.26 | 556 | 1251 !#DIKE2 | | 17.26 | 556 | 1251 !#DIKE2 |
| 18.14 | 576 | 1314 | | 18.40 | 581 | 1327 |
| 19.03 | 588 | 1345 | | 19.54 | 603 | 1365 |
| 19.91 | 599 | 1363 | | 20.68 | 613 | 1384 |
| 20.79 | 604 | 1375 !#SUB2 | | 21.82 | 717 | 1500 !#SUB2 |

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|---|---|---|---|---|---|---|
| ! Rhein. 829.5-830.5. Wardt. versie 1999.1 | | | | ! Rhein. 829.5-830.5, Wardt, versie 2001.1 | | |
| $CROSS 229 TABULATED 326 378 WS 326 DA 13.65 13.65 48 0 | | | | $CROSS 229 TABULATED 326 378 WS 326 DA 20.60 19.27 1452 1063 | | |
| 6.84 | 0 | 58 !#LAKE | | 6.84 | 0 | 58 !#LAKE |
| 7.44 | 183 | 240 | | 7.44 | 183 | 240 |
| 9.03 | 296 | 354 | | 9.03 | 296 | 354 |
| 10.62 | 325 | 383 | | 10.62 | 325 | 383 |
| 12.21 | 326 | 384 !#SUB0 | | 12.21 | 326 | 384 !#SUB0 |
| 13.43 | 327 | 431 | | 13.43 | 327 | 431 |
| 13.53 | 328 | 433 !#KRIB | | 13.53 | 328 | 433 !#KRIB |
| 13.63 | 378 | 436 !#SUB1 | | 13.63 | 378 | 436 !#SUB1 |
| 13.64 | 388 | 452 | | 17.12 | 802 | 1023 |
| 13.65 | 389 | 453 !#DIKE1 | | 20.60 | 862 | 1110 !#DIKE1 |
| 13.66 | 412 | 454 !#DIKE2 | | 20.78 | 1222 | 1908 !#DIKE2 |
| 15.33 | 639 | 741 | | 20.92 | 1245 | 1950 |
| 17.01 | 716 | 1017 | | 21.07 | 1251 | 1965 |
| 18.68 | 721 | 1078 | | 21.21 | 1265 | 1988 |
| 20.35 | 722 | 1106 !#SUB2 | | 21.35 | 1269 | 2000 !#SUB2 |

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|---|---|---|---|---|---|---|
| ! Rhein. 830.5-831.5. Wardt. versie 1999.1 | | | | ! Rhein, 830.5-831.5, Wardt, versie 2001.1 | | |
| $CROSS 230 TABULATED 337 457 WS 337 DA 16.90 15.34 180 155 | | | | $CROSS 230 TABULATED 337 457 WS 337 DA 20.44 19.23 889 545 | | |
| 6.61 | 0 | 0 !#MAIN | | 6.61 | 0 | 0 !#MAIN |
| 7.69 | 228 | 228 | | 7.69 | 228 | 228 |
| 9.16 | 286 | 286 | | 9.16 | 286 | 286 |
| 10.62 | 336 | 336 | | 10.62 | 336 | 336 |
| 12.09 | 337 | 337 !#SUB0 | | 12.09 | 337 | 337 !#SUB0 |
| 13.34 | 338 | 451 | | 13.34 | 338 | 451 |
| 13.44 | 339 | 454 !#KRIB | | 13.44 | 339 | 454 !#KRIB |
| 13.54 | 457 | 457 !#SUB1 | | 13.54 | 457 | 457 !#SUB1 |
| 15.22 | 565 | 619 | | 16.99 | 908 | 908 |
| 16.90 | 726 | 838 !#DIKE1 | | 20.44 | 979 | 994 !#DIKE1 |
| 16.93 | 790 | 902 !#DIKE2 | | 20.55 | 1198 | 1346 !#DIKE2 |
| 17.98 | 806 | 951 | | 20.60 | 1199 | 1347 |
| 19.02 | 810 | 978 | | 20.65 | 1200 | 1348 |
| 20.07 | 813 | 992 | | 20.70 | 1201 | 1349 |
| 21.11 | 814 | 1003 !#SUB2 | | 20.75 | 1202 | 1350 !#SUB2 |

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|---|---|---|---|---|---|---|
| ! Rhein. 831.5-832.5. Niedermormter. versie 1999.1 | | | | ! Rhein, 831.5-832.5, Niedermormter, versie 2001.1 | | |
| $CROSS 231 TABULATED 288 356 WS 288 DA 16.35 16.35 0 0 | | | | $CROSS 231 TABULATED 288 356 WS 288 DA 20.33 15.14 1804 2565 | | |
| 4.06 | 0 | 0 !#MAIN | | 4.06 | 0 | 0 !#MAIN |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4.07 | 28 | 28 | | 4.07 | 28 | 28 |
| 6.69 | 147 | 147 | | 6.69 | 147 | 147 |
| 9.32 | 277 | 277 | | 9.32 | 277 | 277 |
| 11.94 | 288 | 288 !#SUB0 | | 11.94 | 288 | 288 !#SUB0 |
| 13.19 | 289 | 351 | | 13.19 | 289 | 351 |
| 13.29 | 290 | 353 !#KRIB | | 13.29 | 290 | 353 !#KRIB |
| 13.39 | 356 | 356 !#SUB1 | | 13.39 | 356 | 356 !#SUB1 |
| 14.38 | 420 | 424 | | 16.86 | 729 | 754 |
| 15.36 | 470 | 487 | | 20.33 | 888 | 1063 !#DIKE1 |
| 16.35 | 564 | 684 !#LEV1 | | 20.44 | 1116 | 1557 !#DIKE2 |
| 17.33 | 654 | 819 | | 20.84 | 1117 | 1560 |
| 18.32 | 709 | 994 | | 21.23 | 1119 | 1562 |
| 19.30 | 710 | 1042 | | 21.63 | 1120 | 1563 |
| 20.29 | 711 | 1063 !#SUB2 | | 22.02 | 1121 | 1564 !#SUB2 |

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|---|---|---|---|---|---|---|
| ! Rhein. 832.5-833.5. Niedermormter. versie 1999.1 | | | | ! Rhein, 832.5-833.5, Niedermormter, versie 2001.1 | | |
| $CROSS 232 TABULATED 269 348 WS 269 DA 16.07 16.07 0 0 | | | | $CROSS 232 TABULATED 269 348 WS 269 DA 20.15 14.89 2350 2275 | | |
| 2.73 | 0 | 0 !#MAIN | | 2.73 | 0 | 0 !#MAIN |
| 4.34 | 97 | 97 | | 4.34 | 97 | 97 |
| 6.86 | 165 | 165 | | 6.86 | 165 | 165 |
| 9.37 | 257 | 257 | | 9.37 | 257 | 257 |
| 11.88 | 269 | 269 !#SUB0 | | 11.88 | 269 | 269 !#SUB0 |
| 13.13 | 270 | 343 | | 13.13 | 270 | 343 |
| 13.23 | 271 | 346 !#KRIB | | 13.23 | 271 | 346 !#KRIB |
| 13.33 | 348 | 348 !#SUB1 | | 13.33 | 348 | 348 !#SUB1 |
| 14.24 | 377 | 377 | | 16.74 | 825 | 831 |
| 15.16 | 574 | 658 | | 20.15 | 933 | 1014 !#DIKE1 |
| 16.07 | 610 | 807 !#LEV1 | | 20.31 | 1255 | 1447 !#DIKE2 |
| 16.98 | 620 | 848 | | 20.54 | 1256 | 1448 |
| 17.89 | 650 | 946 | | 20.78 | 1257 | 1449 |
| 18.81 | 659 | 991 | | 21.01 | 1258 | 1450 |
| 19.72 | 660 | 1010 !#SUB2 | | 21.24 | 1259 | 1451 !#SUB2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ! Rhein. 833.5-834.5. Niedermormter. versie 1999.1 | | | | ! Rhein, 833.5-834.5, Niedermormter, versie 2001.1 | | |
| $CROSS 233 TABULATED 353 402 WS 353 DA 14.25 14.25 15 0 | | | | $CROSS 233 TABULATED 353 402 WS 353 DA 19.43 18.77 906 329 | | |
| 4.08 | 0 | 236 !#LAKE | | 4.08 | 0 | 236 !#LAKE |
| 5.55 | 42 | 278 | | 5.55 | 42 | 278 |
| 7.63 | 237 | 473 | | 7.63 | 237 | 473 |
| 9.71 | 350 | 586 | | 9.71 | 350 | 586 |
| 11.79 | 353 | 588 !#SUB0 | | 11.79 | 353 | 588 !#SUB0 |
| 12.21 | 389 | 625 | | 12.21 | 389 | 625 |
| 12.62 | 397 | 632 | | 12.62 | 397 | 632 |
| 13.04 | 402 | 637 !#SUB1 | | 13.04 | 402 | 637 !#SUB1 |
| 13.65 | 422 | 703 | | 16.24 | 944 | 1039 |
| 14.25 | 455 | 764 !#DIKE1 | | 19.43 | 1061 | 1413 !#DIKE1 |
| 14.26 | 462 | 765 !#DIKE2 | | 19.44 | 1062 | 1414 !#DIKE2 |
| 15.63 | 485 | 990 | | 19.48 | 1063 | 1415 |
| 17.00 | 524 | 1149 | | 19.52 | 1297 | 1911 |
| 18.36 | 529 | 1304 | | 19.55 | 1298 | 1912 |
| 19.73 | 530 | 1422 !#SUB2 | | 19.59 | 1299 | 1913 !#SUB2 |

| | |
|---|---|
| ! Rhein. 837.1-837.7. Rees. versie 1999.1 | ! Rhein, 837.1-837.7, Rees, versie 2001.1 |

$CROSS 237 TABULATED 355 386 WS 355 DA 18.00 18.00 52 0

| | | |
|---|---|---|
| 2.38 | 0 | 165 !#LAKE |
| 4.03 | 55 | 220 |
| 6.51 | 170 | 335 |
| 9.00 | 346 | 511 |
| 11.48 | 355 | 521 !#SUB0 |
| 12.73 | 356 | 549 |
| 12.83 | 357 | 550 !#KRIB |
| 12.93 | 386 | 552 !#SUB1 |
| 15.47 | 515 | 702 |
| 18.00 | 745 | 1204 !#DIKE1 |
| 18.01 | 771 | 1207 !#DIKE2 |
| 18.58 | 804 | 1271 |
| 19.15 | 832 | 1331 |
| 19.71 | 834 | 1372 |
| 20.28 | 835 | 1409 !#SUB2 |

$CROSS 237 TABULATED 355 386 WS 355 DA 18.00 18.00 52 0

| | | |
|---|---|---|
| 2.38 | 0 | 165 !#LAKE |
| 4.03 | 55 | 220 |
| 6.51 | 170 | 335 |
| 9.00 | 346 | 511 |
| 11.48 | 355 | 521 !#SUB0 |
| 12.73 | 356 | 549 |
| 12.83 | 357 | 550 !#KRIB |
| 12.93 | 386 | 552 !#SUB1 |
| 15.47 | 515 | 702 |
| 18.00 | 745 | 1204 !#DIKE1 |
| 18.01 | 771 | 1207 !#DIKE2 |
| 18.58 | 804 | 1271 |
| 19.15 | 832 | 1331 |
| 19.71 | 834 | 1370 |
| 20.28 | 835 | 1405 !#SUB2 |

! Rhein. 837.7-838.5. Rees. versie 1999.1

$CROSS 238 TABULATED 368 475 WS 368 DA 17.90 16.58 224 514

| | | |
|---|---|---|
| 4.61 | 0 | 168 !#LAKE |
| 5.75 | 91 | 259 |
| 7.63 | 298 | 466 |
| 9.50 | 365 | 533 |
| 11.38 | 368 | 536 !#SUB0 |
| 12.63 | 369 | 638 |
| 12.73 | 370 | 641 !#KRIB |
| 12.83 | 475 | 643 !#SUB1 |
| 15.37 | 739 | 947 |
| 17.90 | 871 | 1205 !#DIKE1 |
| 17.93 | 926 | 1207 !#DIKE2 |
| 18.35 | 927 | 1263 |
| 18.77 | 928 | 1592 |
| 19.19 | 929 | 1611 |
| 19.61 | 930 | 1625 !#SUB2 |

