



Drinking Water Resources Protection Guidelines

Ministry of Water and Irrigation

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Approved by H.E The Minister of Water & Irrigation

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Drinking Water Resources Protection Guidelines

Background:

The water resources in the kingdom are classified as ground and surface water resources. The priority in protection measures taken are given to existing or potential drinking water resources then to other resources that are allocated to other uses taking into account the resource yield, water quality and the risk of pollution sources on the water source.

In the process of delineation of a water resource protection zones, all the relevant data, studies, available information, vulnerability maps and protection zoning maps should be revised, evaluated and examined to ensure that they are sufficient to identify the different signatures of the watershed under investigation.

It is vital to take into consideration the criteria followed in the country in the site selection of the different activities and licenses issued for the land use in that regard.

In the delineation of protection zones many international approaches were reviewed and examined and the following approach was adopted as the Jordanian one:

The groundwater protection area was divided into three zones:

Zone I: Immediate protection of the well/spring against direct pollution

Zone II: Protection against bacteriological pollution (50 days isochrones)

Zone III: Protection of the entire catchment area.

The Ministry of Water and Irrigation and its two Authorities (the Water Authority of Jordan & the Jordan Valley Authority), coordinates with other

concerned national partners to disseminate the Watershed concept in the country and to enforce the relevant national laws and by-laws and the enclosed Drinking Water Resources Protection Guidelines.

Definitions:

Groundwater Resources Protection Guidelines

Protection Zones:

1- Protection zone I:

The spring protection zone I is defined as follows: 50 meters at least in the upstream direction, 10 meters in the downstream direction and 15 meters at each side (Figure 1). The well protection zone I is as follows: 25 meters at least in the upstream direction, 10 meters in the downstream direction and 15 meters at each side (Figure 1). The areas within the zone 1 protection, should whenever possible be owned by the Water Authority of Jordan and fenced taking into consideration the infrastructure and the current situation in the area.

