RIFT TD TUTORIAL

DOWNSTREAM CYCLONE DEPOSITION

INTRODUCTION

In this tutorial you will develop a downstream deposition model, with deposition behind an embankment that is generated during the Deposition Model Run. Deposition Vectors move up the embankment upstream faces as the facility develops.

A copy of the **Rift TD** Users Manual may be useful when working through this tutorial. It is installed during **Rift TD** installation, but can also be downloaded from our download page.

TUTORIAL COMPONENTS

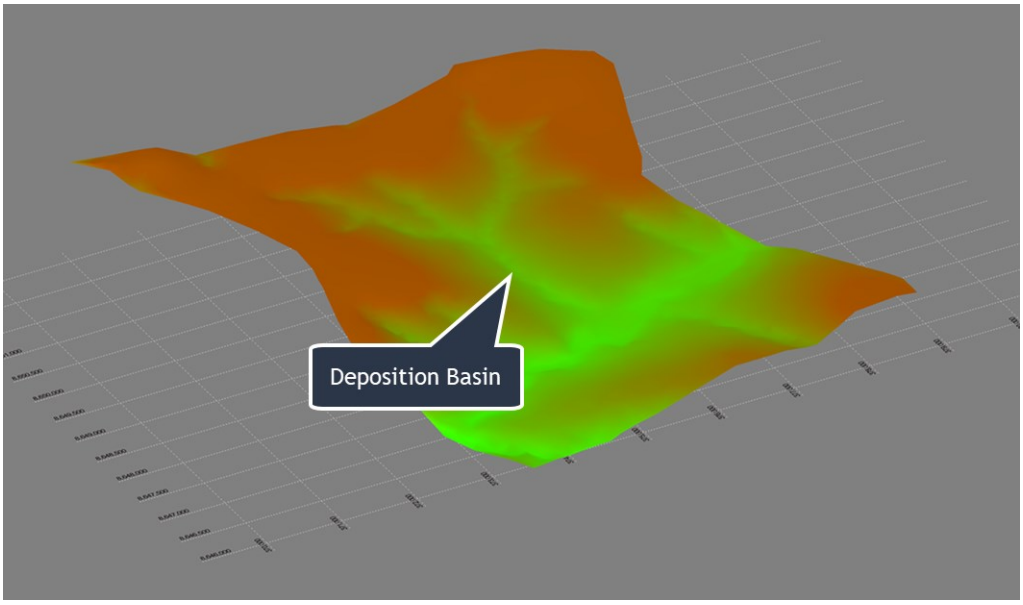
This tutorial comprises:

- This instruction set.
- **Rift TD** files:
  - Base Model.rft: The base model used to develop the deposition surface.
  - Final Model.rft: The final deposition model.
  - Final Model.res: The deposition model result file.
- Text Files (ASCII data files):
  - Survey Data.txt: The ASCII data file used to generate the base topography.
  - Deposition Line.txt: Deposition boundary coordinates.

BASE TOPOGRAPHY

This tutorial provides the **Rift TD data file**, **Base Model.rft**, as a starting point:

- **Click File > Open**.
- **Select Base Model.rft**.
- **Click Open**.



MODEL DEFINITION

A typical deposition model comprises:

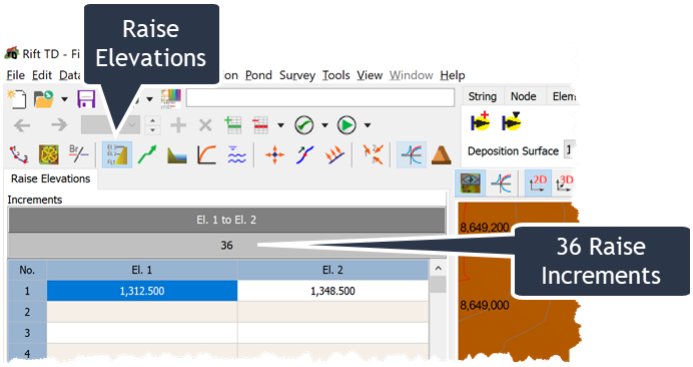
- Raise Elevations:
- Vector Slopes.
- Beach Profiles.
- Material Parameters.
- A Supernatant Pond.
- Deposition Structures. In this model we will define a Deposition Line.

