PROLINE-CE

WORKPACKAGE T2, ACTIVITY T2.2

IMPLEMENTATION OF BEST PRACTICES FOR WATER PROTECTION IN PILOT ACTIONS

D.T2.2.2 PARTNER-SPECIFIC PILOT ACTION DOCUMENTATIONS

PILOT ACTION: PA2.1 Well field Dravlje valley in Ljubljana

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1. Introduction

Best management practices (hereinafter BMPs) for drinking water protection and management derived from T1 were reviewed and relevant BMPs were selected for particular pilot action. Implementation status of BMPs was verified in Pilot Actions (T2); in case of lacks identified, possibilities of improvement and implementation were also assessed. Drinking water protection and management and best practices are strategically implemented in the pilot actions, in order to achieve a function-oriented land-use based spatial management for water protection at the operational level. Measures and actions were analysed and proposed concerning mitigation of extremes and achieving a sustainable drinking water level. PROLINE-CE pilot actions reflect the broad range of possible conflicts regarding drinking water protection, such as: forest ecosystem service function; land-use planning conflicts; flooding issues; impact of climate change and land-use changes; demonstration of effectiveness of measures including ecosystem services and economic efficiency.

Review of main land use conflicts and BMPs on Pilot Action level has already been done in Pilot Action BMPs reports, which were a basis for *D.T2.1.2 Transnational case review of best management practices in pilot actions*. Description of natural characteristics of Pilot Site is presented in *D.T.1.4 Descriptive documentation of pilot actions and related issues*.

Activities within Pilot Action were done according to set-up which was described in *D.T2.1.5 Set-up report about adaptation of the transnational concept to pilot action level*.

The Deliverable *D.T2.2.2 Partner-specific pilot action documentations* presents final Pilot Action report regarding the management actions examined in the Pilot Action, description of conducted activities and identified solutions for case-specific adaptations of management concepts. This report presents final work report regarding the implementation of best management practices for drinking water protection in pilot action PA2.1 Well field Dravlje valley in Ljubljana.

2. Testing of BMPs in Pilot Action

2.1. Objective(s) of Pilot Action

The potential well field is in Glinščica river sub-basin and within urbanized area crossed by Ljubljana’s ring-road, large open spaces (mainly agricultural areas), urban area and industry causing high pressure on land use. Dravlje valley is also a flood area with inappropriate regulated surface waters coming from hilly hinterland. Most of these waters are lead to the urban sewage system, which in high waters cannot receive so much water and are flooded.

The projects focus is to harmonize land use, drinking water source protection and management, which is essential for quality of life and drinking water in this area.

2.2. BMPs of Pilot Action

Gaps were studied and discussed with stakeholders, later on measures were formed. Identified and analysed Gaps, with Best managing practices which are planned to be implemented through running activities are listed in Table 1. In this report activities are divided in three groups; the main focus is on activities based on (1) modelling and (2) identification, (3) while activities based on stakeholder involvement are further described in the report D.T2.3.1.

Table 1: Identified GAPs and proposed BMPs including conducting activity.

Topic	Identified GAP	Measure	Activity
Land use management	Agriculture: inflexible time ban of fertilizers and manure application	Redefinition of time ban of fertilizers and manure application	STAKEHOLDER INVOLMENT
Land use management	Abandoning private forests, aging of forests and with it exposing vulnerable forests to natural disasters	Forestry subsidies and encouraging foresters to younger their forests	STAKEHOLDER INVOLMENT
Non-structural flood mitigation	Legalization of illegal construction on flood areas	To prevent legalization of construction on flood areas	STAKEHOLDER INVOLMENT
Non-structural flood mitigation	Surface water intrusion in the well	Sealed wells heads	HYDROLOGICAL/ HYDRAULICAL MODELLING
Non-structural flood mitigation	Pollution sources in flood prone areas are not known / identified	Register of potential point pollution sources	IDENTIFICATION OF POTENTIAL POLLUTERS
Non-structural flood mitigation	River banks vegetation is not maintained	Reducing river banks vegetation	STAKEHOLDER INVOLMENT
Non-structural flood mitigation	Torrential water flooding - excessive surface runoff, lack of water for animals and watering plants	Collecting torrential water in wider channels, small retention pond (transient marsh Mali Rožnik)	HYDROLOGICAL/ HYDRAULICAL MODELLING
Non-structural flood mitigation	Water balance status and effective mitigation measures are not known (identified)	Hydrological /hydraulical modelling	HYDROLOGICAL/ HYDRAULICAL MODELLING
Drinking Water sourc	Unarranged road rainwater discharge	Collection and treatment of road rainwater discharge, particularly within drinking water protection areas	STAKEHOLDER INVOLMENT

