Flood Classifications and Effects on IDP Sites in North West Syria

Image credit: IOM through SCA – Floods in NWS

This document seeks to clarify and classify different types of rainstorms and floods that can affect IDP sites in north-west Syria (NWS) and provide basic guidance on possible flood response interventions.

One important lesson learned from previous years is that partners should recognize the limitations of standard winterization activities in responding to floods. Graveling and raising tent bases, replacing damaged tents or graveling roads might not be effective in all cases or mitigate the risk of flooding.

The flood classifications are identified according to observations and assessments from the field:

Vulnerability Factors

- Man-made and natural factors
- Location of settlements on floodplains
- Non-resistant buildings and foundations
- Lack of warning system and awareness of flooding hazard
- Land with little capacity of absorbing rain: i.e. because of erosion or concrete covering.

https://www.who.int/hac/techguidance/ems/floods/en

The Hazard

Floods are classified as sudden onset phenomena, although different types may occur with different speeds. Factors influencing the severity of the hazard are depth of water, duration, velocity, rate of rise, frequency of occurrence and season.

https://www.who.int/hac/techguidance/ems/floods/en

Floods in IDP Sites in North West Syria

IDP sites in NWS are badly affected by the rainfall, mainly during winter, with different impacts and to varying extents depending on the general conditions of each site. Rain in NWS is usually seasonal, and flooding occurs as a result of heavy rainfall.

These sites often lack the proper infrastructure and have been established in the flood streams, valleys, slopes and on agricultural lands. In some cases, these floods even limit access to these sites which means that emergency teams are not able to provide swift support, even with heavy vehicles because of the soil erosion. Given the present situation camps and IDP sites in NWS, it is encouraged to consider HLP due diligence before implementing the activities or responding to floods. Noting that receiving the owners' prior written approval is also recommended to avoid any potential future issues.

Floods are divided into three levels depending on the impact and effects they have on the camp residents and infrastructure.

1) First Level: Low Impact and Damage

This level has the lowest negative impact on IDPs' shelters and/or safety.

- **Impact:** Limited access constraints to services, with no direct impact on IDPs' shelters and/or life.
- **Damage:** Muddy ground due to the nature of the camp land (e.g. agricultural land) and lack of basic infrastructure.
- **Likelihood:** High - throughout the winter season especially with high intensity rain.

Image credit: IOM through SCA – Floods in NWS

Possible interventions to consider include:

- ✓ Repairing/upgrading infrastructure, drainage systems and improving access to needed services.
- ✓ Raising and leveling the tents' ground (using bricks, coarse and fine gravel) after conducting a flooding analysis to provide additional protection from weather conditions inside the IDPs' shelters. All gravelling and levelling interventions have to consider proper levelling of the tents and roads.
- ✓ Regular camp maintenance (organizing adequate tools and maintenance teams).

Image credit: IOM through SCA – Floods in NWS

2) Second Level: Medium Impact and Damage

This level has a medium negative impact on IDPs' shelters and/or safety.

- **Impact:** Rainwater forms large pools which directly affect IDPs' shelters and belongings.
- **Damage:** Damage to tents, loss of household items, and significant access difficulties.
- **Likelihood:** Only during heavy or prolonged rainstorms (or after average rainstorms in flood-prone areas).

Image credit: IOM through IYD – Floods in NWS

Possible interventions to consider (based on a flood analysis) include:

- ✓ Tent replacement, levelling and raising of tent bases.
- ✓ Basic infrastructure upgrades, including rehabilitation/construction of access roads, drainage canals and rehabilitation/construction of culverts.
- ✓ In some cases, interventions away from the camps will mitigate the risk, raising soil mounds will help direct floods and water streams away from the shelters.
- ✓ Regular camp maintenance (organizing adequate tools and maintenance teams).
- ✓ Identify emergency shelters (e.g. mosques) on elevated areas.
- ✓ Identify safe evacuation routes from the low land areas.

Image credit: IOM through IYD – Floods in NWS

3) Third Level: High Impact and Damage (Flood-Prone Zones)

This level has the highest impact on IDPs' shelter and/or safety.

