

## ANNEX 1: DYKE SPECIFICATIONS

### Location and distances

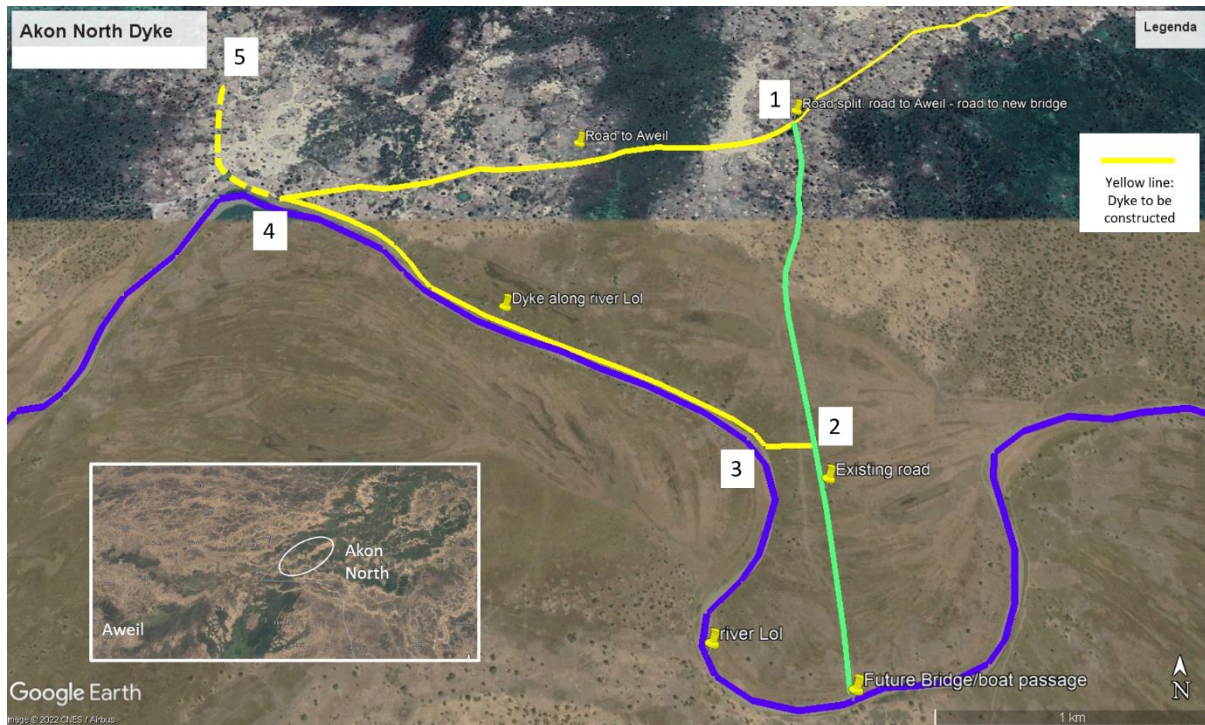


Figure 1: Location of the dyke to be constructed along River Lol in Akon North Payam, Gogrial West County, Warrap State – South Sudan. The project seeks to protect residents, animals, properties, and crops from floods through improved dyke coverage along the flooding river Lol.

In figure 1 the line from point 1 to point 2 shows a part of the existing road from the road split (point 1) to the location of the future bridge over the River Lol (green line). This road is sufficiently high to withstand future high water.

From point 2 to point 3 the future dyke will cross arable land from the road to the river Lol. Starting point (2) for this dyke route is there where the distance between the river and the road is the smallest. (estimated distance is 100 m).

From point 3 the future dyke follows the bank of the river. The minimum distance from the dyke to the river during dry season is at least 15 meters. (estimated distance is 1900 m).

From point 1 to point 4 the future dyke will follow the existing road to Aweil. Part of this road need to be upgraded and will also serve as dyke securing the triangle land. On this route the crown of the dyke must be 3,5 m wide. (estimated maximum distance is 1300 m). For the dyke that serves as a road the

compacting should be as required for road construction. ZOA Dorcas will mark the portions of the road that need to be upgraded. However the bidder may propose otherwise which portion of the road need to be upgraded to dyke height as per specification for safety level and road construction quality.

From point 4 to 5, the dimensions should be as between 3 to point 4 and the length depends on the offer and the budget available for the project. Therefore it is requested that a cost per 10 (ten) meter for this section is provided and with the successful bidder the length will be agreed upon.