	Individualistic (Non-Sectoral) approach to common problematics regarding protection of drinking water resources	Joined and integrated management of drinking water resources (horizontal and vertical co-operation)	STAKEHOLDER INVOLMENT
	Lack and not effective control over Implementation of DWPZ restrictions	Strict implementation and inspection of DWPZ restrictions	STAKEHOLDER INVOLMENT
	DWPZ areas are not determined - problem of spatial planning	With modelling DWPZ areas will be determined	HYDROGEOLOGICAL MODELLING
	In the legislations there is no limitation of road runoff water salinity	Define limitation of salinity of road water run-off	STAKEHOLDER INVOLMENT

In the following tables, interpretation of recognized gaps and measures enhanced with modelling or identification are further analysed:

a. Identified GAP provoking action	
GAP short name	**Pollution sources in flood prone areas are not known / identified**
GAP short description	Identification of the potential pollution sources locations in flood areas is a challenging task.
b. Best management Practice / Management Action	
Name of BMP	**Register of potential point pollution sources on flood areas identified in PA**
Type of land use regarded	Flood prone areas
Location	Slovenia
BMP description	Aggregated list of all potential point pollution sources (industry, heating oil tanks in households, etc.) is needed for efficient incident management in case of flood event. Some of the potential pollution sources are known (especially industrial establishments under Seveso Directive), but there is among others no list of heating oil tanks in households, which are still quite common in Slovenia. Some non-SEVESO and non - IED facilities are handling nevertheless significant amounts of polluting substances on flood prone areas. This includes also households storing small amount of chemicals, and especially heating oil tanks, that might leak during the flood event. Potential pollution sources are exceeding current requirements of national legislation (Slovenia: Environmental protection act O.G. 39/2006) and EU

	requirements SEVESO Directive, IED Directive 2010, E-PRTR Register.	
Advantages of this BMP in PA	It is very important to know all the potential pollution locations to implement prevention measures in the case of floods (i.e. flood proofing) and improve response of intervention forces during the flood events.	
Challenges of this BMP in PA	Data collection, data validation and maintenance, legal framework for the data collection.	
Relevance	Water protection functionality	High
	Cost of the measure	Low
	Duration of implementation	Mid term
	Time interval of sustainability	Long term
Limitations	Household inventory and data privacy.	
Comments	Challenge is how to adopt and enforce legislation enabling access to data and reporting on the amount of stored pollution substances on flood prone areas. Maintenance of the dataset. After the identification it is important to raise awareness and provide measures leading to improvements.	
References / sources	Flood event in Ljubljana in 2010.	

c. **Identified GAP provoking action**		
GAP short name	**Surface water intrusion in the well**	
GAP short description	Exposure of wells during flood events	
d. **Best management Practice / Management Action**		
Name of BMP	**Sealed wells heads on flood areas evaluated according to Hydrological / Hydraulical model**	
Type of land use regarded	Flood prone areas	
Location	Slovenia in cases of wells in flood prone zones.	
BMP description	Many water supply wells are on flood-prone plains, so the wells heads should be constructed as sealed in a way to prevent the surface water intrusion in the well during the flood event.	
Advantages of this BMP in PA	Surface water cannot be mixed with groundwater, which is used for drinking water supply source, during floods. Water supply is not interrupted during the flood event.	
Challenges of this BMP in PA	No specific challenges are foreseen.	
Relevance	Water protection functionality	High

	Cost of the measure	Low
	Duration of implementation	Short term
	Time interval of sustainability	Long term
Limitations	No limitations are foreseen.	
Comments	The information on the type of the well (sealed) should be emended to the data specification according to INSPIRE directive. Recommendations on the level of strategic guidelines resulting from the PROLINE-CE project, implementation on the level of national legislation requesting obligatory sealed well heads for the water supply wells on flood prone areas. Awareness rising and education process on this risk and potential measure.	
References / sources	Flood event in Celje in 1990 and flood event in Ljubljansko barje (Brest - Iški vršaj) in 2010.	

e. Identified GAP provoking action	
GAP short name	**Torrential water flooding - excessive surface runoff,** **lack of water for animals and watering the plants**
GAP short description	Torrential water running from hill Rožnik's banks along the ZOO is causing clogging of the runoff chanels and flooding. Simultaneously there is lack of water for animals and watering the plants.
f. Best management Practice / Management Action	
Name of BMP	**Collecting torrential water in wider channels, small retention pond (transient marsh Mali Rožnik) managed according to Hydrological / Hydraulical model**
Type of land use regarded	Flood prone areas
Location	Slovenia
BMP description	With torrental water management running from hill Rožnik's banks through the chanells along the ZOO would stop causing clogging of the runoff chanels and flooding. Torrental water would be collected in wider channels or ponds. The water runaway with a charging reservoar or a pond for drinking water for the animals would be arranged with previous calculations with a hydrological model.
Advantages of this BMP in PA	Based upon the modelling results mitigation measures will be proposed for the improved torrential water management and flood protection of the ZOO area.
Challenges of this BMP in PA	Financial input for planning and management of the water management construction.