RAISE ELEVATIONS

Raise Elevations define the elevations that deposition vectors will be **raised to**, and the **raise increment**.

In this tutorial you will raise deposition vectors from their initial elevation of

- 1312.5 m; to an elevation of
- 1348.5 m; in
- 36 raises i.e. 1.0 m raise increments.



To **set** the **Raise Elevations**.

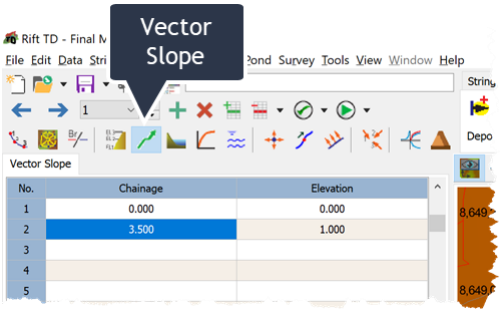
- **Activate Raise Elevations**:
  - **Click Edit > Raise Elevations**; or
  - **Click** the **Raise Elevation Tool-button**.
- **Enter 36 Raise Increments** on the **Raise Increment Grid**.
- On the **Data Grid**:
  - **Enter** an **initial elevation**, **El. 1**, of **1312.5 m**.
  - **Enter** a **final elevation**, **El. 2**, of **1348.5 m**.

VECTOR SLOPE

A **Vector Slope** defines how deposition vectors move horizontally as they are raised vertically.

In this tutorial you will specify a **Vector Slope** of **1 Vertical in 3.5 Horizontal**.

To **define** the **Vector Slope**:



- **Activate Vector Slopes**:
  - **Click Edit > Vector Slope**; or
  - **Click** the **Vector Slope Tool-button**.
- **Enter** the **Vector Slope** on the **Data Grid**:
  - Row 1:
    - Chainage: 0.00.
    - Elevation: 0.00.
  - Row 2:
    - Chainage: 3.50.
    - Elevation: 1.00.

BEACH PROFILE

Beach Profiles define a **longitudinal section** along a **beach**.

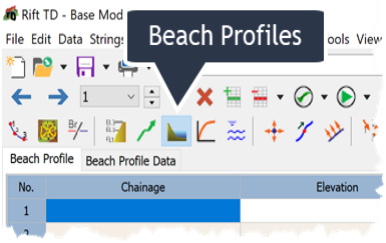
A typical model has two beach profiles:

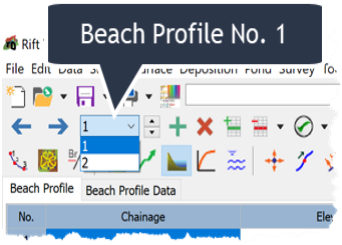
- **Sub-arial profile**: The beach profile above the supernatant pond.
- **Sub-aqueous profile**: The beach profile below the supernatant pond.

You will define both profiles as linear profiles with a:

- Sub-aerial slope of 1V:120H.
- Sub-aqueous slope of 1V:40H.

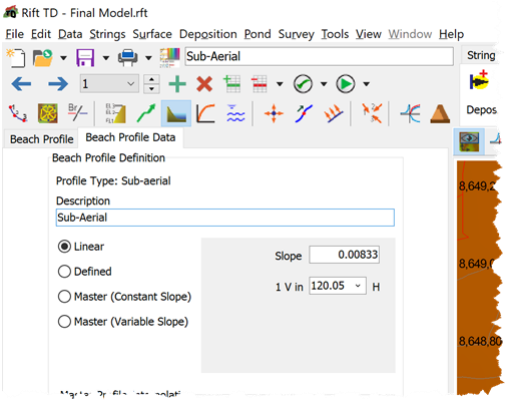
To **define** the **Beach Profiles**:





- Either:
  - **Click Edit > Beach Profiles**; or
  - **Click** the **Beach Profiles Tool-button**.
- If not active, use the **Navigation toolbar** to **activate Beach Profile No. 1**.
- **Click** on the **Beach Profile Data Sheet**.
  - **Enter** a **description** of "**Sub-Aerial**".
  - **Set** the **profile type** to **linear**.

- **Enter** a **beach slope** of **1V in 120H**.
- **Use** the **Navigation Toolbar** to **activate Beach Profile No. 2**:
  - **Enter** a **description** of **"Sub-Aqueous".**
  - **Set** the **profile type** to **linear**.
  - **Enter** a **beach slope** of **1V in 40H**.