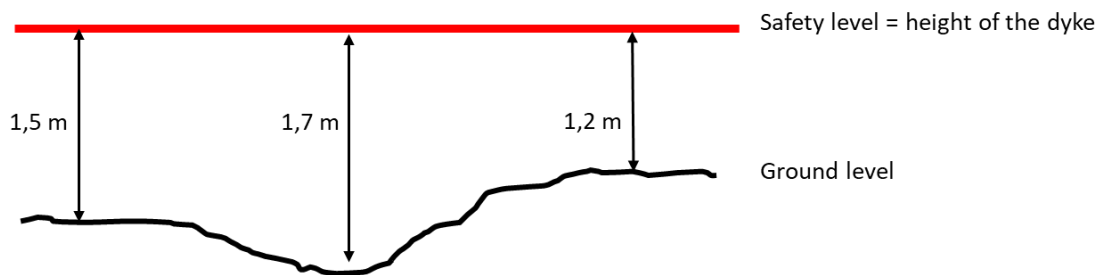
In general, houses and large trees should not be disturbed. In case of insurmountable difficulties, consultation must take place with ZOA Dorcas.

It is possible and advised that the interested bidder makes an appointment with the ZOA Dorcas organization to visit the location and ask any questions.

Note: The distances mentioned are an estimate by ZOA-Dorcas.

### **Height of the dyke**

The height of the future dyke is equal to the safety level that is established for the area. This safety level or reference point, will be made available to the contractor by ZOA-Dorcas at the start of the execution at point 2 and already pointed out during an orientation visit by interested parties. The level of this reference point should be extended towards the whole length of the dyke. It is possible that the ground level varies. Sometimes a bit lower and sometimes a bit higher than at the starting point. Large deviations from the 1.5 m dyke height at the starting point, are at the contractor's risk and are not grounds for additional work.



*figure 2: Dyke height and safety level: sometimes the ground level varies*

## **Dyke construction**

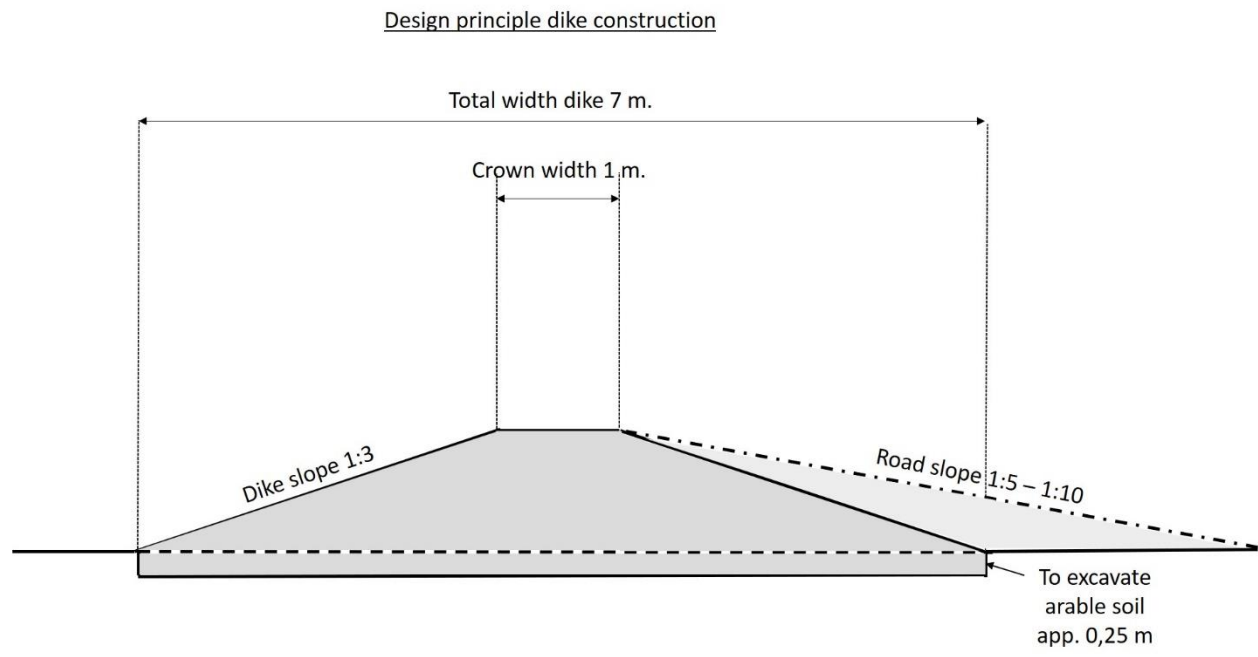


Figure 3: Design principle of the dyke construction

### **Built-up conditions:**

- For the construction of the dyke it is necessary to start with the removal of the top layer of the location (rich in organic matter). The estimated thickness of this layer is 0.25 m. This excavated soil may not be processed in the dyke.
- In order to compact the dyke properly, a layered structure is necessary. After applying each layer of approximately 0.5 m, these layers must be compacted with a compactor.
- To achieve the desired density with machines, the slope must not be less than 1:3.
- The crown width is 1 m. An exception to this is the future dyke from points 1 to 4. To allow traffic on this route, the crown width on this section is at least 3.5 m.