Relevance	Water protection functionality	Medium
	Cost of the measure	Low
	Duration of implementation	Short term
	Time interval of sustainability	Long term
Limitations	Availability and quality of data - there are no active measures of the river discharge.	
Comments		
References / sources	The BMP derives from experiences.	

g. Identified GAP provoking action		
GAP short name	**Water balance status and effective mitigation measures are not known (identified)**	
GAP short description	Identification of problematic locations and possible solutions is done by modelling.	
h. Best management Practice / Management Action		
Name of BMP	**Water balance status will be determined with Hydrological / Hydraulical modelling**	
Type of land use regarded	Flood prone areas	
Location	Slovenia	
BMP description	A hydrologic model is a simplification of a real-world system (e.g., surface water, groundwater) that aids in understanding, predicting, and managing water resources. Hydrological/hydraulical models are developed to analyse, understand, and explore solutions for sustainable water management, in order to support decision makers and operational water managers. Hydrological models also allow us to do scenario analysis.	
Advantages of this BMP in PA	Based upon the modelling results mitigation measures will be proposed for the improved protection of potential drinking water source.	
Challenges of this BMP in PA	To make as good as possible simplification of a real-world.	
Relevance	Water protection functionality	Medium
	Cost of the measure	Low
	Duration of implementation	Short term
	Time interval of sustainability	Long term
Limitations	Availability and quality of data - there are no active measures of the river	

	discharge.
Comments	
References / sources	The BMP derives from experiences.

i. Identified GAP provoking action		
GAP short name	**DWPZ areas are not determined - problem of spatial planning**	
GAP short description	In current Spatial plan there is reserved area for planned Water field without surrounding protected areas with restrictions, which are of major importance for drinking water protection source.	
j. Best management Practice / Management Action		
Name of BMP	**With hydrogeological modeling DWPZ areas will be determined**	
Type of land use regarded	Agriculture, Grassland, Wetland - all	
Location	Slovenia	
BMP description	DWPZ areas were determined with modelling and will be proposed to be included in the Spatial plan of the Municipality of Ljubljana. Drinking water protection zones include restrictions, such as: prohibition of buildings construction, no waste disposal, no storages of dangerous substances, prohibition of use of pesticides and fertilizers, salting undrained surfaces like yards and gravel roads, etc. DWPZs are of major importance for drinking water protection source, therefore restrictions should already be implemented.	
Advantages of this BMP in PA	Protection of potential drinking water source for Ljubljana area.	
Challenges of this BMP in PA	The main challenge presents including DWPZs into Spatial plan of the Municipality of Ljubljana.	
Relevance	Water protection functionality	Very High
	Cost of the measure	Low
	Duration of implementation	Long term
	Time interval of sustainability	Long term
Limitations	Expected limitations are lack of political will.	
Comments	/	
References / sources	The BMP derives from bad practice.	

3. Activities in the Pilot Action

Current activities in the PA include **stakeholder involvement, identification of potential polluters and setting up a hydrogeological and hydrological / hydraulical model**. In this report the main focus is on activities based on modelling and identification, while activities based on stakeholder involvement are further described in the report D.T2.3.1.

3.1. Solutions for case specific adaptation of best management practices

BMP's in PA2.1 Well field Dravlje valley in Ljubljana, important in practice, were previously identified through discussion with stakeholders and experts and later on analysed. BMP's will be strategically planned through further discussion with stakeholders, experts and political consultants in order to direct us and help us to truly implement new or upgraded legislations. Many solutions for case specific adaptation of best management practices connected to flood/drought management practices will be further improved with activities like modelling - therefore, two models are being prepared:

- *Hydrological / hydraulic modelling (3.2.1),*
- *Hydrogeological modelling (3.2.2);*

and some with *identification of potential polluters (3.3)* in order to protect potential drinking water source located in the PA against unidentified issues presenting threat.

3.2. Modelling

3.2.1. Hydrological / hydraulical

A hydrological model is a computer software tool that simulates the flow and behaviour of water along a river system, taking into account the movement of water through the river channel and associated floodplains. These models take a variety of input data, such as measured data for rainfall, temperature, evaporation and stream flow for a given period of time. Additional information and conditions are specified for a given scenario — such as diversions, agreed water sharing rules and river operating rules, as well as landscape information for floodplains, wetlands and various works constructed in the system. The models can provide detailed information on river flows, dam levels, losses and water consumption for each scenario. Statistics can then be used to compare different scenarios and inform robust policy development. The information output from the model can also be used as input for other models and assessments to allow more detailed environmental, economic and social assessments to further inform decision-making processes. Importantly, when used this way, the models do not provide a forecast of what might happen in the future, but broadly show the impacts of various scenarios over the range of climatic conditions specified (MDBA, 2018).