**Groundwater
flow direction**

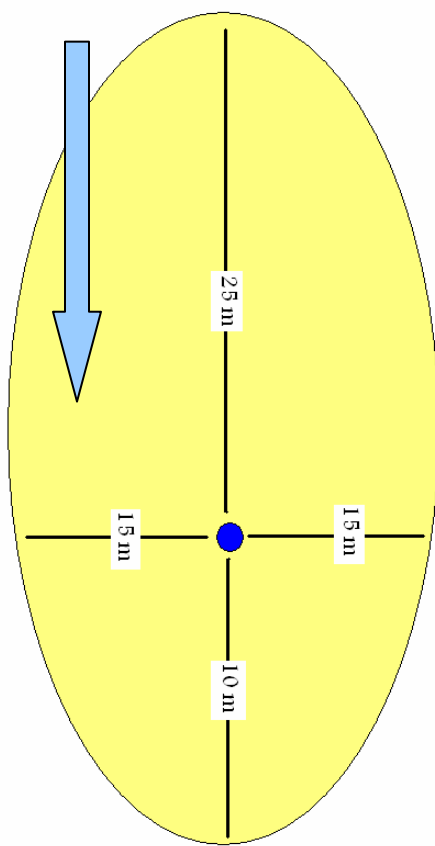


Fig. 1: Protection zone I for a well

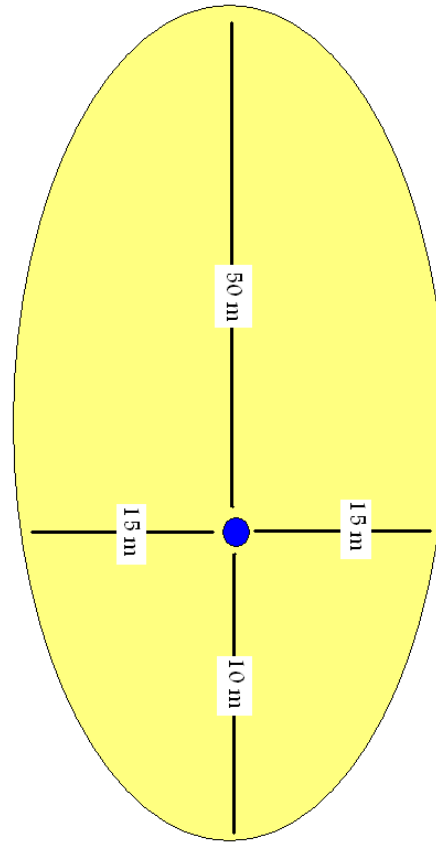


Fig. 2: Protection zone I for a spring

The delineation of protection zone 1 is studied on a case by case basis to accomplish the goal. Many issues are considered, i.e: land nature, available land to be owned, nature of ownership, current and on-going practices in the area. For existing fences on some springs that surround an area exceeding 2 donums for example, all the fenced area will be considered as zone 1.

Concerning new licenses for extraction from private wells, the license would be issued on the condition that the well owner will be committed with the areas and protection guidelines for zone 1. For existing private wells, each

case is studied separately and the current situation and limitations are considered before renewing the well license.

When cesspits and other subsurface disposal systems exist in the area to be protected, priority will be given to that area for establishing a main public sewer system and connections to the sewer system. All technical measures should be taken to make necessary maintenance to assure that such systems do not leak and are sealed completely. Intensive monitoring is required to assure compliance with best environmental and health practices.

2- Protection zone II:

Protection zone II is defined in view of the hydraulic information, studies and technical reports that provide sufficient knowledge to the water sector experts to estimate groundwater flow velocities, residence time and pollutant transport time such that the time needed for the microbiological pollutants to reach the water source is 50 days minimum given that the maximum protection distance in the upstream is 2 km. The distance in the downstream direction should be between 50 and 150 m depending on the characteristics of the water source. In cases when the dominant geological feature is the Karst aquifer system, vulnerability to pollution mapping if available are used and technical consultation is sought in that regard.

The upper limit of 2 km in the upstream direction can be adjusted according to the findings of the detailed hydraulic and geological studies, the aquifer characteristics, water flow direction, residence times and the findings of the advanced techniques like: trend analysis, isotope hydrology applications, remote sensing and mathematical modeling.

3- Protection zone III:

Zone III includes the protection of the entire catchment area.

Activities in the Groundwater Resources Protection Zones

1- Activities in protection zone I:

Activities in protection zone I are limited to the operational activities of the water source that should be installed and handled in the downstream of the source. The cesspit and other constructions should also be place in the furthest point downstream of the source. Best practices should be followed in maintaining and evacuating the sealed cesspit. Also in dealing with chemicals and chlorine cylinders. Good house keeping should at all times be maintained around the source within the zone 1.

The protection guidelines should be followed strictly as indicated on the plates attached on zone 1 of each water source. Regular inspection is carried out by the water rangers and the environmental and health personnel. Non conformities should be reported to the concerned Water Directorate Director and the Watershed Director in WAJ.

2- Activities in protection zone II:

Activities in protection zone II are limited to the housing and the organic (free from pesticides, herbicides and chemical fertilizers) agricultural activities.

When cesspits and other subsurface disposal systems exist all measures should be taken to ensure complete sealing of the systems. Priority will be given to that area for establishing a main public sewer system and

connections to the sewer system in accordance with the Wastewater by-law number (66) for the year 1994.

Intensive monitoring is required to assure compliance with best environmental and health practices.

Licenses for new establishments, expansions or change in use are not granted unless recommended by the concerned authorities after consulting the existing technical studies and recommendations available in that regard or after conducting specialized studies on a case by case basis. Required corrective actions should be taken immediately to prevent any adverse effect on the water sources in that area.

Existing development agricultural, industrial and tourism activities producing wastewater that might adversely affect the environment and the water sources, is asked to adhere strictly and to comply with the best environmental practices as stated in the national laws and by-laws and to conduct the required corrections as stated by the relevant authorities.

3- Activities in protection zone III:

Development agricultural, industrial, social and tourism activities are allowed in zone III provided strict compliance with the best environmental practices as stated in the national laws and by-laws.