- **Impact:** Flood affects most/all of the IDP site and most/all residents, forcing IDPs to evacuate from their shelter and leave the site. Possible threat to IDPs' lives.
- **Damage:** IDPs' shelters totally destroyed/inundated by or in flood water. Complete loss of IDPs' belongings.
- **Likelihood:** During strong and heavy rains in camps located in valleys, slopes, agricultural lands or close to rivers (flood-prone zones).

Image credit: IOM through SCA – Floods in NWS

Possible interventions to consider if relocation of IDP site residents to another IDP site in a less flood-prone location is not possible:

- ✓ Significant infrastructure upgrades, after conducting detailed technical and topographical studies by a team of engineers. This approach has to consider the high risk of potential seasonal flooding.
- ✓ Designing inter-connected drainage systems will force water/floods to be directed away from these shelters taking into account the topographic levelling of the sites and monitoring how water flows when it falls in each location.
- ✓ Having appropriate water tunnels, culverts, and drainage systems to direct the water away from the camps and sites may be effective. Directing flood streams away from the sites is important and is an efficient solution to consider when responding to flood incidents.
- ✓ Raising soil mounds might also mitigate the risk. In some cases, interventions away from the camps will mitigate the risk, raising soil mounds will help to direct floods and water streams away from the shelters.
- ✓ Develop massive evacuation plans and run evacuation exercises.

Image credit: IOM through SCA – Floods in NWS

In general, timely programming supports the avoidance of winter floods where organizations are capable of designing the programmes and implementing their own projects in preparation of floods, instead of improving the infrastructure during the rainy season of winter which might prove useless, and waste money and efforts. Comprehensive plans and technical studies ensure that floods are not avoided in one location but then directed to another location.

Prior preparation and infrastructure improvements will create more resistant settlements and mitigate the risk during rainy seasons. Appropriate sewage systems that are robust in case of heavy rain fall and floods. Complimentary approaches involving other sectors such as ER, WASH and CCCM will also help.

Evacuating camps lying-in low-level areas to safer, higher zones. For camps in low level areas where the problem can't be solved through infrastructure improvements, moving these families to other locations that aren't flooded could be a better choice.

4) Develop and Plan a Drainage System in IDP Sites

For the complete and precise elaboration of a drainage system in IDP sites, the following parameters need to be considered:

- Precipitation, rain intensity of the respective area (http://chrsdata.eng.uci.edu/).
- Define rain period and length (frequency).
- Type (characteristics) of soil of catchment area (bare soil, asphalt, forest).
- Type/shape and size of planned drainage (V-shape, U-shape, O-shape).
- Slope of drainage (elevation parameters; in %, need precise digital terrain model, precise survey).
- Length of drainage.
- Area of catchment area (watershed analysis example with Global Mapper).