! Rhein, 837.7-838.5, Rees, versie 2001.1

$CROSS 238 TABULATED 368 475 WS 368 DA 17.90 16.21 224 125

| | | |
|---|---|---|
| 4.61 | 0 | 168 !#LAKE |
| 5.75 | 91 | 259 |
| 7.63 | 298 | 466 |
| 9.50 | 365 | 533 |
| 11.38 | 368 | 536 !#SUB0 |
| 12.63 | 369 | 638 |
| 12.73 | 370 | 641 !#KRIB |
| 12.83 | 475 | 643 !#SUB1 |
| 15.37 | 739 | 947 |
| 17.90 | 871 | 1209 !#DIKE1 |
| 17.93 | 926 | 1211 !#DIKE2 |
| 18.36 | 927 | 1271 |
| 18.79 | 928 | 1288 |
| 19.22 | 929 | 1303 |
| 19.65 | 930 | 1317 !#SUB2 |

! Rhein. 838.5-839.5. Honnepel. versie 1999.1

$CROSS 239 TABULATED 295 430 WS 295 DA 18.70 17.46 54 865

| | | |
|---|---|---|
| 4.87 | 0 | 47 !#LAKE |
| 5.73 | 165 | 212 |
| 7.58 | 270 | 317 |
| 9.44 | 288 | 336 |
| 11.29 | 295 | 342 !#SUB0 |
| 12.31 | 296 | 474 |
| 12.41 | 297 | 476 !#KRIB |
| 12.51 | 430 | 477 !#SUB1 |
| 15.61 | 796 | 855 |
| 18.70 | 860 | 1126 !#DIKE1 |
| 18.76 | 861 | 1707 !#DIKE2 |
| 19.27 | 862 | 1743 |
| 19.79 | 863 | 1764 |
| 20.30 | 864 | 1775 |

! Rhein, 838.5-839.5, Honnepel, versie 2001.1

$CROSS 239 TABULATED 295 430 WS 295 DA 14.50 14.50 54 0

| | | |
|---|---|---|
| 4.87 | 0 | 47 !#LAKE |
| 5.73 | 165 | 212 |
| 7.58 | 270 | 317 |
| 9.44 | 288 | 336 |
| 11.29 | 295 | 342 !#SUB0 |
| 12.31 | 296 | 474 |
| 12.41 | 297 | 476 !#KRIB |
| 12.51 | 430 | 477 !#SUB1 |
| 13.51 | 500 | 551 |
| 14.50 | 540 | 594 !#DIKE1 |
| 14.51 | 568 | 595 !#DIKE2 |
| 15.43 | 785 | 831 |
| 16.35 | 831 | 912 |
| 17.27 | 858 | 989 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 20.81 | 865 | 1780 !#SUB2 | | 18.19 | 859 | 998 !#SUB2 | |

| | | | | | |
|---|---|---|---|---|---|
| ! Rhein. 839.5-840.5. Honnepel. versie 1999.1 | | | ! Rhein, 839.5-840.5, Honnepel, versie 2001.1 | | |
| $CROSS 240 TABULATED 302 382 WS 302 DA 18.60 17.28 39 1269 | | | $CROSS 240 TABULATED 302 382 WS 302 DA 18.39 17.32 39 1665 | | |
| 3.88 | 0 | 42 !#LAKE | 3.88 | 0 | 42 !#LAKE |
| 5.01 | 106 | 148 | 5.01 | 106 | 148 |
| 7.08 | 246 | 288 | 7.08 | 246 | 288 |
| 9.14 | 297 | 339 | 9.14 | 297 | 339 |
| 11.21 | 302 | 344 !#SUB0 | 11.21 | 302 | 344 !#SUB0 |
| 12.23 | 303 | 421 | 12.23 | 303 | 421 |
| 12.33 | 304 | 422 !#KRIB | 12.33 | 304 | 422 !#KRIB |
| 12.43 | 382 | 424 !#SUB1 | 12.43 | 382 | 424 !#SUB1 |
| 15.52 | 776 | 836 | 15.41 | 770 | 827 |
| 18.60 | 782 | 1339 !#DIKE1 | 18.39 | 782 | 962 !#DIKE1 |
| 18.66 | 783 | 1935 !#DIKE2 | 18.54 | 783 | 2509 !#DIKE2 |
| 18.67 | 784 | 1936 | 18.91 | 784 | 2532 |
| 18.69 | 785 | 1937 | 19.27 | 785 | 2539 |
| 18.70 | 786 | 1938 | 19.63 | 786 | 2547 |
| 18.71 | 787 | 1939 !#SUB2 | 19.99 | 787 | 2549 !#SUB2 |
| ! Rhein. 840.5-841.5. Honnepel. versie 1999.1 | | | ! Rhein, 840.5-841.5, Honnepel, versie 2001.1 | | |
| $CROSS 241 TABULATED 298 405 WS 298 DA 18.40 17.02 160 888 | | | $CROSS 241 TABULATED 298 405 WS 298 DA 14.00 13.53 160 32 | | |
| 3.65 | 7 | 97 !#LAKE | 3.65 | 7 | 97 !#LAKE |
| 5.53 | 141 | 231 | 5.53 | 141 | 231 |
| 7.40 | 260 | 350 | 7.40 | 260 | 350 |
| 9.28 | 297 | 387 | 9.28 | 297 | 387 |
| 11.15 | 298 | 389 !#SUB0 | 11.15 | 298 | 389 !#SUB0 |
| 12.17 | 299 | 493 | 12.17 | 299 | 493 |
| 12.27 | 300 | 494 !#KRIB | 12.27 | 300 | 494 !#KRIB |
| 12.37 | 405 | 495 !#SUB1 | 12.37 | 405 | 495 !#SUB1 |
| 15.39 | 768 | 834 | 13.19 | 436 | 530 |
| 18.40 | 779 | 1329 !#DIKE1 | 14.00 | 539 | 635 !#DIKE1 |
| 18.46 | 780 | 1694 !#DIKE2 | 14.04 | 623 | 639 !#DIKE2 |
| 18.76 | 781 | 1696 | 15.12 | 765 | 827 |
| 19.06 | 782 | 1697 | 16.20 | 773 | 974 |
| 19.36 | 783 | 1699 | 17.28 | 776 | 1103 |
| 19.66 | 784 | 1702 !#SUB2 | 18.36 | 779 | 1141 !#SUB2 |
| ! Rhein. 841.5-842.5. Honnepel. versie 1999.1 | | | ! Rhein, 841.5-842.5, Honnepel, versie 2001.1 | | |
| $CROSS 242 TABULATED 328 436 WS 328 DA 17.00 15.02 417 794 | | | $CROSS 242 TABULATED 328 436 WS 328 DA 17.00 14.52 417 320 | | |
| 3.44 | 0 | 213 !#LAKE | 3.44 | 0 | 213 !#LAKE |
| 3.94 | 38 | 250 | 3.94 | 38 | 250 |
| 6.31 | 175 | 388 | 6.31 | 175 | 388 |
| 8.67 | 322 | 535 | 8.67 | 322 | 535 |
| 11.03 | 328 | 541 !#SUB0 | 11.03 | 328 | 541 !#SUB0 |
| 12.05 | 329 | 646 | 12.05 | 329 | 646 |
| 12.15 | 330 | 648 !#KRIB | 12.15 | 330 | 648 !#KRIB |
| 12.25 | 436 | 649 !#SUB1 | 12.25 | 436 | 649 !#SUB1 |
| 14.63 | 645 | 900 | 14.63 | 645 | 900 |
| 17.00 | 698 | 1042 !#DIKE1 | 17.00 | 697 | 1040 !#DIKE1 |
| 17.05 | 807 | 1149 !#DIKE2 | 17.05 | 806 | 1148 !#DIKE2 |
| 17.34 | 815 | 1166 | 17.29 | 813 | 1163 |

| | | |
|---|---|---|
| 17.62 | 819 | 1176 |
| 17.90 | 823 | 1185 |
| 18.18 | 826 | 1192 !#SUB2 |

| | | |
|---|---|---|
| 17.52 | 815 | 1170 |
| 17.76 | 820 | 1182 |
| 17.99 | 822 | 1185 !#SUB2 |

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! Rhein. 842.5-843.5. Honnepel. versie 1999.1

$CROSS 243 TABULATED 298 372 WS 298 DA 14.50 12.29 236 2011

| | | |
|---|---|---|
| 2.59 | 0 | 353 !#LAKE |
| 4.09 | 72 | 425 |
| 6.38 | 241 | 594 |
| 8.68 | 293 | 646 |
| 10.97 | 298 | 651 !#SUB0 |
| 11.99 | 299 | 723 |
| 12.09 | 300 | 724 !#KRIB |
| 12.19 | 372 | 725 !#SUB1 |
| 13.35 | 469 | 849 |
| 14.50 | 611 | 1033 !#DIKE1 |
| 14.56 | 733 | 1036 !#DIKE2 |
| 15.38 | 845 | 1187 |
| 16.19 | 855 | 1219 |
| 17.01 | 858 | 1261 |
| 17.82 | 860 | 1295 !#SUB2 |

! Rhein, 842.5-843.5, Honnepel, versie 2001.1

$CROSS 243 TABULATED 298 372 WS 298 DA 14.50 14.50 236 0

| | | |
|---|---|---|
| 2.59 | 0 | 353 !#LAKE |
| 4.09 | 72 | 425 |
| 6.38 | 241 | 594 |
| 8.68 | 293 | 646 |
| 10.97 | 298 | 651 !#SUB0 |
| 11.99 | 299 | 723 |
| 12.09 | 300 | 724 !#KRIB |
| 12.19 | 372 | 725 !#SUB1 |
| 13.35 | 469 | 849 |
| 14.50 | 611 | 1033 !#DIKE1 |
| 14.56 | 733 | 1036 !#DIKE2 |
| 15.36 | 844 | 1186 |
| 16.16 | 855 | 1219 |
| 16.95 | 857 | 1257 |
| 17.75 | 858 | 1289 !#SUB2 |

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! Rhein. 843.5-844.5. Grieth. versie 1999.1

$CROSS 244 TABULATED 322 378 WS 322 DA 16.20 14.00 187 2239

| | | |
|---|---|---|
| 4.44 | 0 | 336 !#LAKE |
| 5.91 | 244 | 579 |
| 7.58 | 294 | 629 |
| 9.25 | 318 | 654 |
| 10.92 | 322 | 657 !#SUB0 |
| 11.94 | 323 | 712 |
| 12.04 | 324 | 713 !#KRIB |
| 12.14 | 378 | 714 !#SUB1 |
| 14.17 | 661 | 1073 |
| 16.20 | 867 | 1428 !#DIKE1 |
| 16.25 | 959 | 1429 !#DIKE2 |
| 16.74 | 963 | 1464 |
| 17.23 | 964 | 1490 |
| 17.72 | 966 | 1506 |
| 18.21 | 967 | 2536 !#SUB2 |

! Rhein, 843.5-844.5, Grieth, versie 2001.1

$CROSS 244 TABULATED 322 378 WS 322 DA 18.02 15.88 187 8775

| | | |
|---|---|---|
| 4.44 | 0 | 336 !#LAKE |
| 5.91 | 244 | 579 |
| 7.58 | 294 | 629 |
| 9.25 | 318 | 654 |
| 10.92 | 322 | 657 !#SUB0 |
| 11.94 | 323 | 712 |
| 12.04 | 324 | 713 !#KRIB |
| 12.14 | 378 | 714 !#SUB1 |
| 15.08 | 826 | 1299 |
| 18.02 | 967 | 1513 !#DIKE1 |
| 18.43 | 968 | 5621 !#DIKE2 |
| 18.63 | 969 | 5686 |
| 18.83 | 970 | 5703 |
| 19.02 | 971 | 5720 |
| 19.22 | 972 | 5731 !#SUB2 |

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! Rhein. 844.5-845.5. Grieth. versie 1999.1

$CROSS 245 TABULATED 327 359 WS 327 DA 16.20 13.82 720 3203

| | | |
|---|---|---|
| 3.92 | 0 | 312 !#LAKE |
| 5.18 | 126 | 438 |
| 7.07 | 304 | 616 |
| 8.95 | 320 | 633 |
| 10.84 | 327 | 639 !#SUB0 |
| 11.86 | 328 | 671 |
| 11.96 | 329 | 672 !#KRIB |
| 12.06 | 359 | 673 !#SUB1 |
| 14.13 | 442 | 785 |
| 16.20 | 741 | 1195 !#DIKE1 |

