



Rijkswaterstaat  
*Ministry of Infrastructure  
and Water Management*

**RELEASE NOTES**  
**BASELINE 6.3.4**  
**(July 2024)**

Deltares voert het beheer en onderhoud aan de Baseline-software uit op basis van de Service Level Agreements (SLA) met het Ministerie van Infrastructuur en Waterstaat





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# 1 Overview

Name : BASELINE  
Version : 6.3.4  
Buildnumber : 2802  
Date : July 2024  
Classification : release  
Distribution : <https://iplo.nl/thema/water/applicaties-modellen/watermanagementmodellen/baseline/> (see Downloads)

The following tools are part of the installation:

- Bas2FM 1.0.27 - UPGRADE
- Baseline6 Input Module (BIM6) 0.0.6
- Baseline6 Validation tools protocolcheck 32 / contentcheck 54
- Baseline6 Convertor 0.3.0
- Baseline6 Waterlevel tool 0.1.7
- Baseline6 Fetch tool 2.0 - UPGRADE
- Baseline6 Special Elevation Model tool 1.5.4
- Baswaq.exe (conversion to SWAN) 2.66

Baseline 6 is intended to generate input for the sixth-generation models of Rijkswaterstaat. The data model has been adjusted significantly and is not compatible with Baseline 5. The first release, Baseline 6.1.1 was not distributed, as the data model needed a further update. The data model is documented in Baseline 6 Data protocol [Documentation: 2].

The major change in Baseline 6.2 is the functionality to combine land- and seadata, defined in different coordinate systems. The datamodel is extended.

The main improvements in Baseline 6.3.1 concern Bas2SWAN (conversion of sea-data) with an improved interpolation method for the (sea)bedlevels. Baseline 6.3.0 has not been released due to instabilities.

In the second half of 2022 a Proof of Concept was conducted in the use of Baseline 6.3.1 in the process of “Vergunningverlening” (Dutch). The recommendations are implemented in Baseline 6.3.2.

March 2024 Baseline 6.3.3 was designated as base for the development of Baseline 7, the intended successor fit for use with ArcGIS pro. Baseline 6.3.3 is not distributed.

So, Baseline 6.3.4 replaces Baseline 6.3.2. The main improvements in Baseline 6.3.4 are:

- Conversion to SWAN – which is a known issue in Baseline 6.3.2:
  - Erroneous projection of the Northsea(data) west of Greenwich is now fixed.
  - Conversion of terrain\_jump\_3d\_lines, flow\_blocking\_lines and flow\_blocking\_polygons to Fixed weirs is now separated, which gives the user the option to choose and so diminish the SWAN calculation time.
  - MARK that the conversion to SWAN still is not full proof (see “*Known issues*”).
- Fetch\_tool: a reported error has been fixed.
- Bas2FM: has been upgraded with a significant better performance (lower turn-around time), specifically the conversion of trachytopes.

Baseline 6.3.4 is compatible with D-HYDRO Suite 2024.01 (and higher).

Please, take good notice of the “*Known issues*”.



## 2 Documentation

1. Baseline6\_Installation\_Manual.pdf (updated)
2. Baseline6\_Dataprotocol.pdf
3. Baseline6\_Help.pdf

## 3 Functionality

### 3.1 ***New in BASELINE 6.3.4***

No new functionalities, only improvements and / or fixes (see *Overview of improvements*).

### 3.2 ***New in BASELINE 6.3.3 – NOT distributed***

No new functionalities, only improvements and / or fixes (see *Overview of improvements*).

### 3.3 ***New in BASELINE 6.3.2***

No new functionalities, only improvements and / or fixes (see *Overview of improvements*).

### 3.4 ***New in BASELINE 6.3.1***

#### **Datamodel**

1. No changes

#### **Preparation tools**

1. Tool 06a.renumber routes and events in *measures*.
2. Tool 1, 6 and 6a can be used on an entire database now to process multiple *Featureclasses*.