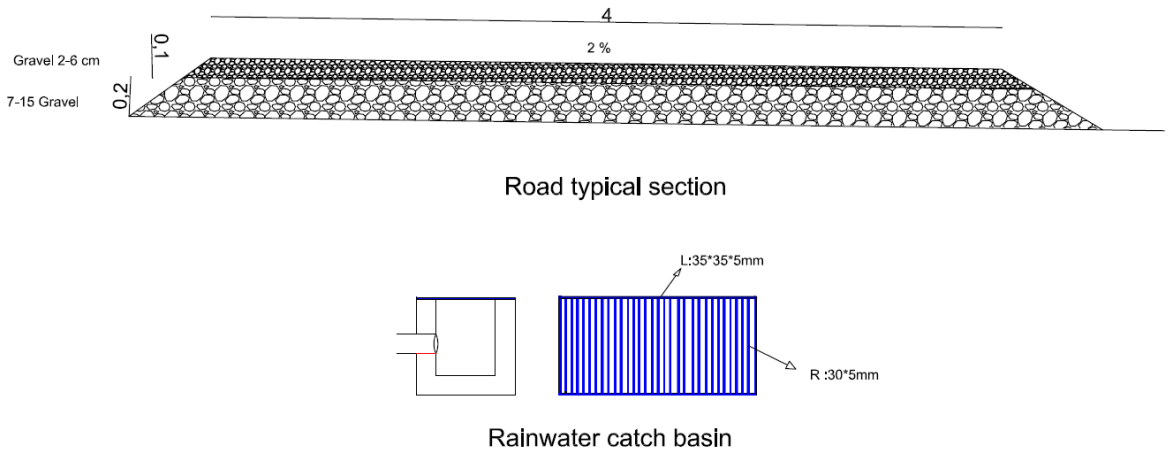

Figure 1: Road section

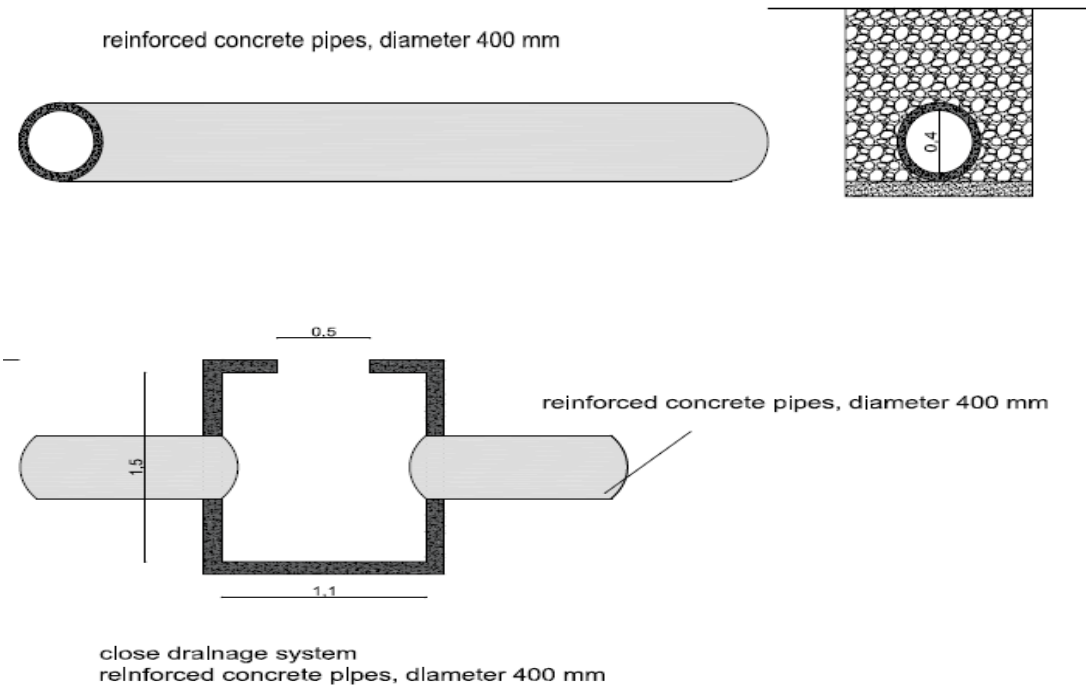

Figure 2: Closed drainpipe design

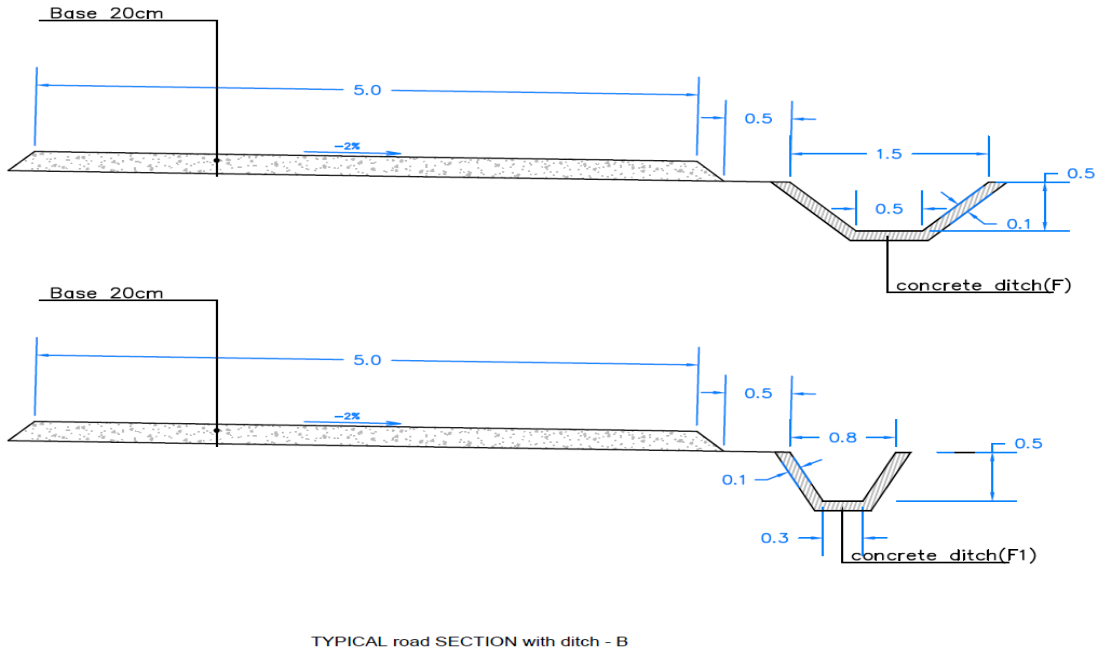

Figure 3: Open drain channel with road design

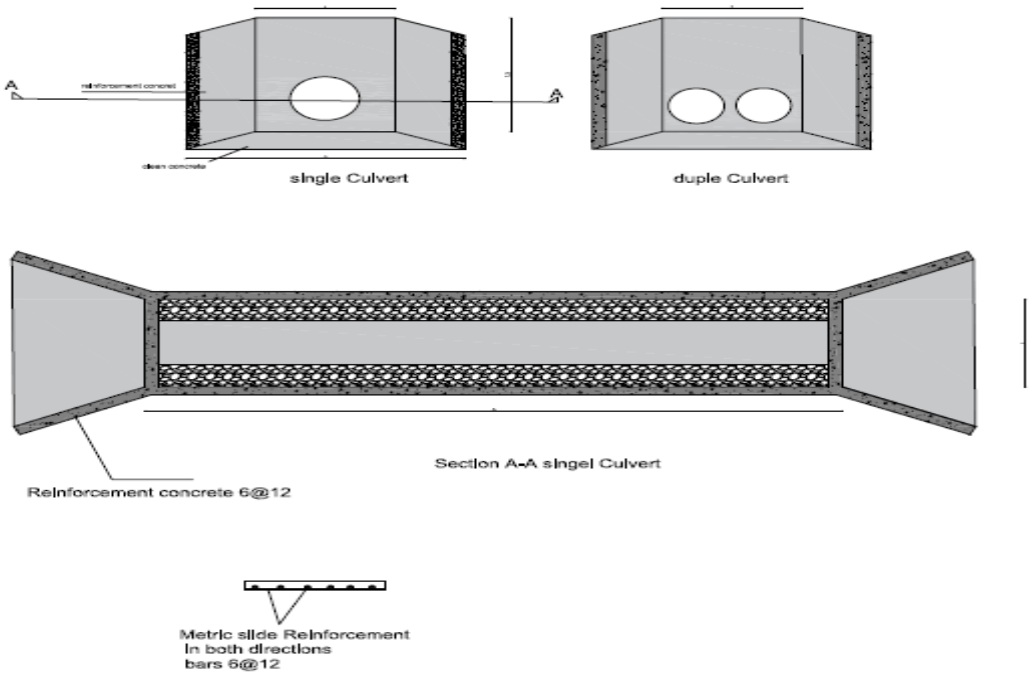

Figure 4: Example of culvert design

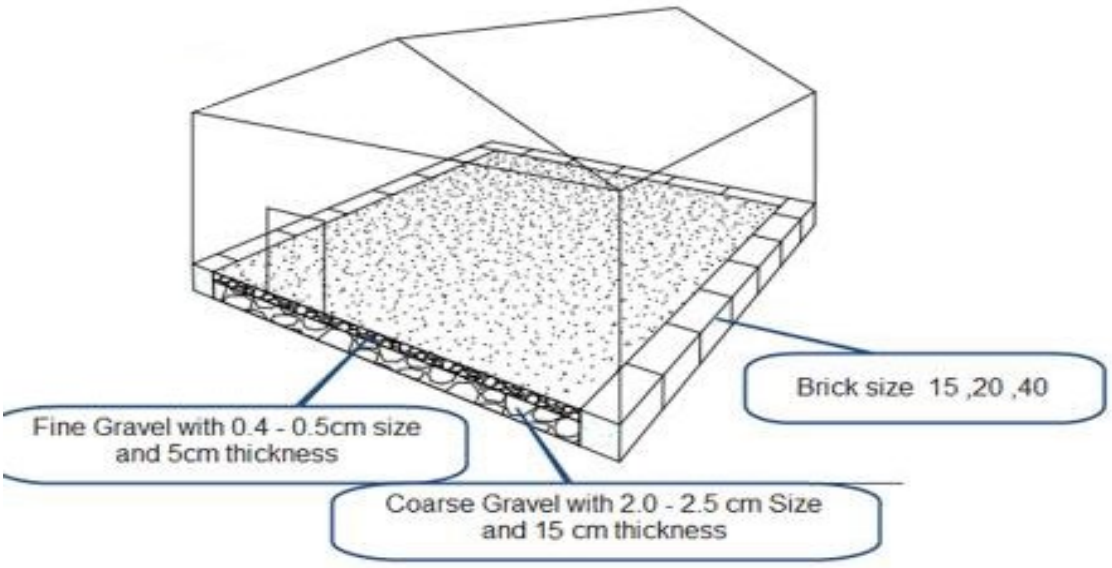

Figure 5: Example of tent ground raising and leveling