! Rhein, 844.5-845.5, Grieth, versie 2001.1

$CROSS 245 TABULATED 327 359 WS 327 DA 17.77 15.96 1044 3641

| | | |
|---|---|---|
| 3.92 | 0 | 344 !#LAKE |
| 5.18 | 126 | 469 |
| 7.07 | 304 | 647 |
| 8.95 | 320 | 664 |
| 10.84 | 327 | 670 !#SUB0 |
| 11.86 | 328 | 702 |
| 11.96 | 329 | 703 !#KRIB |
| 12.06 | 359 | 704 !#SUB1 |
| 14.92 | 502 | 911 |
| 17.77 | 1744 | 2016 !#DIKE1 |

| | | |
|---|---|---|
| 16.40 | 1142 | 1355 !#DIKE2 |
| 16.87 | 1295 | 1529 |
| 17.35 | 1379 | 1628 |
| 17.82 | 1420 | 1676 |
| 18.29 | 1427 | 2885 !#SUB2 |

| | | |
|---|---|---|
| 17.78 | 1745 | 3726 !#DIKE2 |
| 17.83 | 1746 | 3732 |
| 17.87 | 1747 | 3734 |
| 17.92 | 1748 | 3739 |
| 17.96 | 1750 | 3743 !#SUB2 |

! Rhein. 845.5-846.5. Grieth. versie 1999.1

$CROSS 246 TABULATED 299 367 WS 299 DA 16.10 13.47 1493 16033

| | | |
|---|---|---|
| 3.26 | 0 | 157 !#LAKE |
| 4.83 | 110 | 268 |
| 6.80 | 270 | 428 |
| 8.78 | 295 | 452 |
| 10.75 | 299 | 456 !#SUB0 |
| 11.77 | 300 | 523 |
| 11.87 | 301 | 524 !#KRIB |
| 11.97 | 367 | 525 !#SUB1 |
| 14.04 | 451 | 609 |
| 16.10 | 1673 | 1930 !#DIKE1 |
| 16.43 | 2323 | 2425 !#DIKE2 |
| 16.82 | 2727 | 2860 |
| 17.21 | 2751 | 2891 |
| 17.61 | 2764 | 8423 |
| 18.00 | 2770 | 8476 !#SUB2 |

! Rhein, 845.5-846.5, Grieth, versie 2001.1

$CROSS 246 TABULATED 299 367 WS 299 DA 17.62 14.45 1181 13955

| | | |
|---|---|---|
| 3.26 | 0 | 126 !#LAKE |
| 4.83 | 110 | 236 |
| 6.80 | 270 | 396 |
| 8.78 | 295 | 421 |
| 10.75 | 299 | 425 !#SUB0 |
| 11.77 | 300 | 492 |
| 11.87 | 301 | 493 !#KRIB |
| 11.97 | 367 | 494 !#SUB1 |
| 14.80 | 607 | 735 |
| 17.62 | 2434 | 2561 !#DIKE1 |
| 18.01 | 2435 | 6504 !#DIKE2 |
| 18.02 | 2440 | 6531 |
| 18.03 | 2441 | 6532 |
| **18.04** | 2442 | 6533 |
| **18.05** | 2443 | 6534 !#SUB2 |

! Rhein. 846.5-847.5. Dornick. versie 1999.1

$CROSS 247 TABULATED 304 392 WS 304 DA 16.00 14.12 575 471

| | | |
|---|---|---|
| 4.13 | 0 | 120 !#LAKE |
| 4.14 | 15 | 135 |
| 6.32 | 275 | 395 |
| 8.49 | 300 | 420 |
| 10.67 | 304 | 424 !#SUB0 |
| 11.69 | 305 | 511 |
| 11.79 | 306 | 512 !#KRIB |
| 11.89 | 392 | 513 !#SUB1 |
| 13.95 | 817 | 888 |
| 16.00 | 1005 | 1076 !#DIKE1 |
| 16.10 | 1203 | 1203 !#DIKE2 |
| 16.76 | 1279 | 1296 |
| 17.42 | 1294 | 1422 |
| 18.08 | 1299 | 1440 |
| 18.74 | 1302 | 1448 !#SUB2 |

! Rhein, 846.5-847.5, Dornick, versie 2001.1

$CROSS 247 TABULATED 304 392 WS 304 DA 16.00 14.12 575 471

| | | |
|---|---|---|
| 4.13 | 0 | 120 !#LAKE |
| 4.14 | 15 | 135 |
| 6.32 | 275 | 395 |
| 8.49 | 300 | 420 |
| 10.67 | 304 | 424 !#SUB0 |
| 11.69 | 305 | 511 |
| 11.79 | 306 | 512 !#KRIB |
| 11.89 | 392 | 513 !#SUB1 |
| 13.95 | 817 | 888 |
| 16.00 | 1005 | 1076 !#DIKE1 |
| 16.10 | 1203 | 1203 !#DIKE2 |
| 16.76 | 1279 | 1296 |
| 17.42 | 1294 | 1422 |
| 18.08 | 1299 | 1440 |
| 18.74 | 1302 | 1447 !#SUB2 |

# Annex 4 SOBEK cross-sections dike realignments Oberrhein

| ! 1, 366.4-367.0, City, versie 2001.3 | ! 1, 366.4-367.0, Woerth_Jockgrim, versie 2001.ret |
|---|---|
| $CROSS 9 TABULATED 170 246 WS 170 DA 101.90 101.85 108 0 | $CROSS 9 TABULATED 169 247 WS 169 DA 101.70 101.65 108 0 |
| 97.31 0 54 !#LAKE | 97.23 0 54 !#LAKE |
| 97.32 21 75 | 97.24 12 66 |
| 97.76 150 204 | 97.71 140 194 |
| 98.20 168 222 | 98.17 166 220 |
| 98.64 170 225 !#SUB0 | 98.64 169 223 !#SUB0 |
| 99.67 171 292 | 99.67 170 294 |
| 99.77 172 297 !#KRIB | 99.77 171 298 !#KRIB |
| 99.87 246 300 !#SUB1 | 99.87 247 301 !#SUB1 |
| 100.89 576 660 | 100.79 568 651 |
| 101.90 656 744 !#DIKE1 | 101.70 643 740 !#DIKE1 |
| 101.93 711 745 !#DIKE2 | 101.71 644 742 !#DIKE2 |
| 102.76 741 777 | 103.01 750 2714 |
| 103.58 762 800 | 104.32 778 3310 |
| 104.41 778 818 | 105.62 792 3520 |
| 105.24 789 829 !#SUB2 | 106.92 793 3582 !#SUB2 |
| ! 1, 410.9-411.5, City, versie 2001.3 | ! 1, 410.9-411.5, Waldsee, versie 2001.ret |
| $CROSS 90 TABULATED 223 245 WS 223 DA 95.00 95.00 296 0 | $CROSS 90 TABULATED 221 244 WS 221 DA 95.00 95.00 296 0 |
| 84.12 0 171 !#LAKE | 84.14 0 171 !#LAKE |
| 85.52 72 242 | 85.52 72 242 |
| 87.15 169 340 | 87.15 165 336 |
| 88.79 220 390 | 88.79 217 387 |
| 90.42 223 393 !#SUB0 | 90.42 221 392 !#SUB0 |
| 91.11 243 413 | 91.11 242 413 |
| 91.80 244 414 | 91.80 243 414 |
| 92.49 245 415 !#SUB1 | 92.49 244 415 !#SUB1 |
| 93.75 676 1070 | 93.75 676 1071 |
| 95.00 700 1114 !#DIKE1 | 95.00 700 1113 !#DIKE1 |
| 95.01 701 1115 !#DIKE2 | 95.01 701 1114 !#DIKE2 |
| 95.27 706 1128 | 95.50 717 1148 |
| 95.54 719 1152 | 95.99 730 1202 |
| 95.80 727 1174 | 96.47 736 1219 |
| 96.06 735 1212 !#SUB2 | 96.96 737 1222 !#SUB2 |
| ! 1, 411.5-412.0, City, versie 2001.3 | ! 1, 411.5-412.0, Waldsee, versie 2001.ret |
| $CROSS 91 TABULATED 223 241 WS 223 DA 95.19 85.98 153 220 | $CROSS 91 TABULATED 223 242 WS 223 DA 95.19 85.81 160 226 |
| 84.15 4 45 !#LAKE | 84.15 4 47 !#LAKE |
| 85.69 95 136 | 85.69 94 138 |
| 87.24 142 183 | 87.24 142 185 |
| 88.78 214 255 | 88.78 214 257 |
| 90.32 223 264 !#SUB0 | 90.32 223 266 !#SUB0 |
| 91.01 238 279 | 91.01 240 283 |
| 91.70 239 281 | 91.70 241 284 |
| 92.39 241 282 !#SUB1 | 92.39 242 285 !#SUB1 |
| 93.79 577 813 | 93.79 584 1040 |

| | |
|---|---|
| 95.19 608 859 !#DIKE1 | 95.19 628 1275 !#DIKE1 |
| 95.20 609 883 !#DIKE2 | 95.20 629 1300 !#DIKE2 |
| 95.51 615 895 | 95.77 655 1343 |
| 95.82 630 914 | 96.33 678 1371 |
| 96.13 644 931 | 96.90 684 1377 |
| 96.44 649 937 !#SUB2 | 97.46 686 1379 !#SUB2 |

| | |
|---|---|
| ! 1, 412.0-412.5, City, versie 2001.3 | ! 1, 412.0-412.5, Waldsee, versie 2001.ret |
| $CROSS 92 TABULATED 217 254 WS 217 DA 95.19 91.51 126 5564 | $CROSS 92 TABULATED 217 254 WS 217 DA 95.19 91.51 126 5551 |
| 84.93 0 63 !#LAKE | 84.94 0 63 !#LAKE |
| 86.15 160 223 | 86.15 161 224 |
| 87.51 199 262 | 87.51 199 262 |
| 88.86 213 276 | 88.86 211 273 |
| 90.22 217 280 !#SUB0 | 90.22 217 280 !#SUB0 |
| 90.91 247 310 | 90.91 246 309 |
| 91.59 251 314 | 91.59 251 314 |
| 92.28 254 317 !#SUB1 | 92.28 254 316 !#SUB1 |
| 93.74 616 675 | 93.74 636 1100 |
| 95.19 630 744 !#DIKE1 | 95.19 653 1300 !#DIKE1 |
| 95.34 631 2257 !#DIKE2 | 95.34 654 2809 !#DIKE2 |
| 97.01 640 2388 | 97.01 665 2942 |
| 98.68 641 2446 | 98.68 666 3000 |
| 100.35 642 2478 | 100.35 667 3034 |
| 102.02 643 2487 !#SUB2 | 102.02 668 3045 !#SUB2 |

| | |
|---|---|
| ! 1, 412.5-413.1, City, versie 2001.3 | ! 1, 412.5-413.1, Waldsee, versie 2001.ret |
| $CROSS 93 TABULATED 220 320 WS 220 DA 92.30 92.25 16 0 | $CROSS 93 TABULATED 221 320 WS 221 DA 90.45 90.40 17 0 |
| 85.02 0 158 !#LAKE | 85.03 0 159 !#LAKE |
| 85.38 129 287 | 85.38 130 288 |
| 86.96 204 362 | 86.96 207 365 |
| 88.54 216 375 | 88.54 218 377 |
| 90.12 220 378 !#SUB0 | 90.12 221 379 !#SUB0 |
| 90.80 318 476 | 90.80 318 476 |
| 91.49 319 478 | 91.49 319 478 |
| 92.17 320 479 !#SUB1 | 92.17 320 479 !#SUB1 |
| 92.24 570 859 | 92.24 568 836 |
| 92.30 571 862 !#DIKE1 | 92.30 569 837 !#DIKE1 |
| 92.31 579 863 !#DIKE2 | 92.31 570 838 !#DIKE2 |
| 92.98 580 878 | 93.20 571 844 |
| 93.65 581 894 | 94.09 583 873 |
| 94.31 582 914 | 94.97 585 904 |
| 94.98 583 919 !#SUB2 | 95.86 586 921 !#SUB2 |

| | |
|---|---|
| ! 2, 435.8-436.4, City, versie 2001.3 | ! 2, 435.8-436.4, Petersau_Bannen, versie 2001.ret |
| $CROSS 136 TABULATED 289 307 WS 289 DA 93.71 87.56 566 1024 | $CROSS 136 TABULATED 286 305 WS 286 DA 93.71 88.67 556 2015 |
| 80.82 0 0 !#MAIN | 80.82 0 0 !#MAIN |
| 82.32 103 103 | 82.32 103 103 |
| 83.88 203 203 | 83.88 203 203 |
| 85.44 274 274 | 85.44 274 274 |
| 87.00 289 289 !#SUB0 | 87.00 286 286 !#SUB0 |
| 87.67 301 301 | 87.67 299 299 |
| 88.34 305 305 | 88.34 303 303 |

| | | |
|---|---|---|
| 89.02 | 307 | 307 !#SUB1 |
| 91.37 | 472 | 499 |
| 93.71 | 485 | 518 !#DIKE1 |
| 93.75 | 563 | 684 !#DIKE2 |
| 95.77 | 571 | 696 |
| 97.79 | 579 | 708 |
| 99.82 | 584 | 715 |
| 101.84 | 588 | 721 !#SUB2 |

| | | |
|---|---|---|
| 89.02 | 305 | 305 !#SUB1 |
| 91.37 | 476 | 500 |
| 93.71 | 487 | 519 !#DIKE1 |
| 93.75 | 564 | 919 !#DIKE2 |
| 96.25 | 574 | 933 |
| 98.75 | 582 | 946 |
| 101.25 | 589 | 955 |
| 103.75 | 594 | 960 !#SUB2 |