GUIDELINES FOR DRINKING WATER RESOURCES PROTECTION

Introduction:

For the delineation of protection zones all studies and information including vulnerability maps should be reviewed and sometimes a field

survey is needed for updating the available information. Also the location of existing activities and licenses which may be potentially hazardous to ground water should be considered.

Three protection zones were considered in accordance with international guidelines, among others those of Germany.

Guidelines for Groundwater Resources Protection:

Protection Zones:

Zone I

The required area for this zone is delineated for a spring to be at least 50 meters in the direction of the recharge area (upstream) of the water resource, and 25 m for a well. The distance from the resource in the opposite direction (downstream) should be 10 m. The lateral distance to both sides should be at least 15 m in both directions as shown in figs. 1&2, **considering the infrastructure and the existing status of the area (AM: does that mean if there is existing infrastructure zone I only extends to the infrastructure ?)**.

Every case is to be studied individually including the matters of land ownership and the existing activities in the area (e.g. the existing governmentally owned area surrounding some of the springs which exceeds 2 dunum documented in the department of lands where the whole owned area is considered as protection zone I) **(AM: what does that mean/what are the consequences ?)**.

Relating to private wells, the guidelines for governmental wells should be followed as a precondition for granting new licenses **(which ?)** and any type of licenses related to water exploitation (drilling license, annual abstraction license, or annual license for selling drinking water or **????**). Concerning existing private wells, each case should be studied individually when renewing the abstraction license.

In case of existing cesspools in the area, this area should be given superior priority to be connected to the sewerage system or technical measures to be implemented (maintenance and leakage prevention) so that a contamination of the groundwater resources is averted. Special control

should be conducted in these areas to ensure sound environmental and healthy practices.

Zone II:

Zone II is delineated depending on hydrogeological information and technical studies and reports which are used for calculating the groundwater flow velocity and the boundary of zone II by MWI specialists. The travel time for pollutants to reach a water resource should be not less than 50 days and the distance should not exceed 2 km in the upstream direction of the water resource and 50 – 150 m in the downstream direction, considering each case individually. In karstic areas groundwater vulnerability maps are used if available and the technical consultancy is considered.

The boundary of Protection Zone II is to be recalculated if more detailed information about the geology and hydrogeology become available, such as aquifer description, hydraulic parameters, groundwater flow and velocity and other relevant information including hydro-isotope data, remote sensing data, tectonic data, geophysical data and mathematical groundwater models.

Zone III:

Zone III is delineated taking into consideration the groundwater contribution zone (groundwater recharge area for the well or spring) of the groundwater basin. This zone is estimated based on all available and relevant hydrological, geological, hydrogeological and hydraulic information.

Activities allowed in GW resources protection zones:

Activities allowed in Zone I

The activities in this zone are exclusively limited to those related to the well or water resource operation. **In case pumping stations or treatment stations are required for well operation near the well or water resource, these installations should be constructed in the downstream area, outside zone I.**

The guidelines of Zone I are to be obliged to, following the inscription on the signs marking the well protection zone.

Any violation is to be monitored in cooperation with the field operations dept. and reported to the **directors of management & directorate of water resources protection in the center (MWI)**.

Activities allowed in Zone II :

The activities in this Zone are limited to residential activities and organic agriculture (that doesn't use chemical fertilizers or pesticides).

Priority is to be given to these Zones for the establishment of an appropriate sewerage network or cesspools following the by-law No.66 of 1994.

Special Control on these Zones is to be applied to ensure compliance with environmentally sound practices.

No licensing of new establishment or extension or changing the use is to be given unless the responsible organization grants permission after referring to related studies and recommendations if available. If no such studies are available, new studies are to be conducted for every case individually and required correction measures are to be undertaken to prevent any negative impact on the water resources in this zone.

Relating to agricultural development activities or existing industries which produce wastewater and may have an impact on the environment and water resources, these are to be obliged to implement environmental sound practices & comply with corrective measures decided by the responsible agencies. (**which consequences could this have ? who will control this ?**)

Activities allowed in Zone III :

All development, agricultural, industrial, (???) activities which are allowed by the laws & by-laws applied in Jordan under the condition that they comply with environmental sound practices.