MATERIAL

Materials define:

- The **Deposition Rate** over time [mass per day].
- The **Complex Beach Profile** comprising a:
  - Sub-aerial profile, a
  - Sub-aqueous profile, and if necessary, a
  - Cyclone profile.
- **Material densities**.

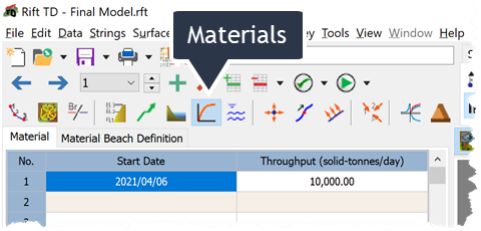
> **Cyclone Profiles** are used to model **beach cyclone deposition** and are not required for this model.

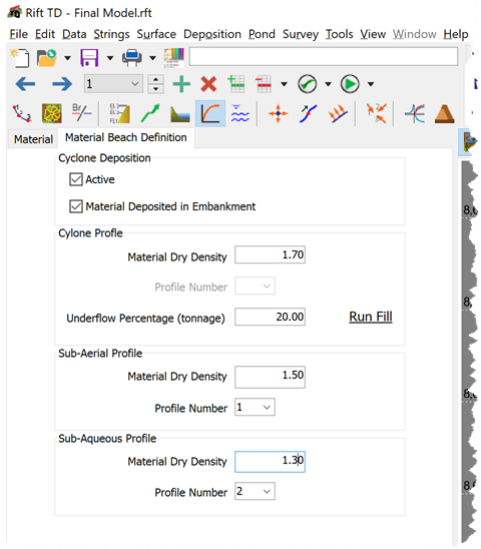
In this tutorial you will **define**:

- A **throughput** of **10,000 tonnes per day**.
- **Use** the two previously defined **Beach Profiles** to **define** the **complex beach profile**.
- **Sub-aerial** and **sub-aqueous densities** of **1.5** and **1.3 tonnes/m^3** respectively.

To **define** the **Material**:

- **Activate Materials**:
  - **Click Edit > Materials**; or
  - **Click the Material Tool-button**.
- On the **Data Grid enter**:
  - A **start date** of **6 April 2021**.
  - A **throughput** of **10,000 tonnes per day**.
- **Click** the **Material Beach Definition Sheet**.
  - **Check Cyclone Deposition Active** .
  - **Check Material Deposited in Embankment**.
  - **Enter** a **Cyclone Density of 1.7 tonnes/m^3**.
  - **Enter** an **Underflow Percentage of 20%**.
  - **Set** a **sub-aerial density of 1.5 tonnes/m^3**.

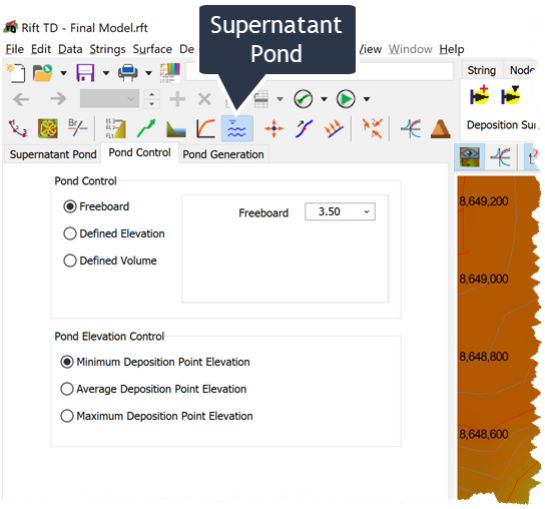




- **Use** the **Sub-aerial Profile Drop Down Box** to **set** the **Sub-aerial Beach Profile** to **Beach Profile No. 1**.
- **Enter** a **sub-aqueous density of 1.3 tons/m^3**.