! 2, 436.4-436.9, City, versie 2001.3

$CROSS 137 TABULATED 291 321 WS 291 DA 91.64 88.15 916 4863

| | | |
|---|---|---|
| 80.84 | 0 | 0 !#MAIN |
| 82.28 | 124 | 124 |
| 83.84 | 186 | 186 |
| 85.39 | 282 | 282 |
| 86.95 | 291 | 291 !#SUB0 |
| 87.62 | 311 | 311 |
| 88.29 | 315 | 315 |
| 88.96 | 321 | 321 !#SUB1 |
| 90.30 | 382 | 383 |
| 91.64 | 389 | 1128 !#DIKE1 |
| 91.70 | 390 | 1426 !#DIKE2 |
| 92.89 | 391 | 1435 |
| 94.09 | 621 | 1800 |
| 95.28 | 623 | 1804 |
| 96.47 | 624 | 1808 !#SUB2 |

! 2, 436.4-436.9, Petersau_Bannen, versie 2001.ret

$CROSS 137 TABULATED 284 317 WS 284 DA 91.64 88.10 902 6411

| | | |
|---|---|---|
| 80.80 | 0 | 0 !#MAIN |
| 82.28 | 124 | 124 |
| 83.84 | 186 | 186 |
| 85.39 | 275 | 275 |
| 86.95 | 284 | 284 !#SUB0 |
| 87.62 | 305 | 305 |
| 88.29 | 310 | 310 |
| 88.96 | 317 | 317 !#SUB1 |
| 90.30 | 381 | 382 |
| 91.64 | 389 | 1126 !#DIKE1 |
| 91.70 | 390 | 1426 !#DIKE2 |
| 94.52 | 620 | 2219 |
| 97.33 | 624 | 2229 |
| 100.15 | 629 | 2236 |
| 102.96 | 631 | 2241 !#SUB2 |

! 2, 436.9-437.5, City, versie 2001.3

$CROSS 138 TABULATED 234 263 WS 234 DA 91.62 87.65 1052 7288

| | | |
|---|---|---|
| 80.46 | 0 | 143 !#LAKE |
| 81.63 | 112 | 254 |
| 83.38 | 176 | 319 |
| 85.14 | 229 | 372 |
| 86.90 | 234 | 377 !#SUB0 |
| 87.57 | 260 | 402 |
| 88.24 | 262 | 405 |
| 88.90 | 263 | 406 !#SUB1 |
| 90.26 | 355 | 841 |
| 91.62 | 362 | 1239 !#DIKE1 |
| 91.63 | 363 | 2052 !#DIKE2 |
| 92.26 | 364 | 2073 |
| 92.90 | 366 | 2085 |
| 93.53 | 368 | 2090 |
| 94.16 | 660 | 2757 !#SUB2 |

! 2, 436.9-437.5, Petersau_Bannen, versie 2001.ret

$CROSS 138 TABULATED 232 262 WS 232 DA 91.62 87.74 1045 8271

| | | |
|---|---|---|
| 80.44 | 0 | 141 !#LAKE |
| 81.63 | 110 | 251 |
| 83.38 | 178 | 319 |
| 85.14 | 226 | 368 |
| 86.90 | 232 | 374 !#SUB0 |
| 87.57 | 257 | 399 |
| 88.24 | 261 | 402 |
| 88.90 | 262 | 404 !#SUB1 |
| 90.26 | 353 | 835 |
| 91.62 | 362 | 1234 !#DIKE1 |
| 91.63 | 363 | 2049 !#DIKE2 |
| 94.68 | 658 | 3057 |
| 97.72 | 664 | 3068 |
| 100.77 | 666 | 3075 |
| 103.81 | 668 | 3079 !#SUB2 |

! 2, 439.2-439.7, City, versie 2001.3

$CROSS 142 TABULATED 294 313 WS 294 DA 90.78 88.11 43 1356

| | | |
|---|---|---|
| 81.16 | 5 | 484 !#LAKE |
| 82.54 | 145 | 623 |
| 83.92 | 268 | 746 |
| 85.30 | 289 | 768 |
| 86.68 | 294 | 772 !#SUB0 |

! 2, 439.2-439.7, Worms_Mittlerer_Busch, versie 2001.ret

$CROSS 142 TABULATED 290 314 WS 290 DA 92.00 89.67 42 2526

| | | |
|---|---|---|
| 81.16 | 4 | 483 !#LAKE |
| 82.54 | 144 | 623 |
| 83.92 | 269 | 747 |
| 85.30 | 286 | 764 |
| 86.68 | 290 | 769 !#SUB0 |

| | | |
|---|---|---|
| 87.35 | 307 | 785 |
| 88.01 | 311 | 789 |
| 88.68 | 313 | 792 !#SUB1 |
| 89.73 | 931 | 2787 |
| 90.78 | 1075 | 3643 !#DIKE1 |
| 90.79 | 1077 | 3645 !#DIKE2 |
| 91.24 | 1117 | 3944 |
| 91.69 | 1134 | 3977 |
| 92.14 | 1146 | 4012 |
| 92.59 | 1155 | 4030 !#SUB2 |

| | | |
|---|---|---|
| 87.35 | 307 | 786 |
| 88.01 | 313 | 791 |
| 88.68 | 314 | 793 !#SUB1 |
| 90.34 | 1011 | 3775 |
| 92.00 | 1142 | 4819 !#DIKE1 |
| 92.01 | 1143 | 5400 !#DIKE2 |
| 94.02 | 1172 | 5461 |
| 96.03 | 1174 | 5466 |
| 98.03 | 1175 | 5469 |
| 100.04 | 1176 | 5470 !#SUB2 |

! 2, 440.3-440.9, City, versie 2001.3

$CROSS 144 TABULATED 282 310 WS 282 DA 90.68 89.38 0 198

| | | |
|---|---|---|
| 80.50 | 0 | 0 !#MAIN |
| 81.41 | 86 | 86 |
| 83.13 | 157 | 157 |
| 84.85 | 258 | 258 |
| 86.58 | 282 | 282 !#SUB0 |
| 87.24 | 294 | 294 |
| 87.90 | 302 | 302 |
| 88.56 | 310 | 310 !#SUB1 |
| 89.62 | 457 | 474 |
| 90.68 | 661 | 695 !#DIKE1 |
| 90.69 | 662 | 848 !#DIKE2 |
| 91.34 | 734 | 933 |
| 91.99 | 745 | 953 |
| 92.63 | 751 | 965 |
| 93.28 | 754 | 972 !#SUB2 |

! 2, 440.3-440.9, Worms_Buergerweide, versie 2001.ret

$CROSS 144 TABULATED 281 310 WS 281 DA 90.68 89.37 0 199

| | | |
|---|---|---|
| 80.51 | 0 | 0 !#MAIN |
| 81.41 | 86 | 86 |
| 83.13 | 157 | 157 |
| 84.85 | 259 | 259 |
| 86.58 | 281 | 281 !#SUB0 |
| 87.24 | 295 | 295 |
| 87.90 | 303 | 303 |
| 88.56 | 310 | 310 !#SUB1 |
| 89.62 | 457 | 841 |
| 90.68 | 662 | 1436 !#DIKE1 |
| 90.69 | 663 | 1590 !#DIKE2 |
| 91.88 | 745 | 1735 |
| 93.06 | 753 | 1762 |
| 94.25 | 756 | 1770 |
| 95.43 | 757 | 1771 !#SUB2 |

! 2, 440.9-441.4, City, versie 2001.3

$CROSS 145 TABULATED 299 322 WS 299 DA 91.02 91.02 0 0

| | | |
|---|---|---|
| 81.14 | 0 | 0 !#MAIN |
| 82.47 | 167 | 167 |
| 83.82 | 241 | 241 |
| 85.17 | 290 | 290 |
| 86.52 | 299 | 299 !#SUB0 |
| 87.18 | 311 | 311 |
| 87.84 | 319 | 319 |
| 88.51 | 322 | 322 !#SUB1 |
| 89.35 | 515 | 535 |
| 90.18 | 619 | 657 |
| 91.02 | 709 | 765 !#LEV1 |
| 91.86 | 739 | 804 |
| 92.70 | 746 | 820 |
| 93.53 | 753 | 839 |
| 94.37 | 761 | 855 !#SUB2 |

! 2, 440.9-441.4, Worms_Buergerweide, versie 2001.ret

$CROSS 145 TABULATED 298 321 WS 298 DA 94.55 94.55 0 0

| | | |
|---|---|---|
| 81.14 | 0 | 0 !#MAIN |
| 82.47 | 167 | 167 |
| 83.82 | 241 | 241 |
| 85.17 | 291 | 291 |
| 86.52 | 298 | 298 !#SUB0 |
| 87.18 | 309 | 309 |
| 87.84 | 317 | 317 |
| 88.51 | 321 | 321 !#SUB1 |
| 90.52 | 683 | 1470 |
| 92.54 | 744 | 1677 |
| 94.55 | 756 | 1718 !#LEV1 |
| 96.56 | 758 | 1721 |
| 98.57 | 760 | 1723 |
| 100.59 | 761 | 1724 |
| 102.60 | 762 | 1725 !#SUB2 |