Surface Water Protection Guidelines:

1. Dams :

Zone I:

A – Existing Dams:

Protection Zone I is the area surrounding of the dam which is owned by JVA for the operational and implementation activities (which are shown on the maps of JVA). (what does that mean for Wadi Mujib and Wadi Wala dams ?)

B – Planned Dams & Projects:

The fenced distance should not be less than 100 m (or as the nature of the area requires ???) measured from the bank of the dam when at the highest level.

Zone II:

This Zone starts from the boundary of zone I and is delineated case by case depending on the geologic & topographic situation (slope) of the area. The outer boundary of the protection zone should not be less than 2.5 km around the bank of the dam and 350 m to both sides of the main wadies recharging the reservoir (until a distance of xx km from the reservoir).

Zone III:

Is delineated to include all the catchments area which is estimated from the hydrogeological & hydrological description of the area.

³ The focus here will be on surface water resources used for drinking water.

⁴ Existing Dams which are used or expected to be used for drinking water are Mujib dam , Wala dam , wadi Al-Arab dam , Wehda dam , Tannour dam & Shurahbeel (Ziglab) dam .

2. Wadies :

Zone I: Is the area of the wadi owned by the government (sanctuary ?) and registered in the land department (how large is that area commonly ?).

Zone II: This Zone starts from the boundary of zone I and is delineated case by case depending on the geologic & topographic situation of the area. The protection zone should not be less than 350 m to both sides of the wadi.

3. King Abdullah Canal (KAC) :

The area of KAC owned by the government is **40 m** to both sides of the canal. The drinking water intake for Amman is 65 km far away from the tunnel (**is not part of the guideline**).

The canal and the area around owned by the government should be fenced perfectly (**meaning 40 m to both sides ???**) and the control should be along the canal starting from the tunnel until the Swalha bridge.

Activities Allowed in Surface Water Protection Zones :

Activities allowed in Zone I:

The activities in this zone are limited to those of which are related to operation and management of the water resource. Environmental and constructional sound practices are to be undertaken.

Activities allowed in Zone II :

- The activities in this zone are limited to organic agriculture only.
- Prohibition of any development, industrial or chemical activity which may produce wastes that have negative impact on the environment like the fuel stations, car washing and maintenance in addition to free zones and industrial zones.
- If the area is connected to sewerage network, all buildings and constructions must be connected to it in accordance with standards of connection and in case of absence of the network cesspools should be established for these buildings and priority is given to installation of sewerage networks in protection Zone II if inhabited according to sewage by-law No. 66 of 1994.
- Special Control on these Zones is to be applied to ensure compliance with environmental sound practices.
- No licensing of new establishment or extension or changing the use is to be granted unless the relative organization gives agreement after referring to related studies if available to prevent any negative impact on the water resources in this zone.

- The required correction measures are to be undertaken by the owner of establishment according to recommendations prepared by the Licensing Committee.
- Relating to the developing agricultural activities or existing industries which produce wastewater and may have impact on the environment and water resources are to be obliged to implement environmental sound practices & comply with the correction measures decided by the responsible agencies.

Activities allowed in Zone III :

All development activities are allowed under the condition of compliance with environmental sound practices.

Control and Implementation:

- MWI including JVA and WAJ is responsible for implementation of what is required for protection zone I including land ownership around the water resource. MWI should also inform the Ministry of Municipalities about the **land development** to consider it in the requirements for the guidelines in the development and detailed plans of the land around the water resource.
- Ministry of Environment in coordination with related governmental agencies is responsible to control zone II and zone III and will undertake the required measures according to the applied law.
- Ministry of Agriculture in coordination with related governmental agencies takes the responsibility of controlling the agricultural activities and the landuse restrictions on agricultural land in protection zones II and III.
- All investment owners should allow the monitoring agencies to inspect these zones and take samples if needed.
- All private well owners should allow the monitoring agencies to inspect these zones and take samples if needed as mentioned in the groundwater by-law No. 85 of 2002.