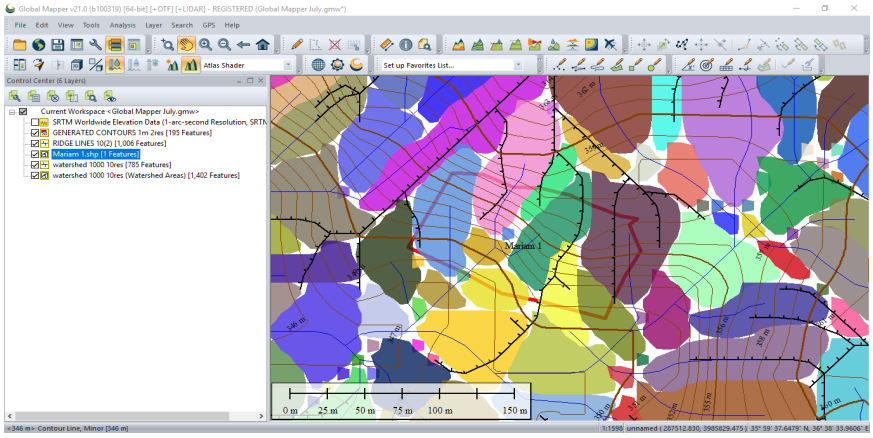

Figure 6: Watershed analysis and ridge analysis, IDP site Mariam. 1 with Global Mapper.

Useful Links

Drainage dimension/size:

- SWMM 5.1 tutorial (Arabic) https://www.youtube.com/watch?v=AkuXN46VqKo
- SWMM 5.1 tutorial (English) https://www.youtube.com/watch?v=ioPdNcFKOAQ
- SWMM 5.1 tutorial (Arabic) https://www.youtube.com/watch?v=UJpHtVyLCzE
- SWMM 5.1 official site https://www.epa.gov/water-research/storm-water-management-model-swmm
- Global Mapper watershed analysis: https://www.youtube.com/watch?v=2kLAEtExNFk

Flooding analysis (workflow with Global Mapper):

- https://www.youtube.com/watch?v=LicJRA6oY10&t=15s

Other site planning tutorials:

- https://www.youtube.com/channel/UCv6-IGiIXn4IcQio_EZWf-A