# Annex 5     Cross-sections overviews measures Niederrhein
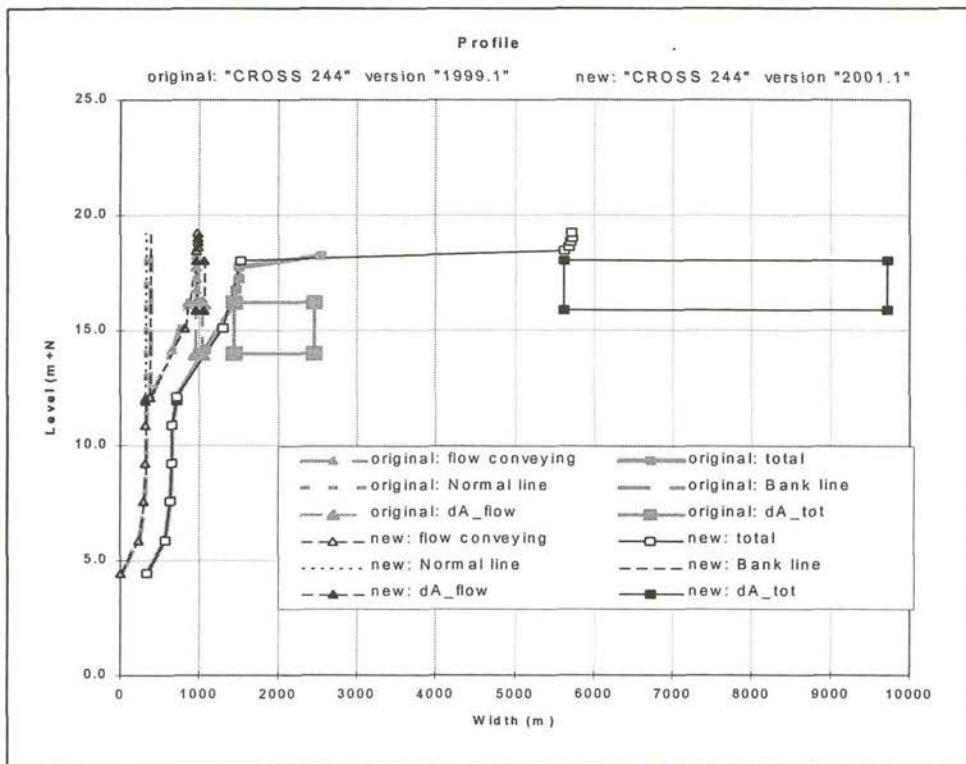


Figure A5.1A: River measure Grietherbusch Cross-section 244 (843.5-844.5 km)
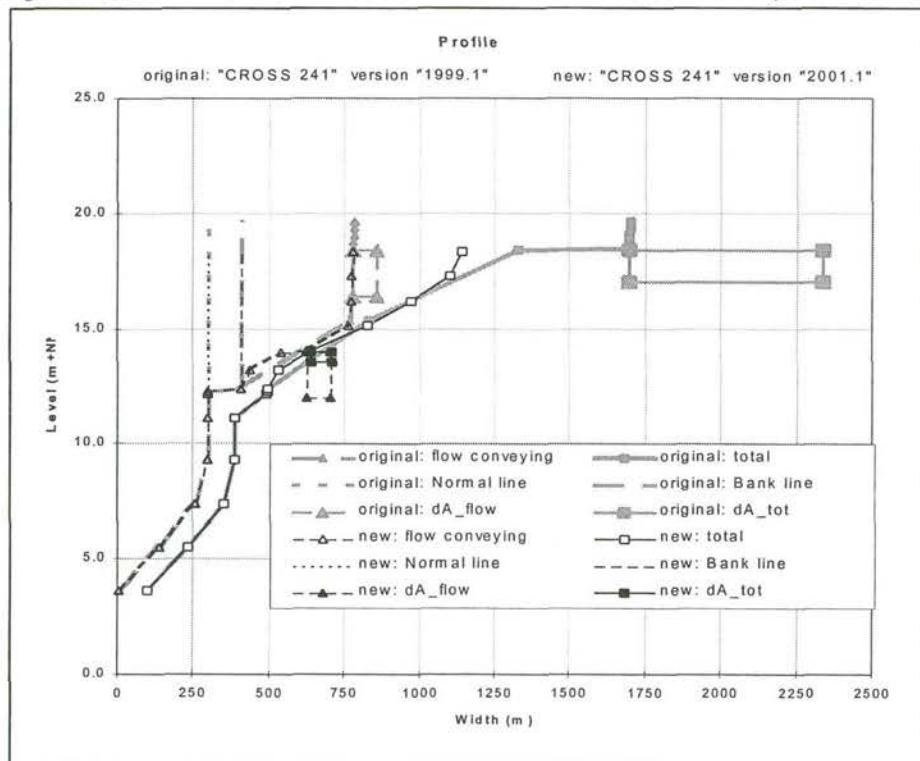


Figure A5.1B: River measure Grietherbusch Cross-section 241 (840.5-841.5 km)
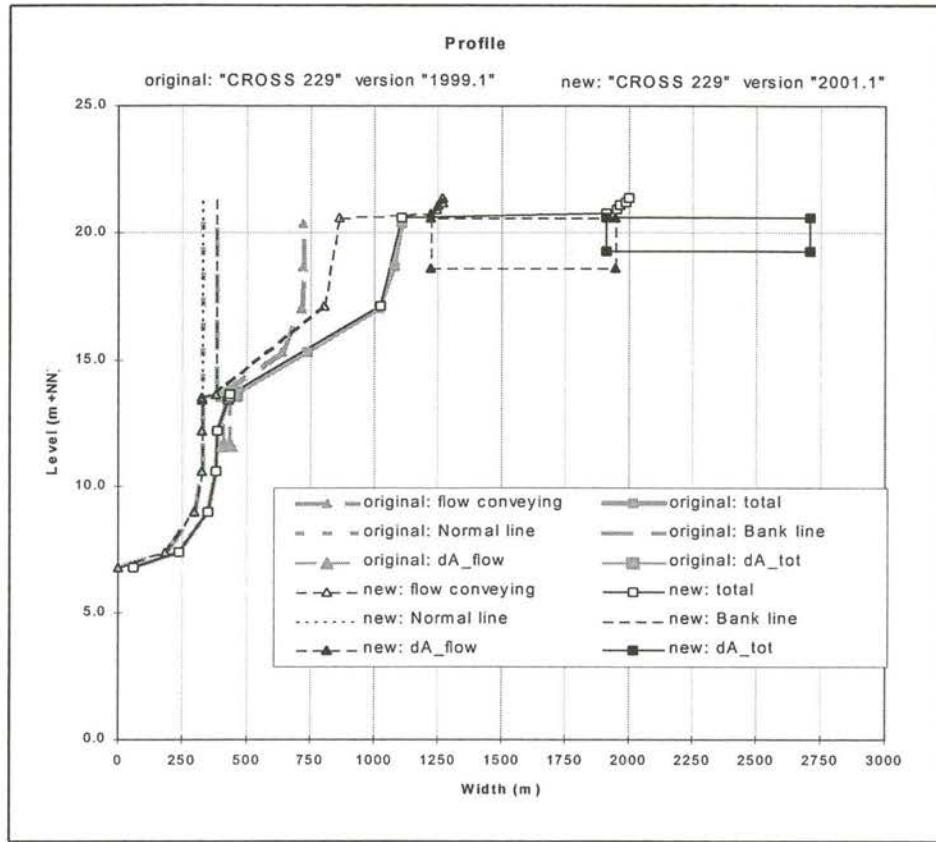
Figure A5.2: River measure Lohrwardt Cross-section 229 (829.5-830.5 km)
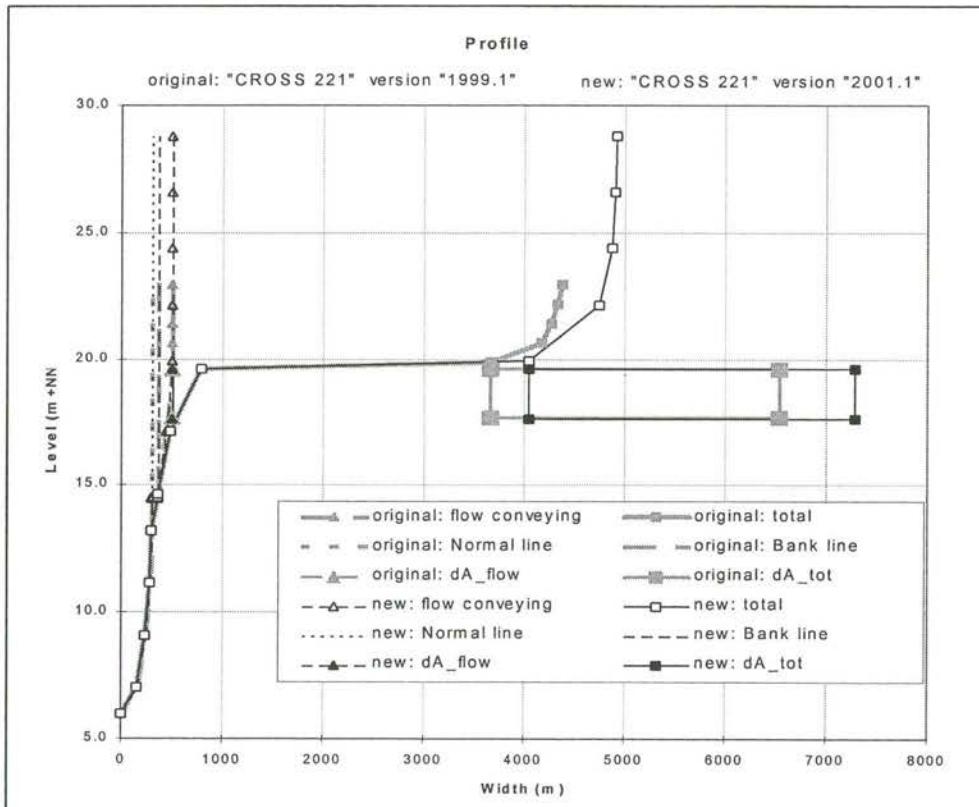


Figure A5.3A: River measure Bislicher Insel Cross-section 221 (821.5-822.5 km)
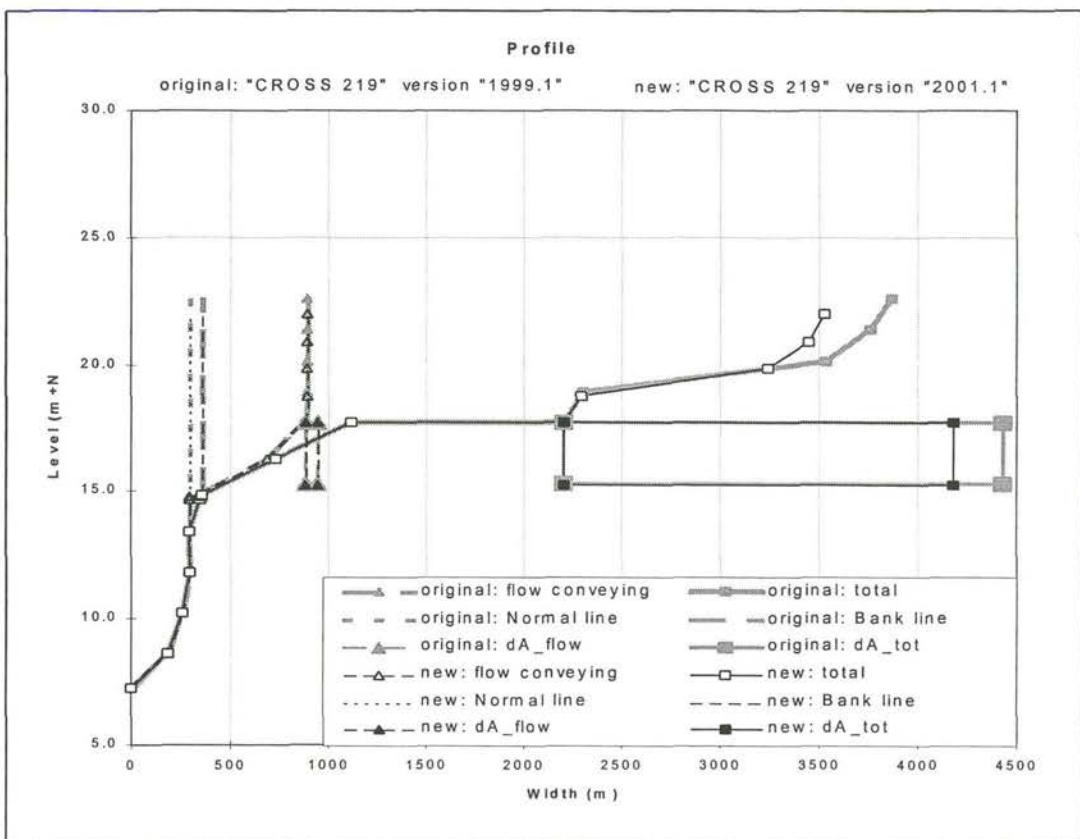
Figure A5.3B1: River measure Bislicher Insel Cross-section 219 (819.5-820.5 km)
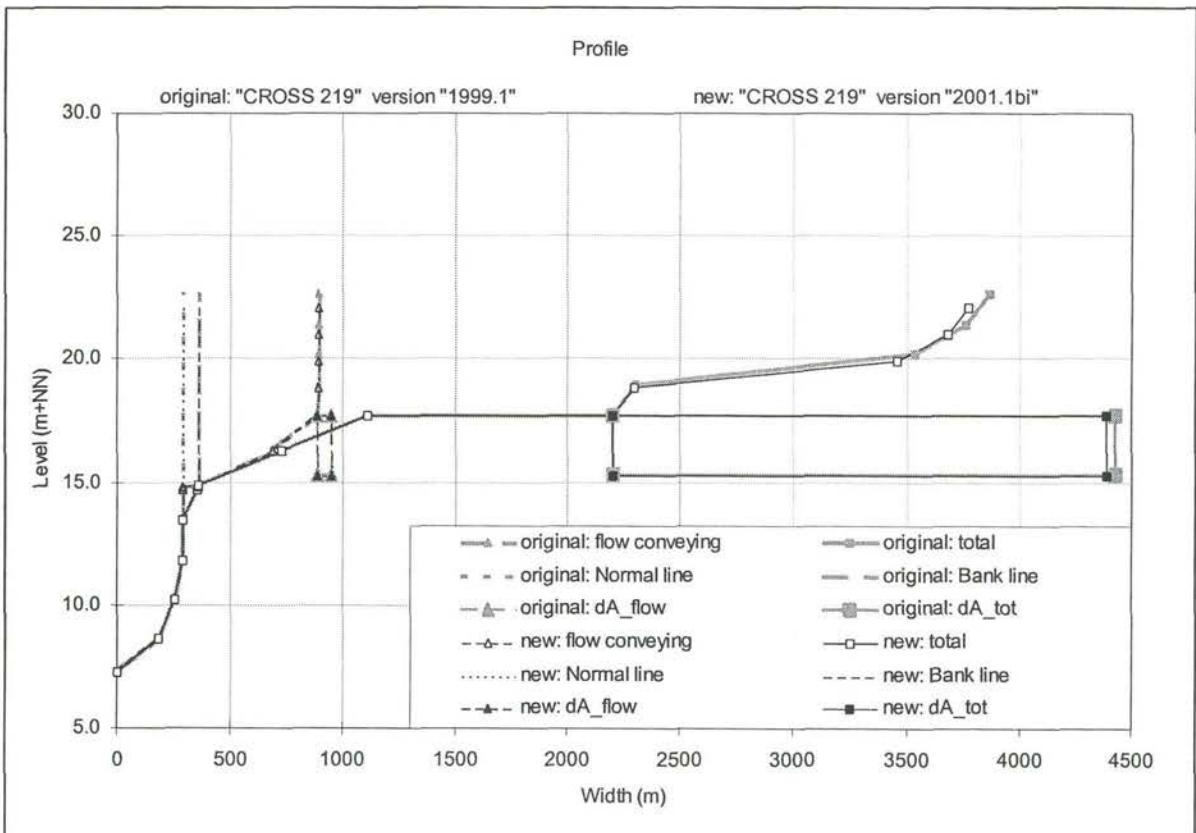