#### **Assimilate measures and clip**

1. Improvement of error handling when *measure\_contour\_polygons* is used in different Baseline functions. A generalization of *measure\_contour\_polygons* is applied when using a 1 meter tolerance.
2. Improved routine to append point information in feature dataset Elevation, in order to prevent errors when clipping, assimilating or merging extensive datasets.

#### **Bas2FM**

1. When a modelboundary is used in Bas2FM the elevation is updated in the NetCDF within this modelboundary and also extrapolated to 250 metres outside of the modelboundary..
2. Besides the traditional method to derive surface information from an *elevation\_model\_terrain* (linear interpolation) or *elevation\_raster* (bilinear interpolation) Bas2FM now supports grid cell averaging within Thiessen polygons around fm nodes. For this function the Spatial Analyst extension is required.

#### **Bas2SWAN**



1. Baswaq updated to use gridcell averaging (elevation interpolation) instead of “LINEAR” interpolation for land-databases and “BILINEAR” interpolation for sea-databases.

#### **Content checker**

1. Tolerance of elevation points on same location altered (5 centimeters).
2. Truncation of lines in logfile removed.
3. Some special items from converted Baseline 5 data are whitelisted.

#### **Advanced tools**

1. Create initial waterlevel is improved:
  - a. Boundary summerbed is defined by the shoreline as defined by sections (section2/3) and not by roughness codes 102 and 103.
  - b. Connected waterbodies are treated in accordance to the summerbed.
  - c. Improved moving average algorithm to smooth the elevation of shorelines.
  - d. Open water boundaries receive a more realistic elevation.

### **3.5 New in BASELINE 6.3.0**

#### **Datamodel**

1. Sorting field in output\_locations, structure\_lines source\_sink\_points and cross\_section\_lines altered in Text because the required information did not fit into a Long Integer
2. New FDS elevation\_mosaic and new raster elevation\_raster\_land added on behalf of higher resolution required in the land domain of sea models.

#### **Preparation tools**

1. Tool 08. Create Measure\_contour\_polygons now works with a user defined buffer distance.

#### **Assimilate measures, clip and erase**

1. Improvement of error handling when measure\_contour\_polygons is used in different Baseline functions.

#### **Bas2FM**

1. Converting the NetCDF and Netgeom to GIS featureclasses is now done in a separate function and has to be done only once for each pair of NetCDF/Netgeom. This reduces the subsequent conversion time in Bas2FM, especially when more variants are converted using the same NetCDF.
2. This function is added to the batch functionality.
3. The use of a modelboundary is added to Bas2FM in order to convert only a certain part of a Baseline database.
4. Besides the traditional method to derive surface information from an elevation\_model\_terrain (linear interpolation) or elevation\_raster (bilinear interpolation) Bas2FM now supports grid cell averaging within the polygons of fm faces. For this function the Spatial Analyst extension is required. **This function is only beta, there still is discussion about the representative polygon to use for averaging.**
5. Bed\_characteristics\_polygons is now added to the Bas2FM menu; in previous versions this Featureclass was taken into account without user interaction.

#### **Bas2SWAN**



1. "Add schematisation" updated in order to make an equivalent folder structure as used in D-Flow FM.
2. Baswaq updated to write output with similar names and extensions as used in D-Flow FM.
3. The use of a modelboundary is added to Bas2SWAN in order to convert only a certain part of a Baseline database.
4. Bas2SWAN updated to add terrain\_jump\_3d\_lines, flow\_blocking\_lines and flow\_blocking\_polygons to fixed weirs. Flow\_blocking\_lines and flow\_blocking\_polygons are treated as high walls so no flow can pass these objects.
5. Bas2SWAN updated to deal with sea variants and merged sea variants.
6. Baswaq updated to work with data in spherical projection (eg. WGS1984).