For the addressed zone of Glinščica watershed a new, integrated hydrological and hydraulic model is under development. It will be developed in RiverFlow2D tool. RiverFlow2D is a combined hydrologic and hydraulic, mobile bed and pollutant transport finite-volume model for rivers, estuaries and floodplains. It can route floods in rivers and simulate inundation over floodplains and complex terrain at high resolution and with remarkable speed, stability, and accuracy. The use of adaptive triangular-cell meshes enables the flow field to be resolved around key features in any riverine environments. The input data for the model are:

- Topological background: LIDAR DTM (min 5 reference points per m^2), already available from national LIDAR DTM database (as per 2014, Figure 1).

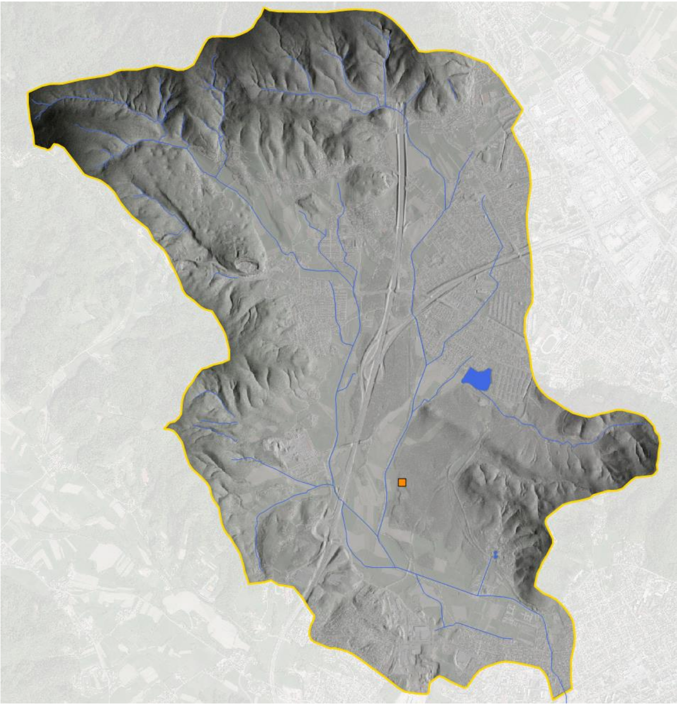

Figure 1: Digital Terrain Model (LIDAR data from 2104).

- Runoff data – CORINE land cover and national actual land use spatial database with reference values of runoff coefficient (CN) developed on the basis of specific actual land use (Figure 2).