Figure A5.3B2: River measure Bislicher Insel Cross-section 219 (819.5-820.5 km) with situation including polder (version 2001.1bi)
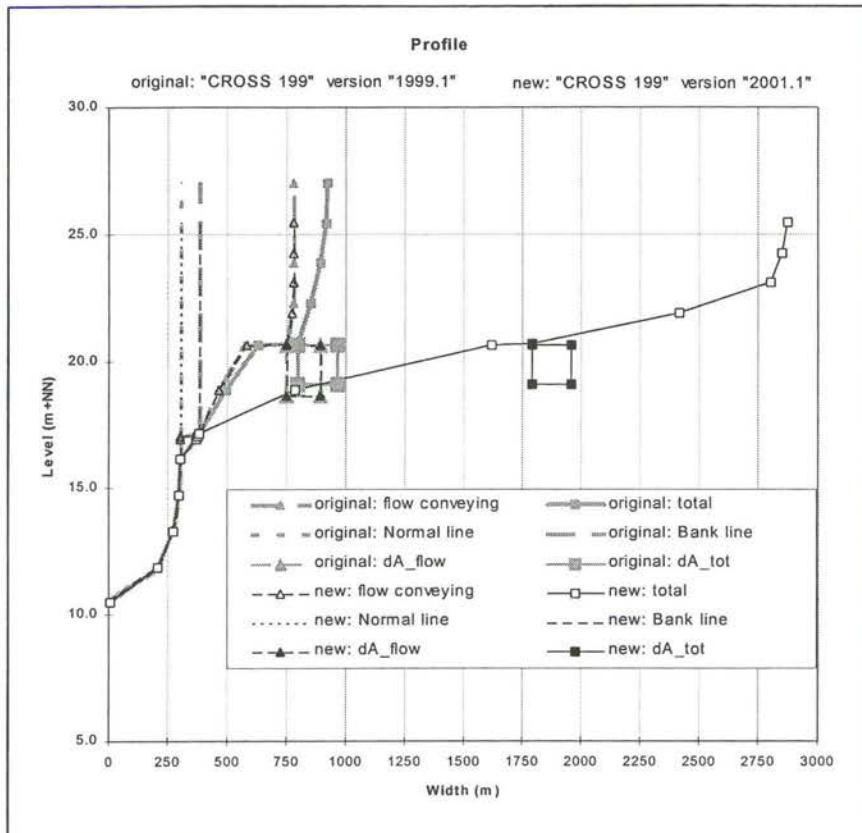
Figure A5.4: River measure Orsoy Cross-section 199 (801.5-802.5 km)
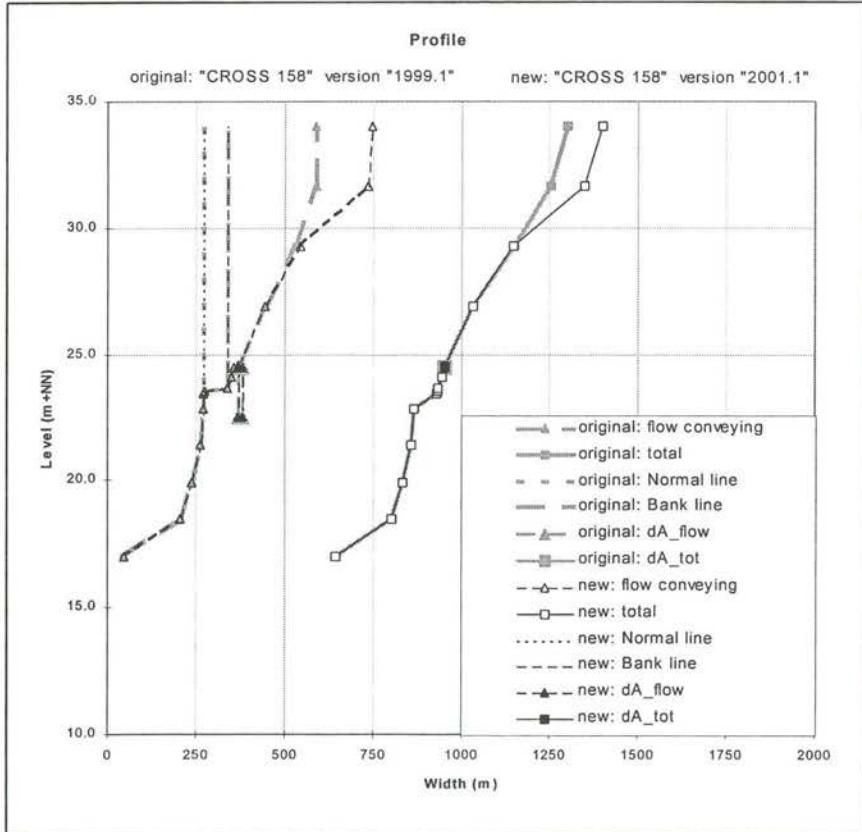
Figure A5.5: River measure Mündelheim Cross-section 158 (763.5-764.5 km)
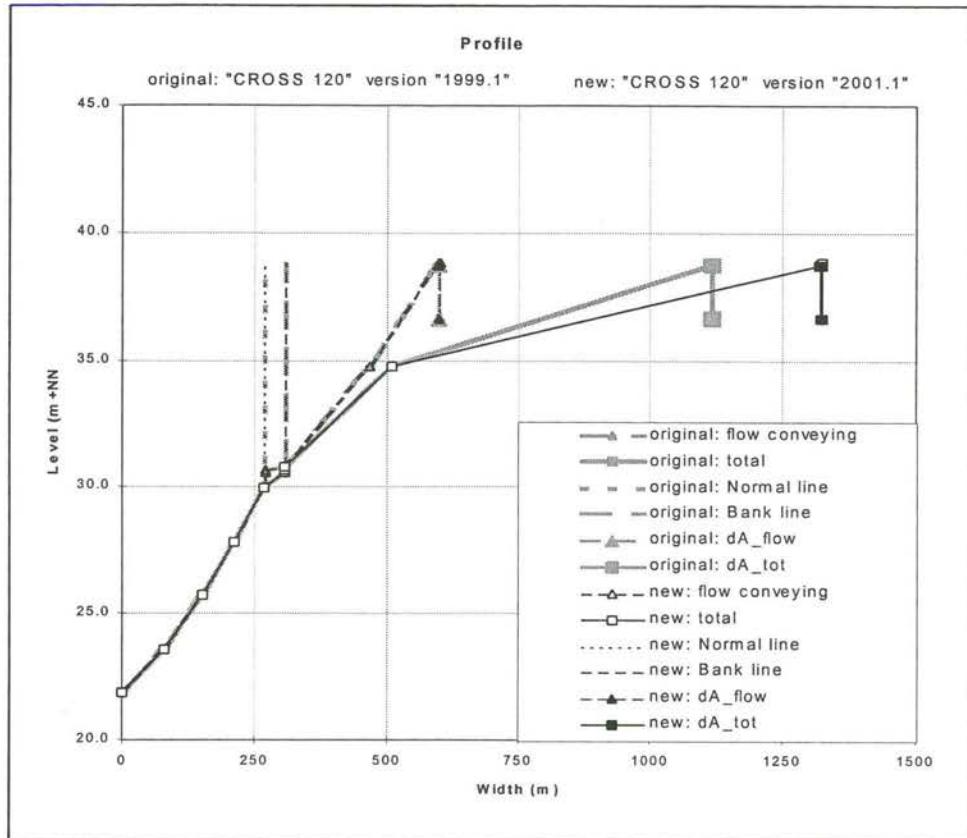
Figure A5.6: River measure Itter Himmelgeist Cross-section 120 (727.5-728.5 km)
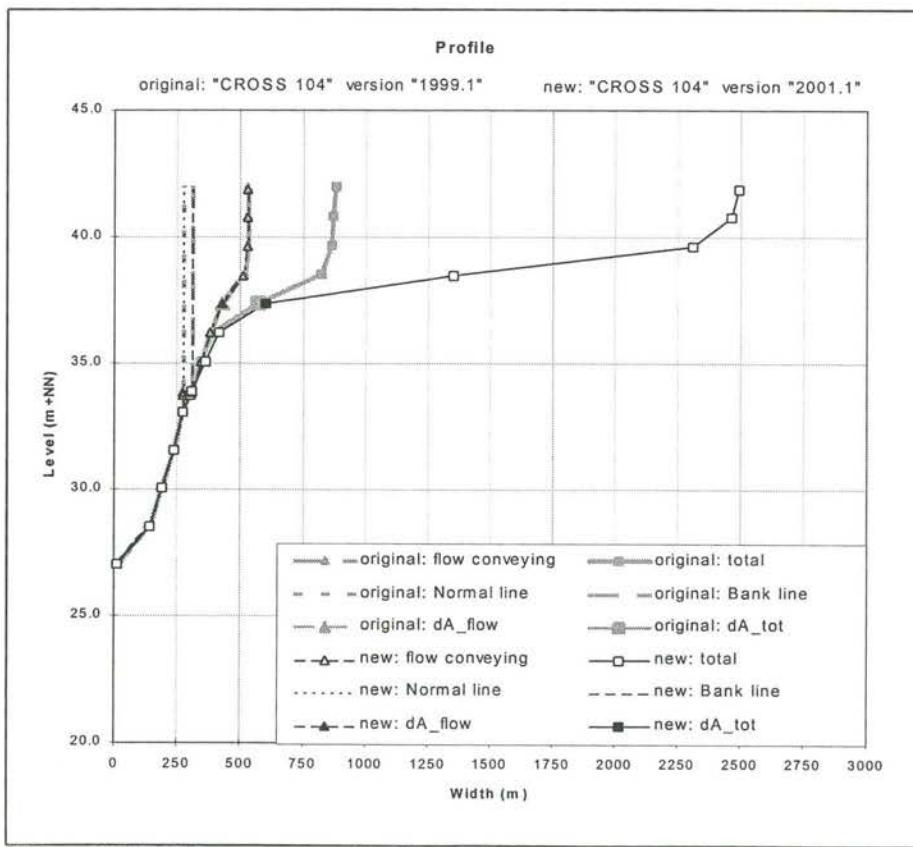


Figure A5.7: River measure Monheim Cross-section 104 (711.5-712.5 km)