#### **Protocol checker**

1. Tolerance of objects falling within measure\_contour\_polygons altered (5 meters).

#### **Toolbar**

1. Improved Z-tool (all vertices and Z-values are shown within a drawn box).

### **3.6 New in BASELINE 6.2.1**

Baseline setups for ArcGis 10.6.1, 10.7.1 and 10.8.1

### **3.7 New in BASELINE 6.2.0**

#### **Datamodel**

1. Datamodel extension with variant\_sea and measure\_sea (Baseline data in non-projected coordinate systems)
2. Datamodel adaptations:
  - a. structures have a direction
  - b. Sorting field added in structure\_lines, source\_sink\_points and branch\_1d\_lines
  - c. Field Fixed\_weir\_definition removed
  - d. Elevated lines removed from elevation\_model\_terrain
  - e. Field Roughnesscode in flowblocking\_polygons removed
  - f. Fields connected and groundlevel in land\_use\_polygons removed
  - g. New FC bed\_characteristics\_input\_polygons and bed\_characteristics\_polygons added on behalf of smooth roughness gradients

#### **Bas2FM**

1. Baseline 6 compatible with netgeom-file in D-HYDRO 2020-04 (CF-1.8 UGRID-1.0 Deltares-0.10)
2. Description added for installation of 3dparty software for Bas2FM
3. Shorter filenames exported by Bas2FM
4. Baseline export according to adapted folder structure
5. Folder meta-info added to Repos-structure Bas2FM output
6. consequent filenames added FM input
7. Bas2FM adapted to generate partial conversions
8. All used Bas2FM input added to Bas2FM.log
9. Temporary files are cleared after conversion

#### **Preparation tools**



1. Preparation tool - added: "create landuse\_polygons"
2. Improvement of tool 08: Create measure contour

#### Toolbar

1. Added functionality to add, create, edit and assimilate Sea\_variants and measures
2. Added functionality to merge land- and sea-databases
3. Improvement of clip function

### 3.8 New in BASELINE 6.1.2

The following changes were implemented:

1. Default use of "Villemonte" option instead of "Tabellenboek" for weirs.
2. Initial waterlevel model can be added to a batch.
3. When the functions "Assimilate measures", "Clip", "Erase", "Conversion to D-Flow FM" or "Conversion to SWAN" are opened a check is performed whether 3D-analyst is checked in. This is also done when these functions are used in batch-mode.
4. Smooth transitions for calibration purposes is added.
5. Non existing FeatureClasses are skipped in TOC when setting active variant. Therefore also `_lijnen` and `_punten` files are added to all templates.
6. A batch Clip function has become available within the existing clip-function.
7. The protocolcheck accepts measurenames with maximum 27 characters.
8. Some errors in the Contentcheck are fixed.
9. The term "WBI" has changed to "BOI".
10. `Output_locations` and `cross_section_lines` have new "type" definitions.

### 3.9 New in BASELINE 6.1.1

The following changes were implemented:

1. Change in the data model: 'bandijken' are treated both as `elevated_lines` (using `elevation_crest`) and as `terrain_edge_3d_lines` (using `elevation_toe`) and as such included in the elevation model (Terrain).
2. Bridge pillars can be added, mixed and converted to an input-file for D-HYDRO Suite / D-Flow Flexible Mesh.
3. Polygons can be added, that will be used in the calibration process. These will not be part of the simulation model.

### 3.10 New in BASELINE 6.0.5

The following changes were implemented.