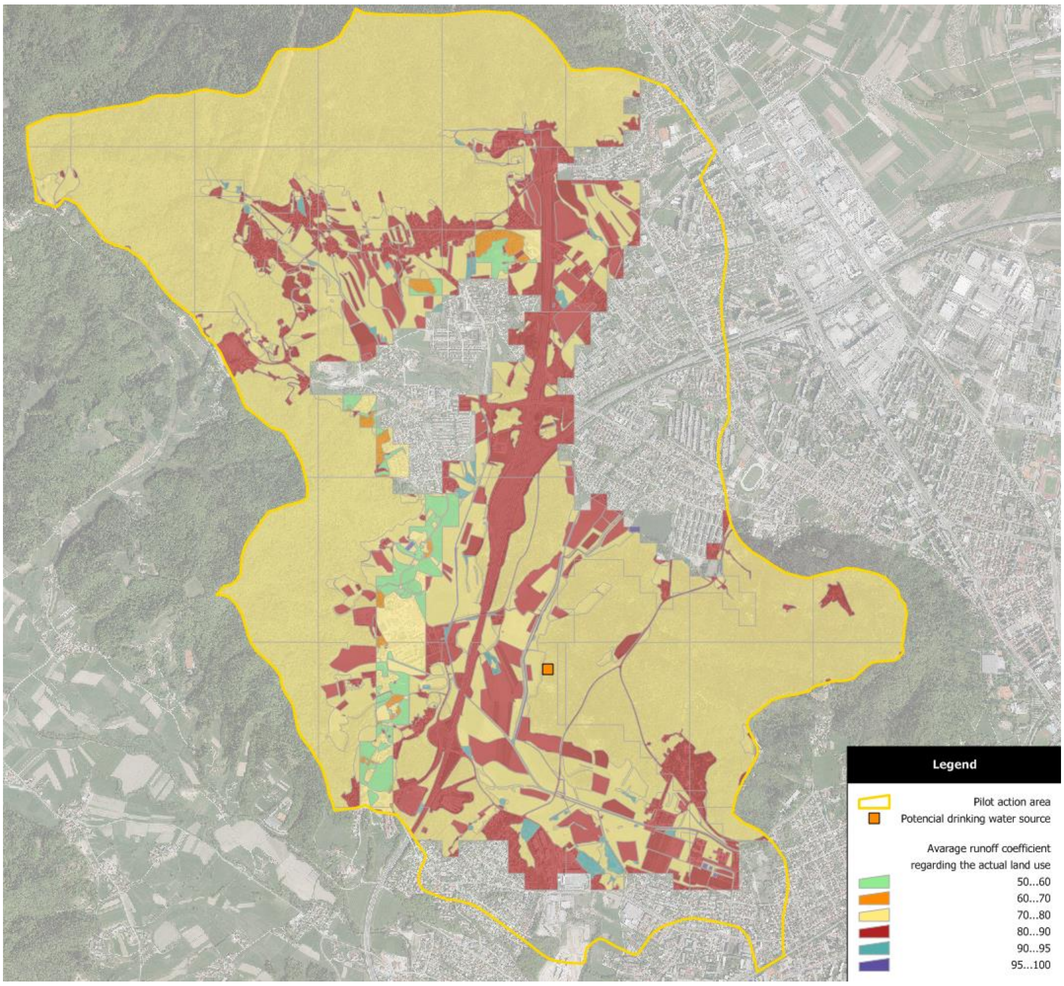

Figure 2: Average runoff coefficient regarding the actual land use.

- Meteorological data – all available data from the national network of Rain Gages will be used to determine the expect amount of rainfall (Figure 3).
- Modelling approach: to determine the flood areas the RiverFlo2D model (full 2D model - explicit modelling scheme with consideration of rainfall drainage) will be split into three models (Figure 4) with adding additional input from rainwater drainage using SWMM model. Additional input will be used in Model 2 and 3. Outflow results from upstream model will represent the inflow data for downstream model. The models are shown in Figure 5. The created mesh for Model 1 is shown in Figure 5. The model will be calibrated on flooding events in 2010 and 2014.

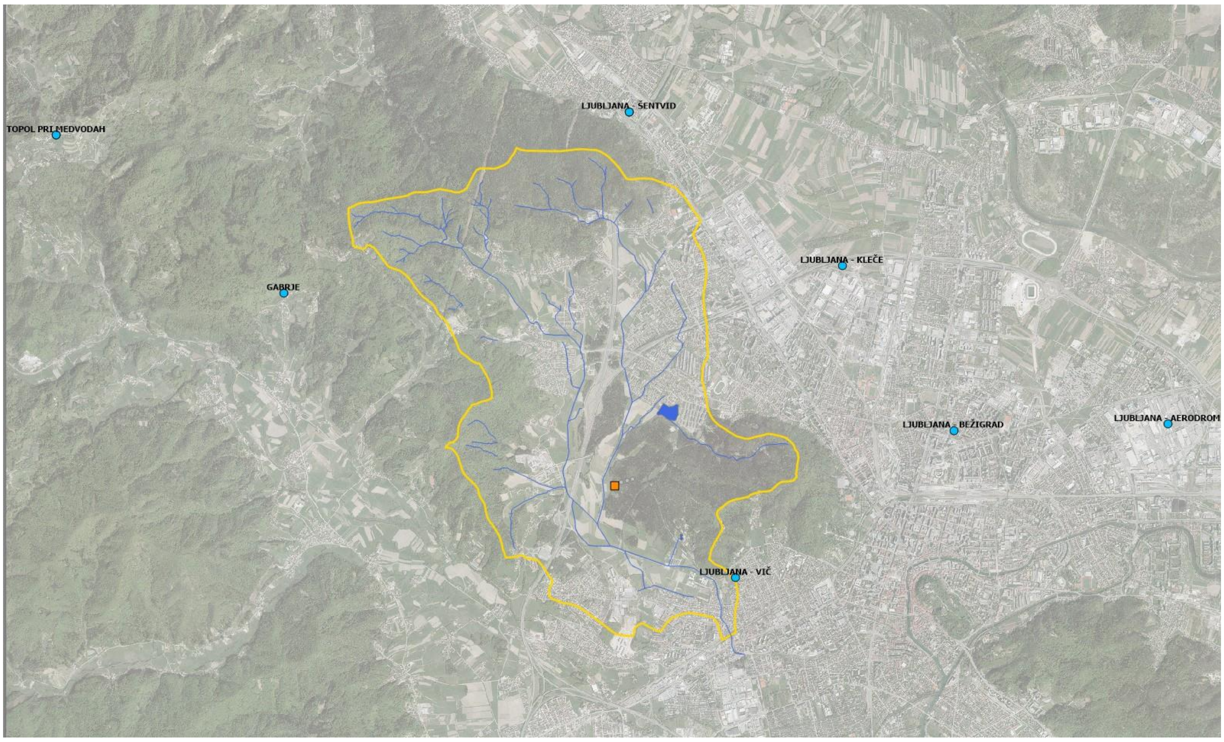

Figure 3: Location of Rain Gages.