# Annex 6    Cross-sections overviews measures Oberrhein
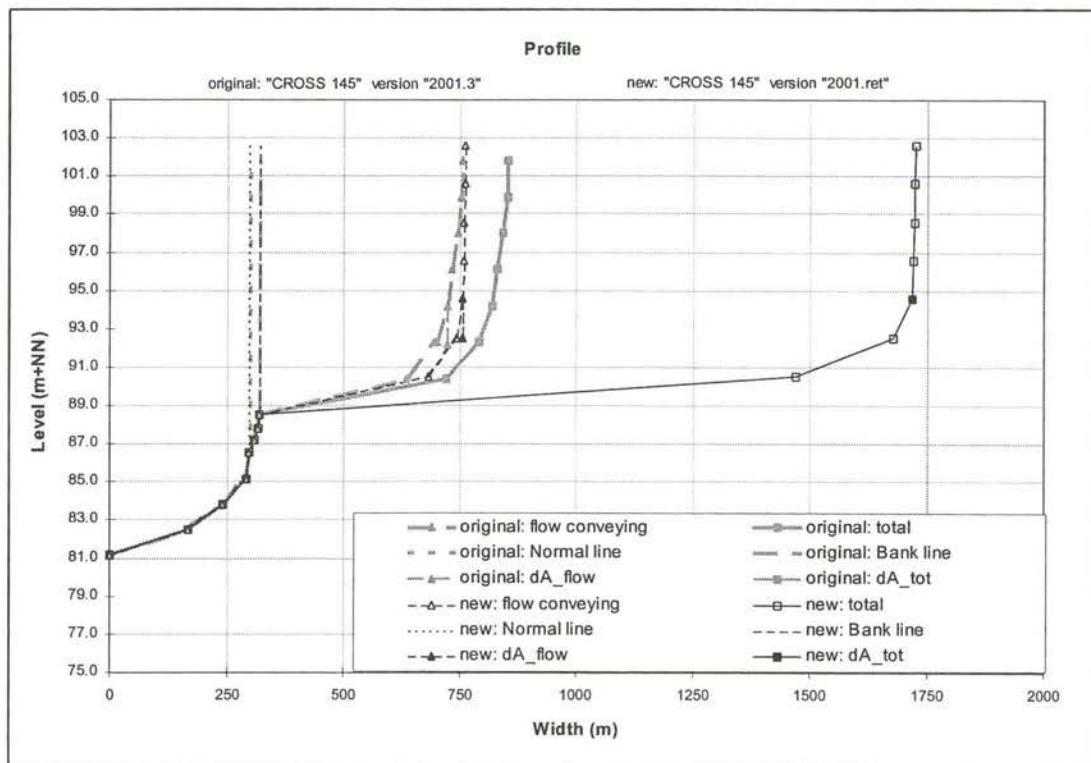


Figure A6.1: River measure Worms Bürgerweide Cross-section 145 (440.9-441.4 km)
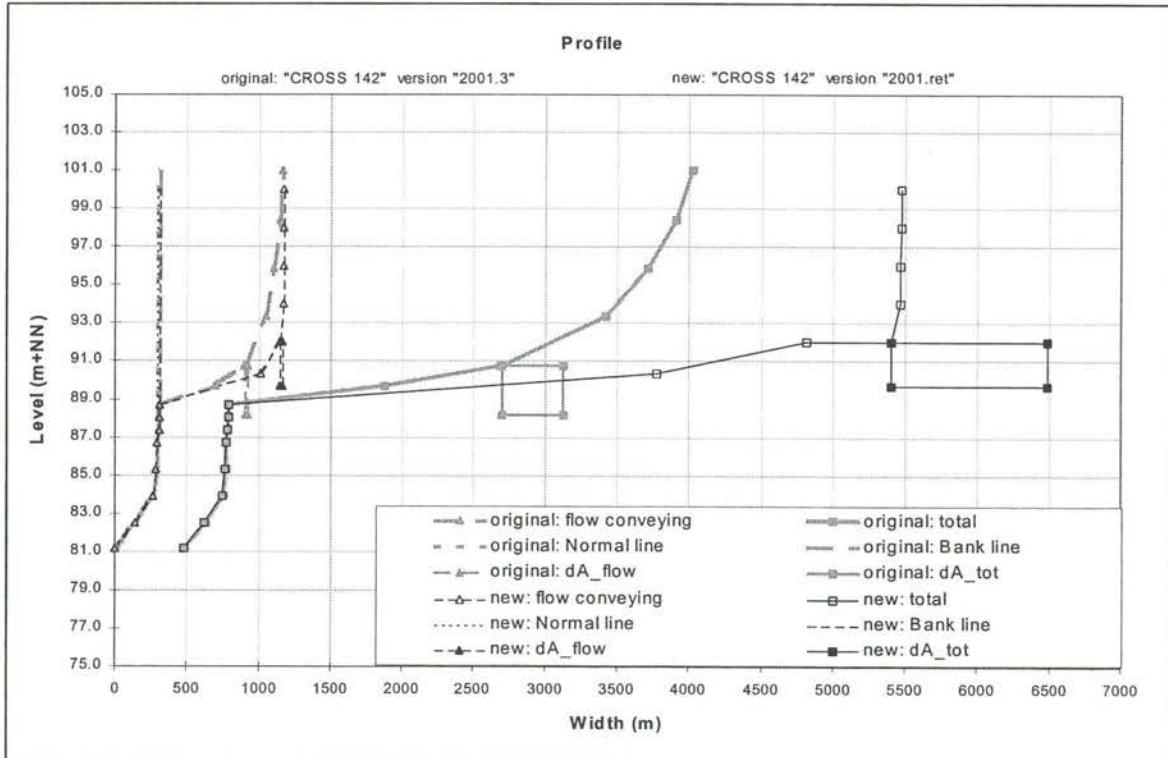


Figure A6.2: River measure Worms Mittlerer Busch Cross-section 142 (439.2-439.7 km)
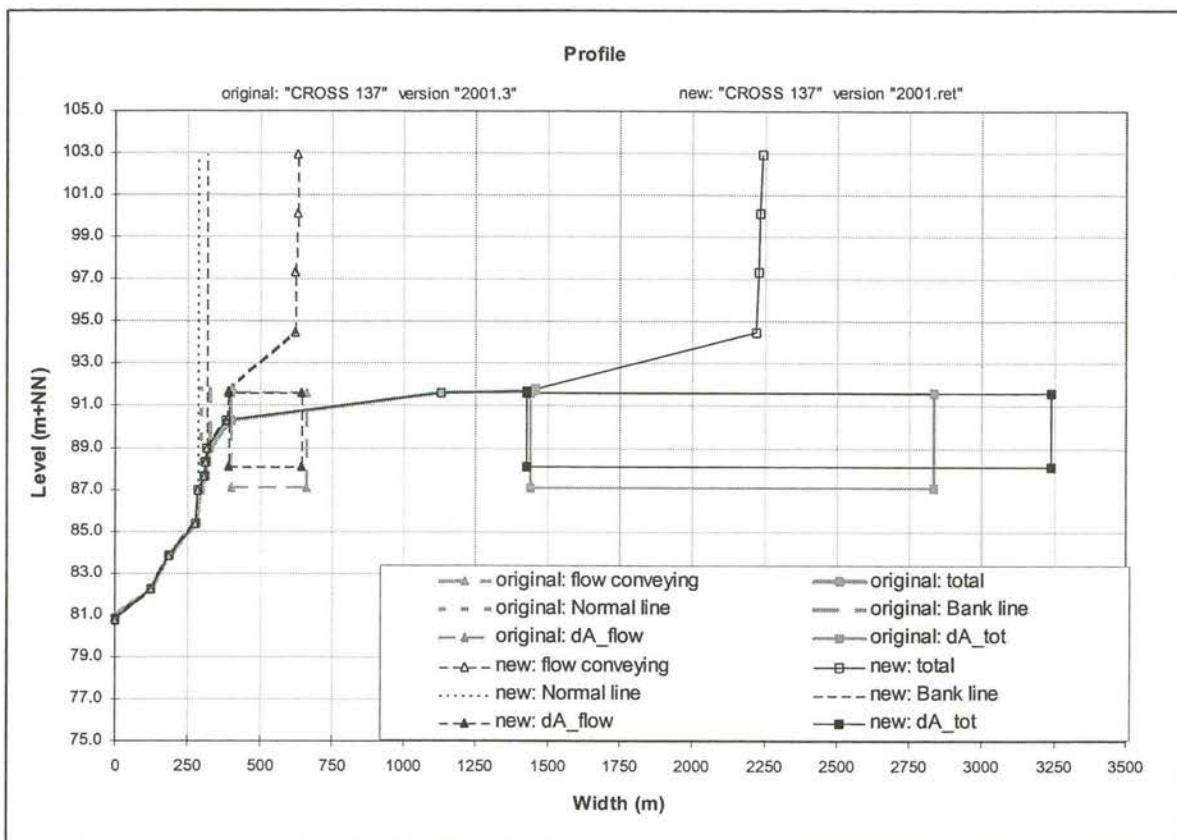
Figure A6.3: River measure Petersau Bannen Cross-section 137 (436.4-436.9 km)
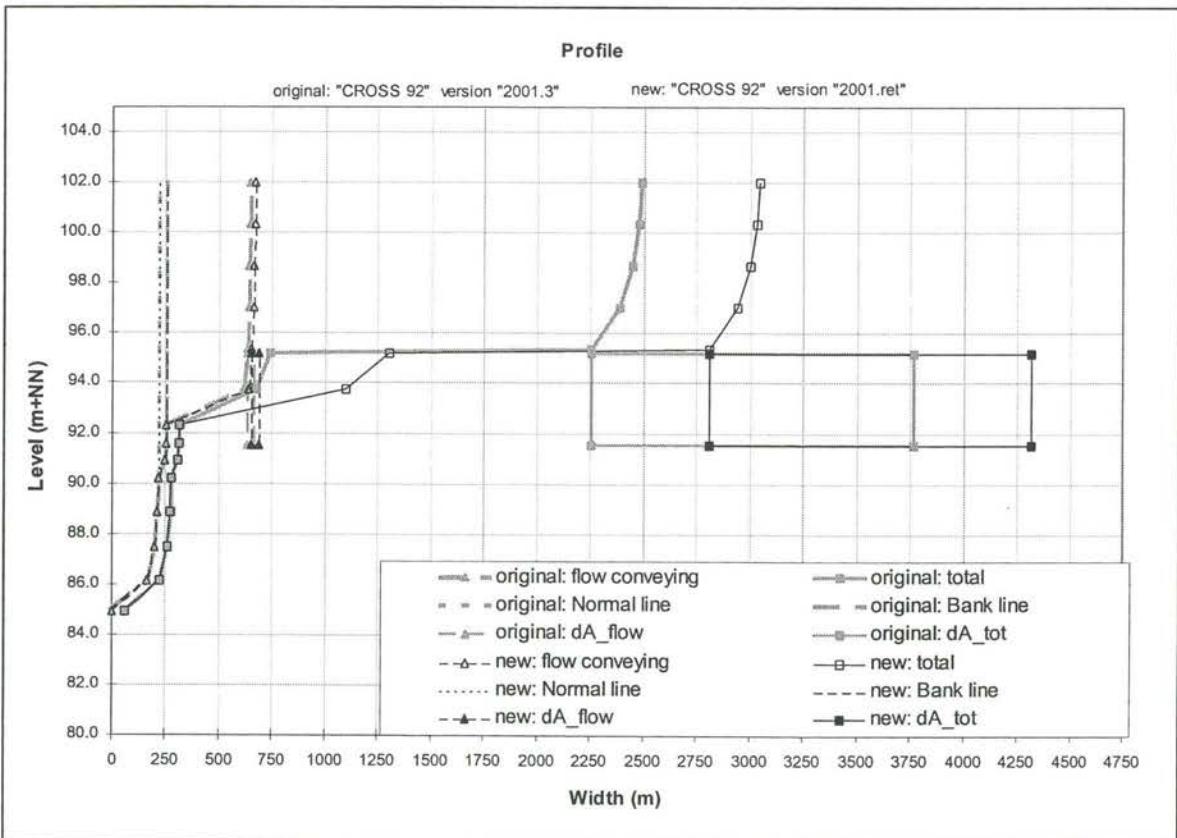