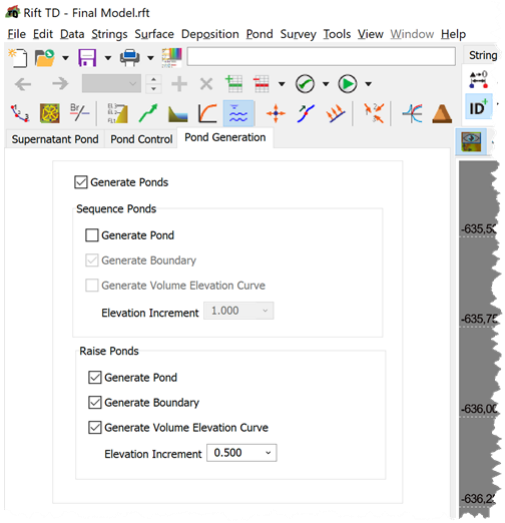
SUPERNATANT POND

The **Supernatant Pond** defines the **interface between the sub-aerial and sub-aqueous beaches**. In this tutorial you set a **defined Freeboard** of **3.5 m** relative to the **Minimum Deposition Point Elevation**.



To **define** the **Supernatant Pond**:

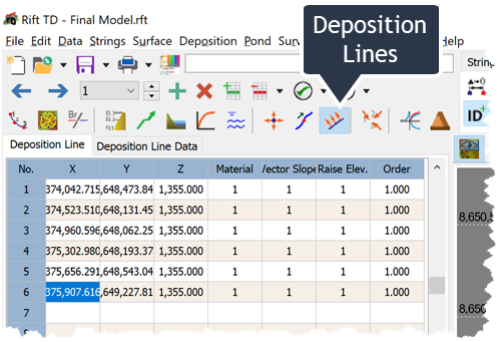
- **Activate** the **Supernatant Pond**:
  - **Click Edit > Supernatant Pond**; or
  - **Click** the **Supernatant Pond Tool-button**.
- **Select** the **Pond Control Data-sheet.**
  - **Set** the **Pond Control** to **Freeboard**.
  - **Enter** a **Freeboard** of **3.5 m**.
  - **Set** the **Pond Elevation Control** to **Minimum Deposition Point Elevation**.
- **Select** the **Pond Generation Data-sheet**:
  - **Check Generate Ponds**.
  - **Sequence Ponds**:
    - **Uncheck Generate Ponds**.
  - **Raise Ponds**:
    - **Check Generate Raise Ponds**.
    - **Check Generate Raise Pond Boundary**.
    - **Check Generate Volume Elevation Curve**.
    - **Enter** an **elevation increment of 0.5 m**.



DEPOSITION LINE

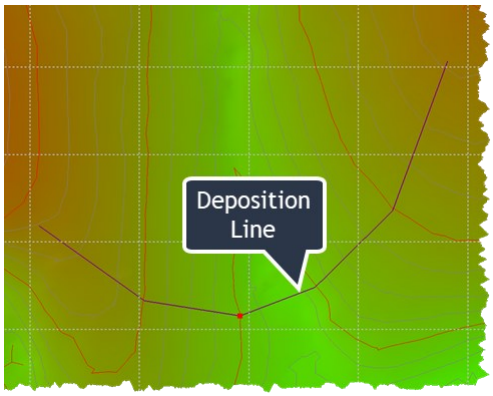
Deposition Lines generate **Deposition Vectors** from which deposition takes place. **Deposition Lines** have the following parameters:

- On the **Data Grid**:
  - Coordinates.
  - Materials.
  - Raise Elevations.
  - Vector Slopes.
- On the **Deposition Line Data Sheet**:
  - Deposition Direction.
  - Vector Direction.
  - Vector Spacing.



To **define** the **Deposition Line**:

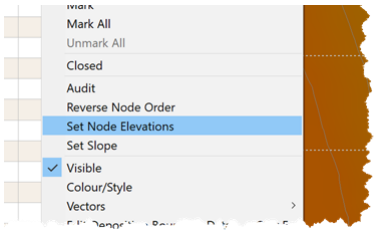
- **Activate Deposition Line**:
  - **Click Edit > Deposition Lines**, or
  - **Click Deposition Line Tool-button**.
- **Define** the **Deposition Line** visually on the **DTM View**:
  - **Click Data > Edit in View > Add**; or
  - **Click** the **View Add Tool-button**; or
  - **Right click** on the **DTM View** and **click Data > Add**.
- **Click** on the **DTM View** to **define** the **Deposition Line Coordinates**.
- **Deactivate DTM View Add Data**:
  - **Press Escape**; or
  - **Click Data > Edit in View > Add**; or
  - **Click** the **View Add Tool-button**; or
  - **Right click** on the **DTM View** and **click Data > Add**.