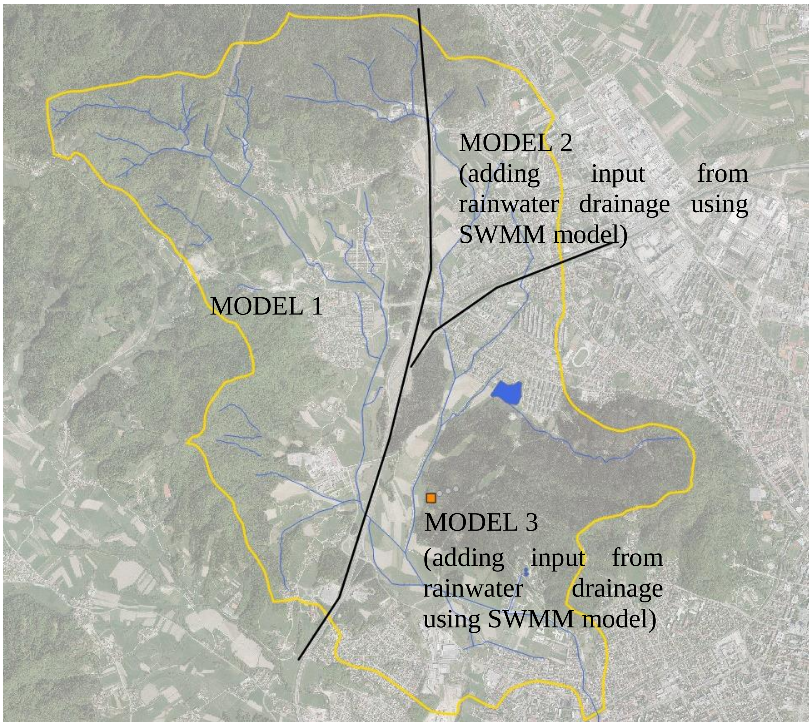

Figure 4: Distribution of three models

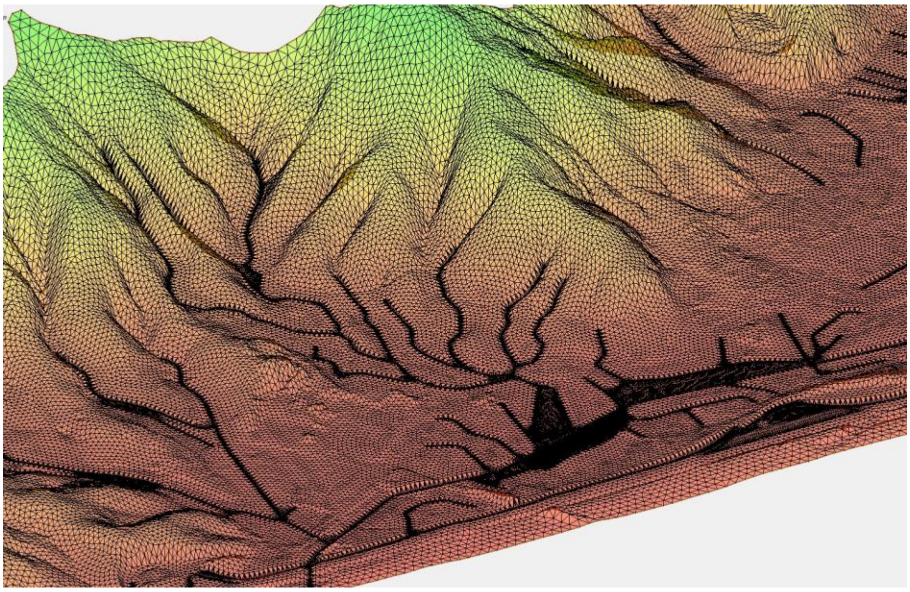

Figure 5: Surface runoff model.

- Scenarios which will be subject of modelling:

  (1) **Current status** – basis for the calibration of the model based upon the events of 2010 and 2014. Observed flood hazard in the zone of water source.

  (2) **Status after** the construction of the “Brdnikova” retention reservoir with 451.600 m^3 of effective retention volume, covering area of 42.3 ha, potential impact of the retention reservoir on water source.

  (3) **Impact of climate change scenarios** on the operation of the “Brdnikova” reservoir and potential impact on water source.

Based upon the modelling results mitigation measures will be proposed for the improved protection of potential drinking water source.

3.2.2. Hydrogeological modelling

With hydrogeological modelling we want to check the existing pumping regime in the Ljubljansko polje aquifer and to acquire new data about expansion the cone of depression due to new well field Dravlje. We would also like to define and determine the optimal DWPZ for well field Dravlje.

Mathematical model for the potential location of the water well field Dravje is based on geometry of the Ljubljana polje aquifer and the northern part of Ljubljansko barje aquifer. The model foresees 4 wells in the well field Dravje. The geometry of the aquifers, the hydrodynamic parameters of the aquifer and hydrological characteristics of surface waters data are embedded in the 4-layered model with network with 276 x 320 cells with size of each cell 50 x 50 m (Figure 6, Petauer & Hiti, 2017a). The design of the model is based on the modular program Visual MODFLOW Premium 2015, Version 4.6.0.167 Pro, Engine 5.0.

