10

Excavation and dewatering [ADV]

10.1 Introduction

In this tutorial lowering the groundwater level and the flow around a sheetpile wall will be analysed. The **Well** feature is introduced in this example. The geometry model of the tutorial 7 Dry excavation using a tie back wall [ADV] (p. 121) will be used.

10.2 Create and assign material data set

The material parameters remain unchanged from the original project as shown in Table 7–1 (p. 123).

To create the project:

1. Open the project defined in the tutorial 7 Dry excavation using a tie back wall [ADV] (p. 121).
2. Save the project under a different name (e.g. 'Flow around a sheet pile wall').

10.3 Define the structural elements

1. In the **Structures mode** click the **Create hydraulic conditions** button in the side toolbar.
2. Select the **Create well** option in the appearing menu.
3. Draw the first well by clicking on (42 20) and (42 17).
4. Draw the second well by clicking on (58 20) and (58 17).

10.4 Generate the mesh

1. Proceed to the **Mesh mode**.
2. Select the cluster and two wells as shown in the Figure 10–1 (p. 167) . In **Selection Explorer** specify a **Coarseness factor** of 0.25.

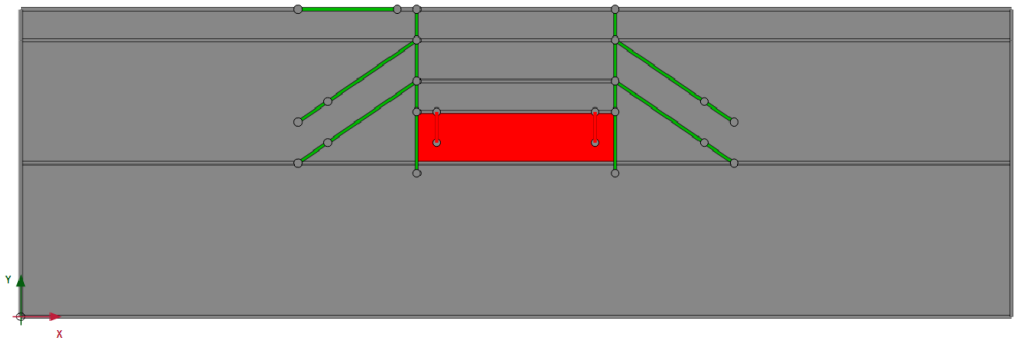

Figure 10–1: Indication of the local refinement of the mesh in the model

3. Click the **Generate mesh** button to generate the mesh. Use the default option for the **Element distribution** parameter (Medium).
4. Click the **View mesh** button to view the mesh as shown in Figure 10–2 (p. 167).

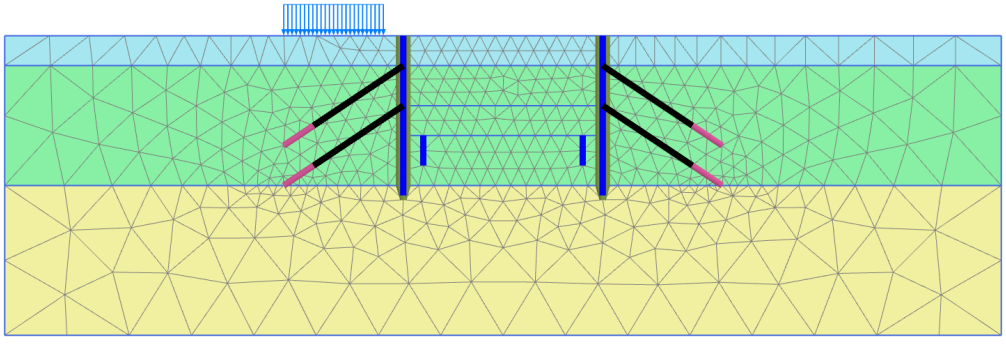

Figure 10–2: The generated mesh

5. Click the **Close** tab to close the Output program.

10.5 Define and perform the calculation

Proceed to the **Staged construction mode** . The groundwater flow analysis performed in phase 6 has to be modified.

10.5.1 Phase 6: Dewatering

In this phase the wells will be used to lower the phreatic level in the excavation down to y = 17m. This corresponds to 3m below the final excavation level.

1. Multi-select the wells in the model and activate them.
2. In the **Selection explorer** the behaviour of the wells is by default set to **Extraction**.
3. Set the discharge value to 1.5m^3/day/m.
4. Set the h_{min} value to 17m. This means that water will be extracted as long as the groundwater head at the wall location is at least 17m.

   Figure 10–3 (p. 168) shows the parameters assigned to the wells in the **Selection explorer**.

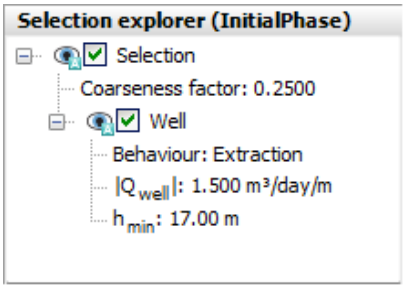

Figure 10–3: Well properties

10.5.2 Execute the calculation

The definition of the calculation process is complete.