1. The mixer routine is adjusted to account for different values for TYPE in weirs and terrain jumps. Feature classes `weirs_routes`, `terrainjumps_3d_routes`, `erase_weirs` and `erase_terrainjumps_3d` have to be split in different values for TYPE (2 possible values) before they can be treated by the Erase tool.
2. The names of several feature classes were adjusted (amongst others: weirs => `elevated_line`, breaklines => `terrain_edge`, roughness => `land_use`). Some feature classes were moved to the `models` feature dataset (`flow_blocking_lines` and `flow_blocking_polygons`). The name of the `terrain` dataset has also been adjusted. In addition, both `code` and `template FileGeoDataBases` and `layerfiles` were adjusted.
3. A number of (Python) toolboxes were added to the Baseline toolbar, amongst others: *Fetch tool*, *Create initial waterlevel*, *Create special elevation model*,



- Baseline 5 to 6 converter* (>Tools >Advanced tools) and all tools belonging to the *Input Module toolset* (>Preparation).
4. Conversion to D-Flow FM (Bas2FM) is added to the Baseline Toolbar (>Models). Bas2FM is also added to the *Batch* functionality.
  5. Conversion to SWAN is adjusted to the Baseline 6 data protocol.

### 3.11 New in BASELINE 6.0

The major changes are:

1. A major update of the data model: simplified (no duplications) and extended compared to Baseline 5. All feature classes that are part of the elevation model are now part of the *Elevation* feature dataset and part of an existing *Terrain* dataset (in order to avoid duplication). Some feature classes were merged.
2. All feature classes, tables and feature datasets are now in English.
3. The mixer has been adjusted, so it can handle more than one *measure* in the *measurelist*. First, *measures* are mixed together. Then, they are mixed (as one) into the *variant*.
4. Some Baseline 5 functions are now obsolete. These were removed, e.g.: “aanmaken overlaten”, “aanmaken waterhoogtemodel”, “aanmaken hoogtemodel”, ‘conversie van hoogtelijnen”.
5. The “Conversie naar ruwheden” functionality has been removed as all roughnesses are in one feature class now.
6. The “Conversie naar Waqua” and “Conversie naar Delft3D” were removed, as Baseline 6 is intended for the sixth-generation models in D-HYDRO Suite.
7. The “Omzetten naar RGFgrid” functionality has been removed.
8. A new “BaseTool” is added to the toolbar to present coordinates of 3D lines (as labels).





## 4 Systemrequirements

<b>Operating systeem</b>	
Minimum	Microsoft Windows 10 (64-bit)
Recommended	Microsoft Windows 10 (64-bit)
<b>Processor</b>	
Minimum	Single Core 1.6 GHz
Recommended	Dual Core 1.6 GHz or higher
<b>RAM</b>	
Minimum	16 GB
Recommended	16 GB or higher
<b>Required disk space</b>	
	3.2 GB
<b>Screen resolution</b>	
Minimum	1024 x 768, 24 bit color depth
Recommended	1280 x 1024, 32 bit color depth
<b>Software</b>	
Minimum	ArcGIS 10.6.1
Supported on	10.6.1, 10.7.1 and 10.8.1 (Advanced Licence with 3D Analyst and Spatial Analyst)
Recommended	ArcGIS 10.6.1, with 3D Analyst and Spatial Analyst