In the model wells are predicted to be 60 m deep with groundwater intake of 100l/s per well. The impacts of pumping groundwater on the Ljubljansko polje aquifer have been verified with simulation of mathematical model Ljubljansko polje aquifer calibrated for low and high groundwater levels (Figure 7, Petauer & Hiti, 2017b). Simulations of 4 wells confirmed that up to 400 l/s groundwater can be pumped in the well field Dravlje.

At the moment, there is only one piezometer in the PAA. Proposal for further research for more detailed determination of the DWPZ is to drill 1-2 piezometers to the bottom of the Quaternary sandy gravel sediments. Piezometers are foreseen to make pumping test, microbiological and chemical tests and to continuously measure groundwater levels and also to evaluate predictions of the model and to remodel according to new measurements. After two measurement cycles, optimal location of first well will be determined.

In addition, based on the analyses of quality and quantity of the water a professional scientific basis will be made and process will be submitted to the Ministry of the environment and spatial planning as a proposal for the adoption of the Decree that will protect this source of drinking water.

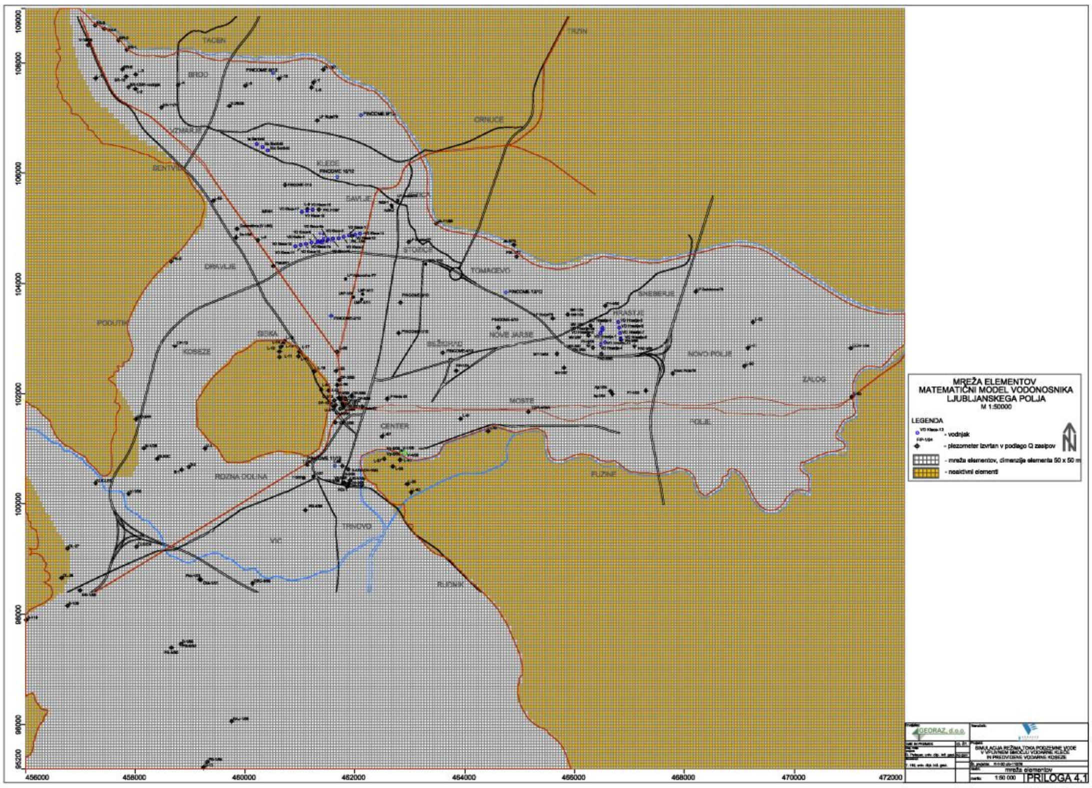

Figure 6: Network of elements for mathematical model of Ljubljana polje aquifer.