You can import coordinates. This tutorial incudes an **ASCII file**, **Deposition Line.txt**, that has the **Deposition Line** definition.

Click File > Import > ASCII to **import** the data.

- On the **Data Grid**:
  - **Set** the **Deposition Line Node elevations** to the **deposition elevation** of **1348.5**:
    - **Right click** on the **Data Grid**.
    - **Click Set Node Elevations**.
    - **Enter** a **Constant Elevation** of **1348.5 m**.
    - **Click Ok**.
  - **Enter** the **indices** for the previously defined:
    - **Material No. 1**.
    - **Vector Slope No. 1**.
    - **Raise Elevation No. 1**.
  - **Enter** a **Deposition Order of 1**.
  - **Click** the **Deposition Line Data-sheet**:
    - **Set** the **Deposition Line** to **Active**.
    - **Uncheck Boundary Closed**.
    - **Set** the **Deposition Direction** to **360 Degrees**.
    - **Set** the **Vector Direction** to **Right of Line**.
    - **Set** a **Fixed Vector Spacing** of **50 m**.
  - To **define** the **Deposition Embankment**:
    - **Click** the **Embankment Button** to open the **Deposition Embankment Dialog**.
    - On the **Embankment Sheet**:
      - **Check Generate Embankment**.
      - **Retain** the **Upstream Slope** of **1V:3.75**. The **Upstream Slope** refers to a **Vector Slope**. If more than one **Vector Slope** is defined, **click** the **text link** to show, and **select**, a **Vector Slope**.
      - **Enter** a **Downstream Slope** of **0.25 (1V:4H)**.
    - On the **Crest Nodes Sheet**, **set** a **Defined Spacing** of **25 m**.
    - On the **Elevations Sheet**, **set**:
      - A **Start Elevation** of **1,312.0 m**.
      - An **End Elevation** of **1,352.0 m**.
      - A **Raise Height** to **5 m**.
    - **Click Ok**.



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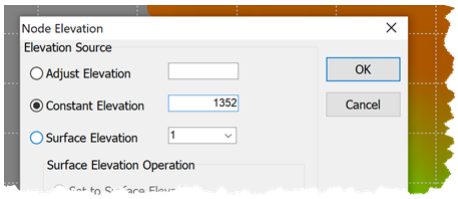
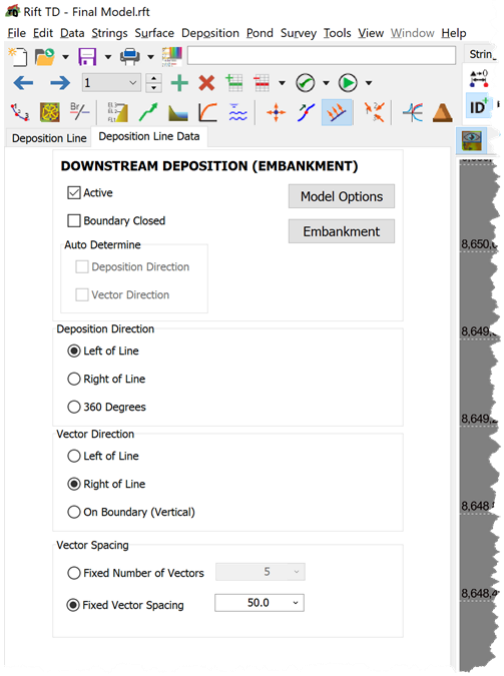
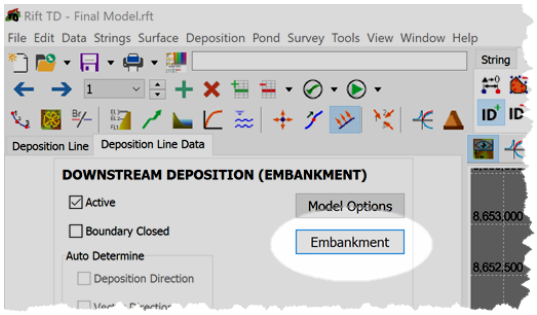
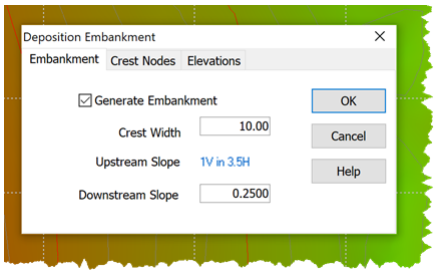