### **Geotechnical conditions:**

- By means of a global preliminary investigation it was established that the soil in the area generally consists of clay and is suitable for building a dyke. Nevertheless, it is possible that in

certain places sand or sandy clay can be found in the surface or in the subsoil. The starting point is that the contractor determines this during the work. Sand and sandy clay may not be processed in the dyke.

- Clay with too high a content of organic matter (black soil) may also not be processed in the dyke.
- In order to limit future clay shrinkage, the amount of liquid (water) in the clay is limited. On the other hand the clay should not be too dry either. The plasticity of the clay should in a condition to make sufficient compacting possible. To determine the optimal moisture content of the clay a simple, so called rollout test (or mouse tail test), is advised.

*rollout test: It's determined by repeatedly remolding a small ball of moist clay soil and manually rolling it out on a plate (or between two hands) into a 3 mm thick thread (= the mousetail). If the clay is too dry the "mousetail" will easily break. If the clay is too wet it is not possible to roll it out into a "mousetail" at all.*

- If the conditions in the field are too wet, the clay may need to be placed in piles for a period of time until the desired moisture content is reached.
- Because the window of opportunities for optimal field conditions (wet season - dry season - wet season) is limited in time, it is important that the work start in time. Immediately after the contract has been awarded, the contractor must start as soon as the circumstances are favorable. This in consultation with the ZOA Dorcas organization.
- ZOA Dorcas supervisor will be regularly available during the implementation of the project and directions by him should be followed at all times within the boundaries of the quality measures outlined above and below in the work method.

### **Work method:**

The necessary soil with which the dyke is constructed, is excavated nearby the future dyke. A hole is created at these places that can be used as seasonal storage. Precipitation water can be stored here for later use by people for irrigation.

These seasonal water storage facilities will be created along the future dyke route at the locations where the clay will be excavated. For safety reasons the slope of the edges of this seasonal water storage must not be less than 1:2. The depth of these facilities depends on the clay layer thickness and the boom length of the excavator.

This is shown schematically in Figure 4 that you will find below.

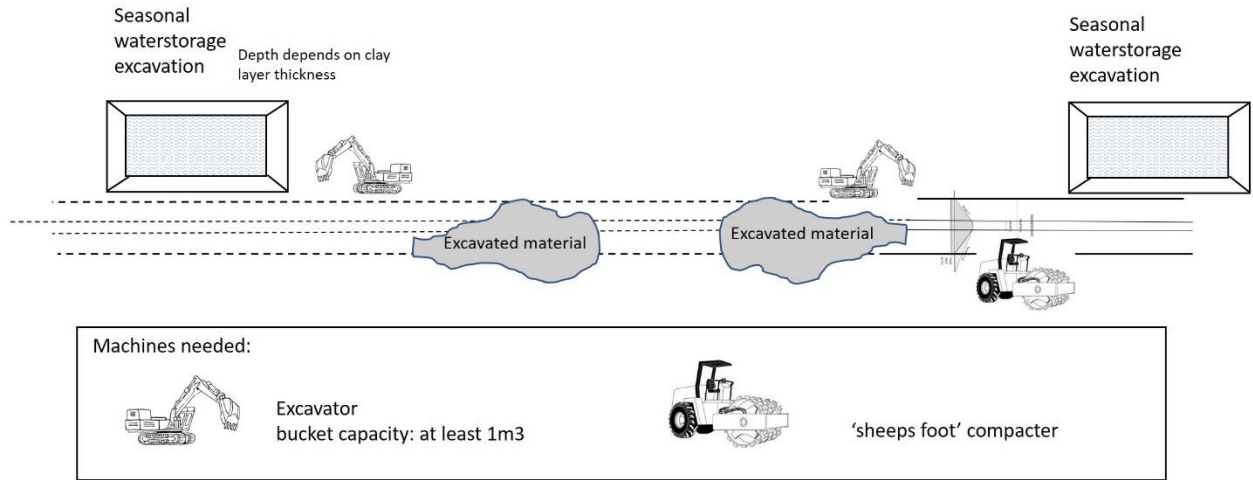


Figure 3: work method dyke construction

Besides the requirements in the tender, the bidder should provide details of length and costs per section as:

1. Section 2 via 3 to 4 (length and costs)
2. Section 4 to 1 (length and costs)
3. Section 4 to 5 is variable and depending on the per 10m length cost. Depending on the available budget the actual length will be decided upon in the contract. (in a next phase the dyke construction will continue from the point the work stops)