## 5 Known issues

1. Baseline 5 to 6 convertor
  - special attention should be given to measures which in Baseline 5 contain *erase\_plassen* or *erase\_hoogwatervrije\_vlakken* in which the polygons intersect the main channel. In the resulting Baseline 6 measure the roughness code of the main channel part might be outdated.
2. Mixing a lot (>200) of measures or an extensive measure can take long (as a lot of memory has to be allocated). This can also lead to unexpected problems (“Attempting to divide by zero”).
3. When a merged sea-variant is added as active variant both *elevation\_raster* and *elevation\_raster\_land* are shown in the TOC using a mosaic dataset. However the default symbology is not copied from the *variant\_sea.lyr*.  
Workaround is to copy  
C:\Program Files  
(x86)\Deltares\Baseline6\Template\variant\_sea\variant\_sea.lyr  
in the *sea\_variant* in subfolder *data\layers* prior to setting the active variant.
4. The window to select a projection, does not load the current projection automatically. This is an artifact (defect) of ArcGIS.
5. Bas2FM:
  - Small differences occur in Bas2FM output in different ArcGIS versions; the order of *Fixed weirs* might be different between versions.
  - Bas2FM can take a long time when converting larger models; for example the complete conversion of the Rhine Meuse model including Volkerak Zoommeer might last 45 hours (without initial waterlevel model). This is mostly due to the translation of *land\_use* to trachytopes. This has been improved significantly in Baseline 6.3.4.
  - If an error occurs in Bas2FM and the conversion is done a second time, it is recommended to remove the previous made <model name>.gdb in (models\dflofm\<model name>\geometry) and restart ArcGIS.
  - Bas2FM might crash when special characters (like *ú* in *brücke*) are used in the NAME field of various location featureclasses (*structures*, *bridges*, *sources\_sinks*). It is strongly advised to replace these characters by standard characters.
6. Conversion to SWAN:
  - Conversion to Swan does not recognize “bodemhoogte” in the Grevelingen model. This can be avoided by mixing the “Grevelingen” model in a different model and remove the *section\_polygons* of that model.
  - Conversion to SWAN is not stable in various cases:
    - This might be a result of multiple separated polygons in the *section\_polygons* featureclass; Baswaq is not able to deal multiple polygons. Check this prior to conversion by making a copy of *section\_polygons*, dissolve all features to one polygon and exploding it again. This should result in one polygon only. If not delete the redundant polygons from *section\_polygons* in the original Baseline database. Or correct the *Baseline\_clip\_contour* used to construct the variant database.
    - Also, it is recommended to clip or merge the source database to an extent equal to the SWAN model. this prevents that an overload of data have to be converted by Baswaq which might result in errors.
  - The projection of line elements is not stable both in RD-coordinates and in WGS84.



## 6 Overview of improvements (on reported bugs)

This overview is for the user who reported a bug in a previous release and wants to check whether it has been fixed.

The following improvements (in the application or the documentation) have been achieved compared to the previously distributed release (Baseline 6.3.2):

Issue key	Summary
BASELINE-977	Er worden (te)veel obstacles weggeschreven bij de conversie naar SWAN
BASELINE-992	Code review Baseline python scripts
BASELINE-997	Opbouwen Testbank voor de Python tools
BASELINE-1004	Merge Land and Sea crashed
BASELINE-1006	Wens: Schempje Merge Land and Sea variabel
BASELINE-1007	Wens: Controle punten Elevated_lines met dubbele punten en verschillende hoogtes
<b>BASELINE-1010</b>	swan projectie Noordzee gaat mis voor alle punten te westen van Greenwich
<b>BASELINE-1012</b>	BASELINE: Verbetering wegschrijven obstakels naar SWAN
BASELINE-1013	BASWAQ: Verbetering wegschrijven obstakels naar SWAN
BASELINE-1017	Bas2FM: bij wegschrijven van Fixed weirs altijd in dezelfde volgorde gebruiken
BASELINE-1020	Toevoegen vervangen waarde toe elevation
BASELINE-1022	contentcheck warning aanpassen bij elevation = -9999
BASELINE-1023	aanpassen kilometerlabels in variant.lyr
BASELINE-1028	Converter: erase_flow_blocking polygons voldoet niet aan dataprotocol
BASELINE-1031	Contentcheck: Warning bij controle "flow_blocking_polygons met area > 2500 m2" is in Baseline 6 niet meer van toepassing.
BASELINE-1032	Verbeter het werken met 3D lijnen: editen en labelen op basis van Z waarden
BASELINE-1033	Test 64-bit background processing tbv verbetering Baseline 6 performance
BASELINE-1040	Trachytopye fractions are not equal to 1
<b>BASELINE-1047</b>	Improved version of Fetch tool (delivered by HKV)
<b>BASELINE-1048</b>	Improved version of Bas2FM (trachytopye) tool (delivered by HKV)
BASELINE-1053	download van Visual C++ bibliotheek
BASELINE-1067	Update recommended RAMemory to 16 GB in the Release notes; due to updated Bas2FM