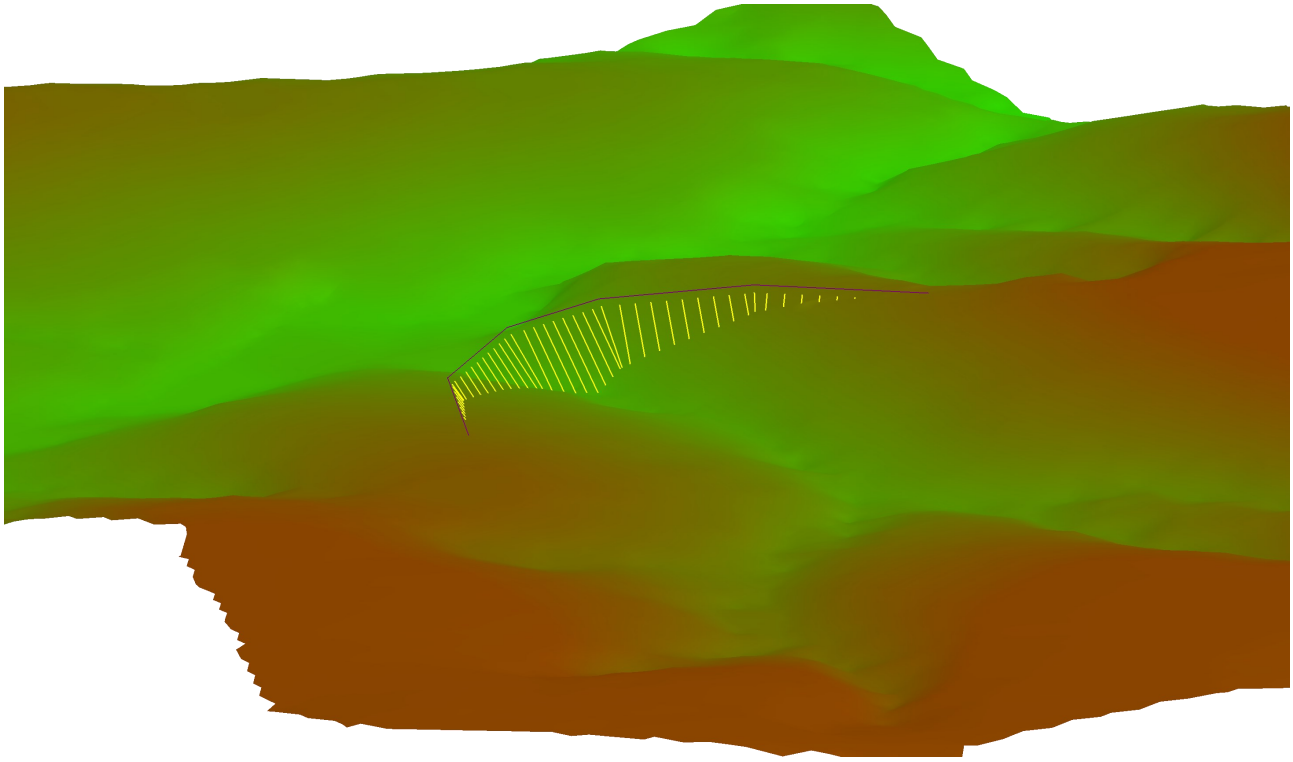




Deposition Vectors

To **generate** the **Deposition Vectors**:

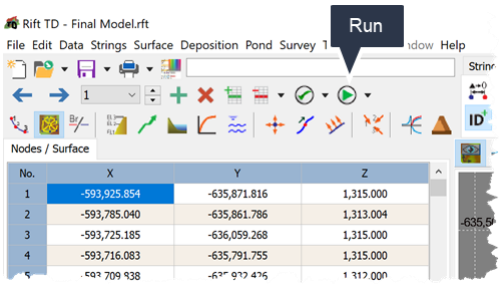
- **Click Deposition > Deposition Vector > Generate All Vectors**; or
- **Click** the **Generate Deposition Vector Tool-button**.