Figure A6.4: River measure Waldsee Altrip Neuhofen Cross-section 92 (412.0-412.5 km)
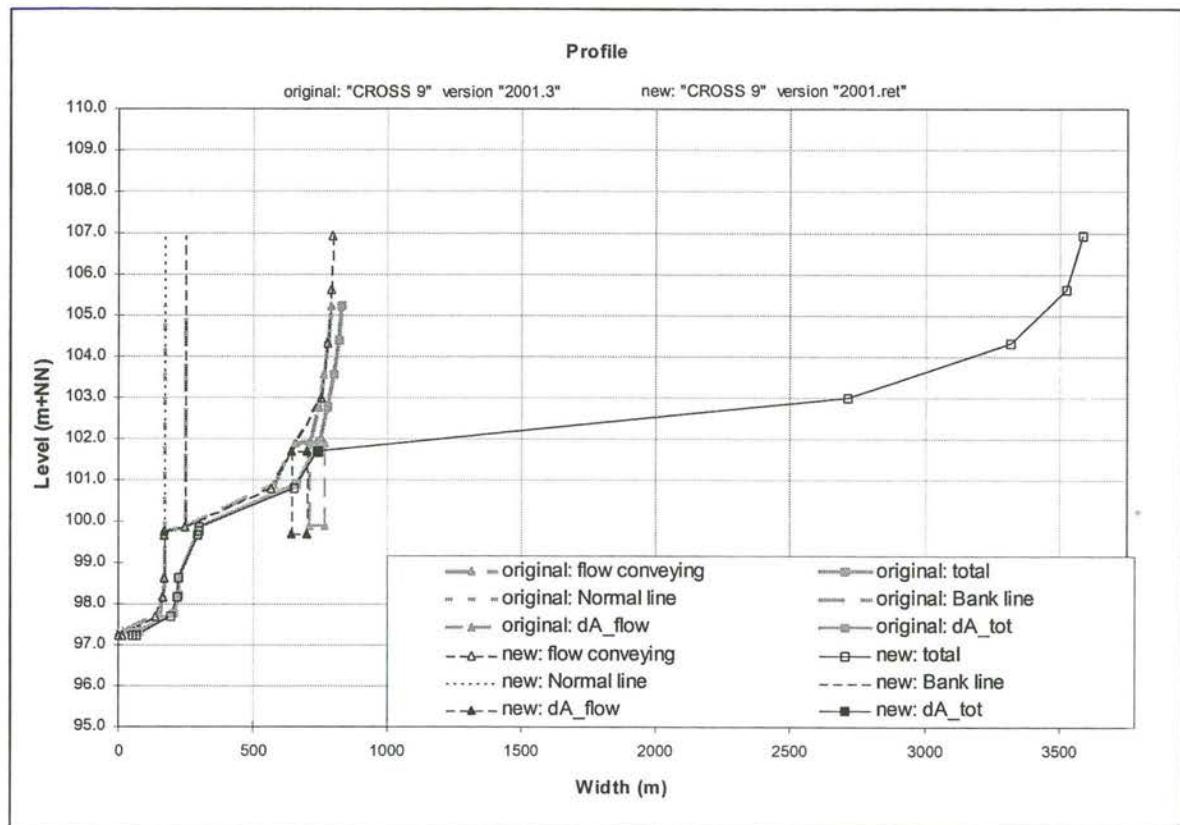
Figure A6.5: River measure Wörth Jockrim Cross-section 9 (366.4-367.0 km)

# Annex 7      Used GIS- and ArcInfo-expressions

This appendix gives an overview of ArcInfo expressions used in BASELINE-application SOBEK cross-sections.

| | |
|---|---|
| AAT | Arc Attribute Table |
| Arc or Line | 1. An ordered string of vertices (x,y-coördinate pairs) that begin at one location and end at another. Connecting the arc's vertices creates a line. The vertices at each endpoint of an arc are called nodes. |
| | 2. A coverage feature class used to represent linear features and polygon boundaries. One line feature can contain many arcs. Arcs are topologically linked to nodes (arc-node topology) and to polygons (polygon-arc topology). The descriptive attributes of arcs are stored in the arc attribute table (AAT). |
| Attribute or Item | 1. A characteristic of a geographic feature described by numbers, characters, images and CAD drawings, typically stored in tabular format and linked to the feature by a user-assigned identifier (e.g., the attributes of a well might include depth and gallons per minute). |
| | 2. A column in a database table. |
| Coverage | 1. A digital version of a map forming the basic unit of vector data storage in ArcInfo. A coverage stores geographic features (such as arcs, nodes, polygons, and label points) and secondary features (such as tics, map extend, links, and annotation). Associated feature attribute tables describe and store attributes of the geographic features. |
| | 2. A set of thematically associated data considered as a unit. A coverage usually represents a single theme such as soils, streams, roads, or land use. |
| Dangle | A line element that is connected with another line element only on one side |
| Feature | There are two types of features: |
| | 1. Geographic features, such as arcs, nodes, polygons, and label points. |
| | 2. Secondary features, such as tics, map extend, links, and annotation. |
| Grid | A geographic data model representing information as an array of equally sized square cells arranged in rows and columns. Each grid cell is referenced by its geographic x,y-location. |
| Label | See point |
| PAT | Point or Polygon Attribute Table |
| Point | 1. A single x,y-coördinate that represents a geographic feature too small to be displayed as a line or area; for example, the location of a mountain peak or a building location on a small-scale map. |
| | 2. A coverage feature class used to represent point features or to identify polygons. It is not possible to have point and polygon features in the same coverage. When representing point features, the x,y location of the label point describes the location of the feature. When identifying polygons, the label point can be located anywhere within the polygon. Attributes for points are stored in a PAT. |
| Polygon | A coverage feature class used to represent areas. A polygon is defined by arcs that make up its boundary and a point inside its boundary for identification. Polygons have attributes (PAT) that describe the geographic feature they represent. |

| | |
|---|---|
| TIN | Triangulated irregular network. A surface representation derived from irregularly spaced sample points and breakline features. The tin data set includes topological relationships between points and their neighbouring triangles. Each sample point has an x,y- coördinate and a surface, or z-value. These points are connected by edges to form a set of non-overlapping triangles used to represent the surface. Tins are also called 'irregular triangular mesh' or 'irregular triangular surface model'. |
| Workspace | A directory containing geographic data sets for use with ArcInfo. A workspace contains an INFO directory for the feature attribute tables. ArcInfo workspaces have three primary uses: as a user work area, to store all the map sections for each tile in an map library, and as automation workspaces to store all the versions of a single coverage as it progresses through the coverage automation process. |

# Annex 8        Materials supplied by the counterpart

**Niederrhein:**
- 4 April 2001:
    - o   BASELINE: new reference situation Bislicher Insel
    - o   BASELINE: files with dike realignments

**Oberrhein:**
- 15 August 2001:
    - o   BASELINE: new reference situation (compartments 33-43)
- July 2001:
    - o   BASELINE: files with dike realignments
- 17 July 2001: SOBEK-model of Oberrhein with old schematisation (2001.3)

# Annex 9     Project results forwarded to the counterpart

- 18 May 2001  (e-mail)
    - o  Oberrhein: Figures dike realignments
    - o  Profilkontrolle Niederrhein
    - o  Cross-sections Niederrhein 2001.1 & 2001.1bi:
        - ▪  Ascii
        - ▪  UI-files: Umlaut, kein Umlaut
- 11 June 2001 (e-mail)
    - o  Profilkontrolle Niederrhein
    - o  Cross-sections Niederrhein 2001.1 & 2001.1bi:
        - ▪  Ascii
        - ▪  UI-files: Umlaut, kein Umlaut
- 13 June 2001 (e-mail)
    - o  Profilkontrolle Niederrhein
    - o  Cross-sections Niederrhein 2001.1 & 2001.1bi:
        - ▪  Ascii
        - ▪  UI-files: Umlaut, kein Umlaut
- 10 October 2001:
    - o  CD-rom Niederrhein, Dike realignments, BASELINE basis data, SOBEK-schematisation 2001.1
    - o  CD-rom Oberrhein, Dike realignments, BASELINE basis data, SOBEK-schematisation 2001.ret
    - o  CD-rom Niederrhein, New reference situation, BASELINE basis data, SOBEK-schematisation 2001.1bi

# Annex 10     Data format of SOBEK cross-sections

A SOBEK cross-section is made up by the following data-format (see Annex 3 Niederrhein and 4 Oberrhein) (Zeeman, 1994):

![branch], [km-km], [city], version[year.x]

$cross [nr.] TABULATED $W_{main}$ $W_{sub1}$ WS $W_s$ DA $h_{top}$ $h_{base}$ $dA_{flow}$ $dA_{tot}$

| | | | | |
|---|---|---|---|---|
| h1 | $W_{fh1}$ | $W_{th1}$ | | !#LAKE/!#MAIN |
| h2 | $W_{fh2}$ | $W_{th2}$ | | |
| h3 | $W_{fh3}$ | $W_{th3}$ | | |
| h4 | $W_{fh4}$ | $W_{th4}$ | | |
| h5 ($h_{max}$) | $W_{fh5}$ ($W_{main}$) | $W_{th5}$ | ($W_{main}$ + $W_{lake}$) | !#SUB0 |
| h6 | $W_{fh6}$ ($W_{main}$) | $W_{th6}$ | ($W_{sub1}$ + $W_{lake}$) | |
| h7 ($h_{groyne}$) | $W_{fh7}$ ($W_{main}$) | $W_{th7}$ | | !#KRIB |
| h8 ($h_{groyne}$ + 0.01) | $W_{fh8}$ | $W_{th8}$ | ($W_{th7}$) | !#SUB1 |
| h9 ($h_{top}$) | $W_{fh9}$ | $W_{th9}$ | | |
| h10 ($h_{top}$ + 0.01) | $W_{fh10}$ | $W_{th10}$ | ($W_{th9}$) | !#DIKE1 |
| h11 ($h_{10}$ + 0.5) | $W_{fh11}$ | $W_{th11}$ | | !#DIKE2 |
| h12 | $W_{fh12}$ | $W_{th12}$ | | |
| h13 | $W_{fh13}$ | $W_{th13}$ | | |
| h14 | $W_{fh14}$ | $W_{th14}$ | | |
| h15 | $W_{fh15}$ | $W_{th15}$ | | !#SUB2 |

Such a cross-section description can be read as (Hoefsloot et al., 1999):

First line:
- ![branch]: name of the river stretch where the cross-section is belonging to
- [km-km] River kilometres: kilometre indications of the borders of the (river)compartment
- [city]: name of the nearest settlement

Second line:
- $cross[nr.]: number of compartment
- $W_{main}$: width of main channel section in metres
- $W_{sub1}$: combined with of the main and bank section in metres
- WS: sediment transporting width in metres
- $h_{top}$: Elevation of the primary summer dike in the SOBEK compartment in m.
- $h_{base}$: Elevation of the primary summer dike minus the average terrain elevation behind all summer dikes in the SOBEK compartment
- $dA_{flow}$: Flow conveying area behind the summer dike in m$^2$ in the SOBEK compartment
- $dA_{tot}$: Total area behind the summer dike in m$^2$ in the SOBEK compartment

From the third line onwards the flow conveying widths (Wf) and total widths are displayed as a function of elevation. In the first column the elevations are displayed, the second column contains the flow-conveying widths and the third column contains total widths all in metres.

- #MAIN in line 3 indicates the lowest level if there are no connected lakes in the compartment;
- #LAKE in line 3 indicates that there is a connected lake in the compartment. The width of the lake (area divided by the compartment length) is added to the total width at the lowest level in the main section. The difference between flow conveying width and total width should comply to the width of the connected lakes in the compartment;

- #SUB0 indicates the highest level in the main section. Level 3 to 7 therefore describe the main section;
- #KRIB indicates the groyne level. The elevation of this level complies to the groyne elevation in the SOBEK compartment given that there are groynes;
- #SUB1 indicates the highest level in the bank section. Level 8 to 10 thus describe the bank section;
- #DIKE1 indicates the elevation of the primary summer dike in the compartment;
- #DIKE2 indicates the level where the primary summer dike is flooded;
- #SUB2 indicates the highest level in the floodplain section.

Because these conditions were not always satisfied, the following changes were made within ArcInfo:

- In compartments 120, 231 and 232 the elevation of one pixel per compartment was changed in the floodplain in the grid HOOGWIN. Also a change was made in the settings within BASELINE. The area below the highest level in the floodplain section was set to 100 % instead of the default value 99 %.

In the output of the BASELINE application "SOBEK cross-sections" the following changes were made:

- In the cross section of compartment 246 (see Annex 3-18, version 2001.1), 1 cm had to be added to the heights h14 and h15 in order to make the heights ascending.