1. Click the **Calculate** button to calculate the project.
2. Save the project after the calculation has finished.

10.6 Results

To display the flow field:

1. Select the Phase 6 in the drop down menu.
2. Click the menu **Stresses** > **Groundwater flow** > **|q|**.

   A scaled representation of the results (scale factor = 5.0) is shown in Figure 10–4 (p. 169):

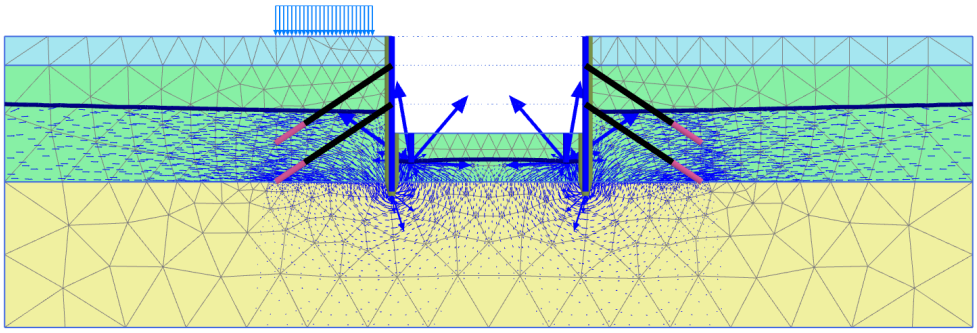

Figure 10–4: The resulting flow field at the end of Phase 6

Click the menu **Stresses** > **Pore pressures** > **Groundwater head**. Compare the results with the ones of the Phase 6 of the project defined in the tutorial 7 Dry excavation using a tie back wall [ADV] (p. 121).

In Figure 10–5 (p. 169), the resulting groundwater head with and without the wells are displayed .

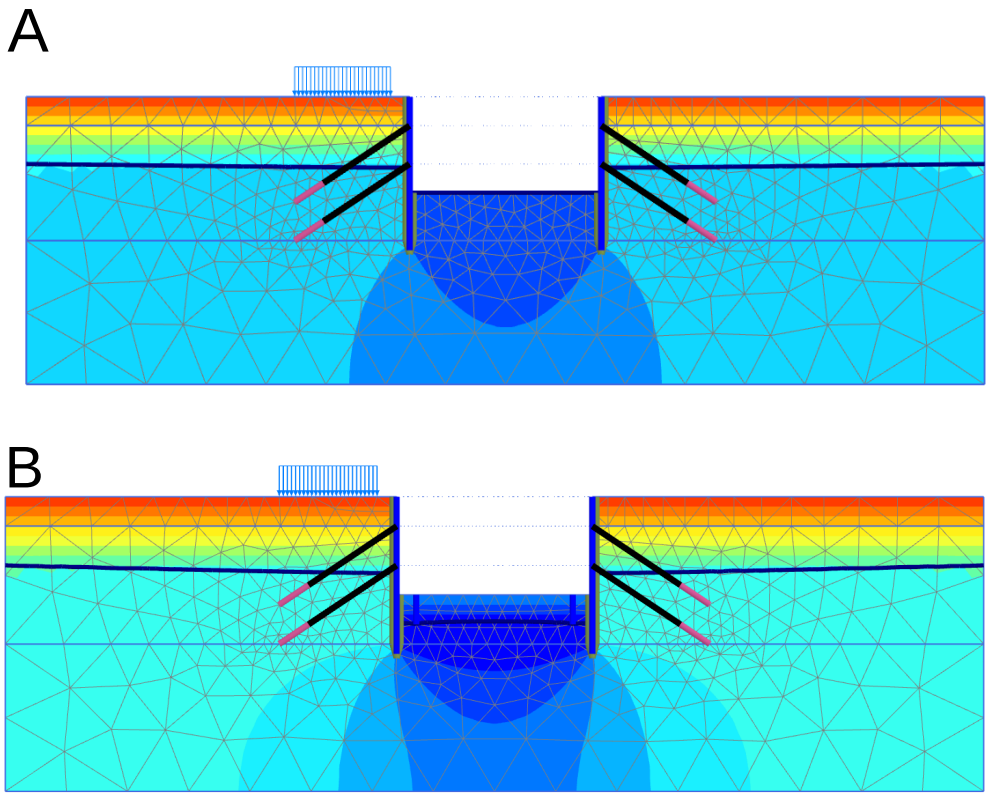

Figure 10–5: Comparison of the resulting groundwater head

A: Groundwater head (Phase 6 in the tutorial 7 Dry excavation using a tie back wall [ADV] (p. 121))

B: Groundwater head (Phase 6 in the current project)