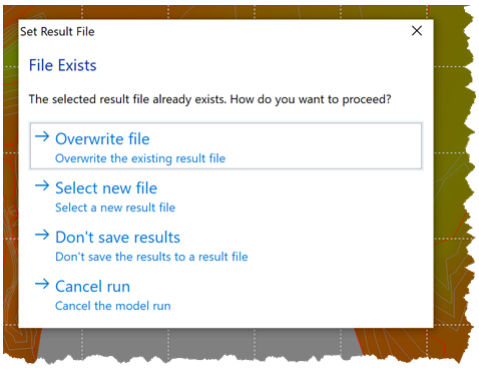


MODEL RUN

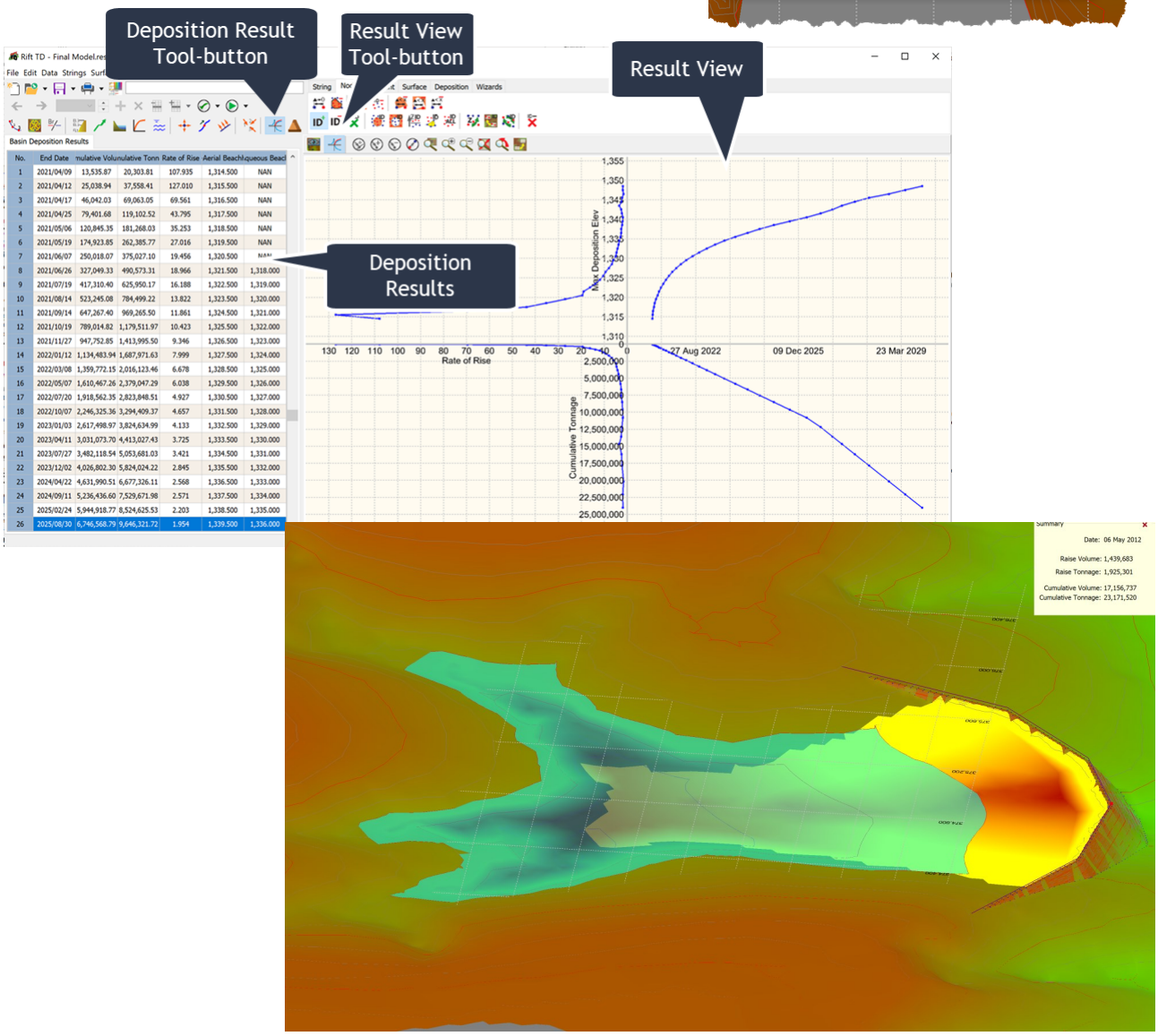
To **run** the **deposition model**:

- Either**:**
  - **Click Run > Run Model**; or
  - **Click** the **Run Tool-button**.
- If the result file already exists:
  - You are **prompted** for a **Result File Name**. **Click Ok** to retain the existing file.
  - **Select Overwrite File** on the **Set Result File Task Dialog**.

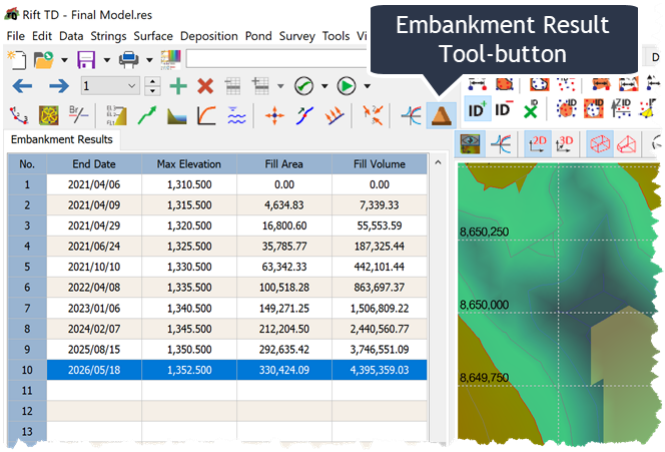




Deposition Results are **shown** on the **Data Grid** and the **Result View** after the model run .



To **view Embankment Results**, **click** the **Embankment Result Tool-button**.

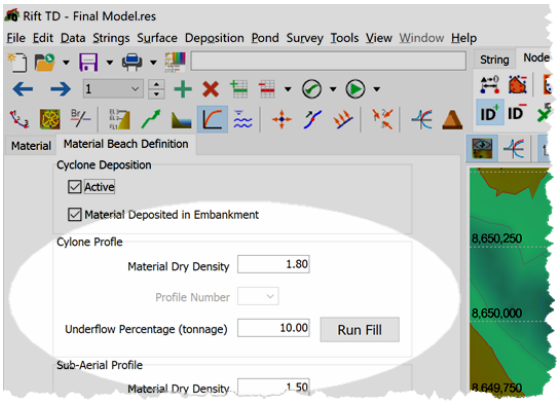


Results comprise:

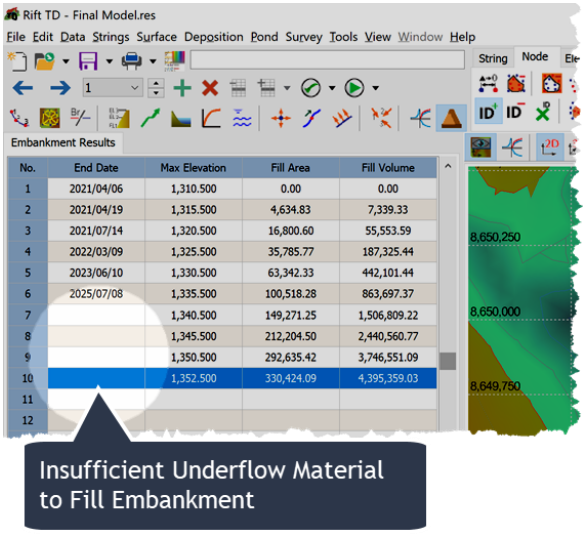
- Fill Date.
- Crest Elevation.
- Plan Area.
- Cumulative Volume.

You can **adjust** the **underflow material parameters** following a model run to **assess** the **effect on deposition**:

- **Activate Materials**.
- On the **Material Beach Definition Sheet**:
  - **Change** the **Underflow Density** and/ or the **Underflow Percentage**.
  - **Click Run Fill**.



Blank Deposition Embankment Result End Dates indicate that there is **insufficient underflow material** to fill the embankment.



A **tutorial** on **Deposition Result Output** is available at riftxone.com.