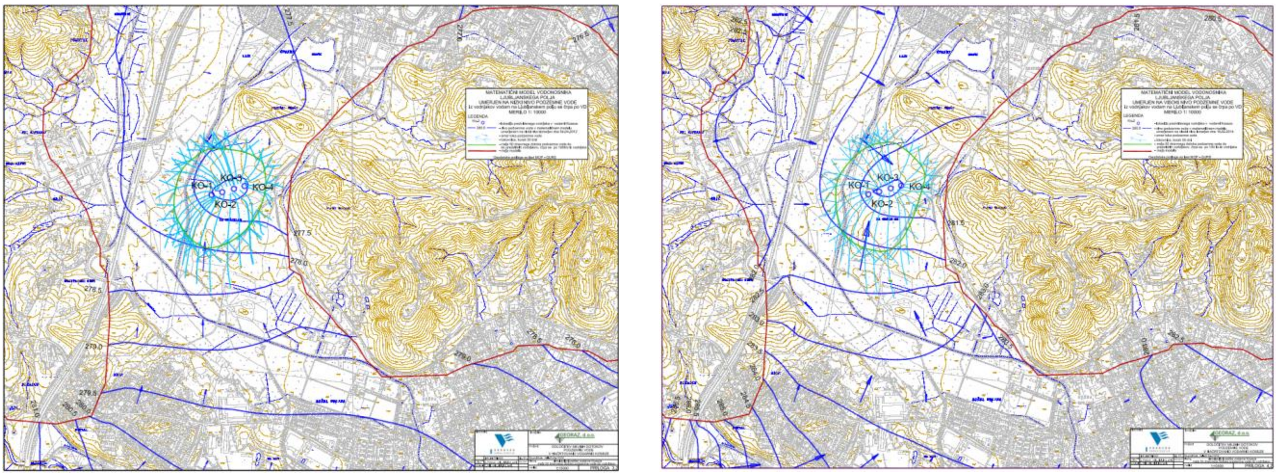

Figure 7: Mathematical model of groundwater level in case of low (left) and high (right) groundwater level.

DWPZs for well field Dravlje are first assessment and are defined (Figure 8) according to mathematical model prediction of 50-day isochrone (DWPZ I) and 400-day isochrone (DWPZ II) according to how many days groundwater travels to the capture through saturated zone. Location of DWPZs belongs also to northern part of DWPZ IIIA of Ljubljana moor aquifer.

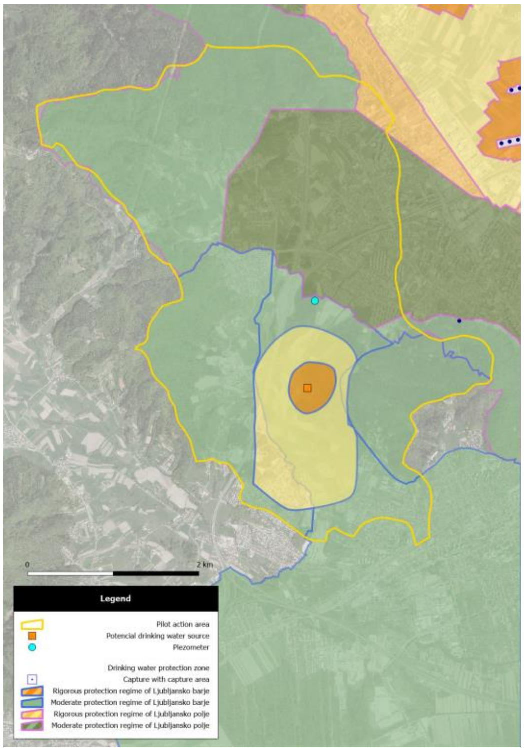

Figure 8: Defined DWPZ according to the mathematical model.

3.2.3. Summarized solutions and recommendations for adaptation of existing land use management practices and flood/drought management practices

Table 2: GAPs and proposed BMPs with recommendations for implementation in Pilot Action.

<table>
<tr><td colspan="2">Actual management practice (GAPs)</td><td>1. Water balance status and effective mitigation measures are not known (identified)
2. Torrential water flooding - excessive surface runoff, lack of water for animals and watering plants</td><td>1. DWPZ areas are not determined - problem of spatial planning</td></tr>
<tr><td colspan="2">Proposed BMP</td><td>Hydrological / hydraulical modelling</td><td>Hydrogeological modelling</td></tr>
<tr><td rowspan="3">Proposed solutions and recommendations</td><td>adaptation of existing land use management practices</td><td>Not relevant</td><td>A Hydrogeological model is a mathematical model simulation for low and high groundwater level. DWPZs are defined according to mathematical model prediction of 50-day isochrone (DWPZ I) and 400-day isochrone (DWPZ II) according to how many days takes the water to inflow from vadose zone.</td></tr>
<tr><td>Adaptation of existing flood/drought management practices</td><td>A Hydrologic model is a simplification of a real-world system (e.g., surface water, groundwater) that aids in understanding, predicting, and managing water resources. Hydrological/hydraulical models are developed to analyse, understand, and explore solutions for sustainable water management, in order to support decision makers and operational water managers. Hydrological models also allow us to do scenario analysis.</td><td>Not relevant</td></tr>
<tr><td>Adaptation of policy guidelines</td><td>Flood risk map as an adaptation of evaluation of parcels included in Municipal spatial planning.</td><td>Adaptation of Spatial plan of the Municipality of Ljubljana with DWPZ determination.</td></tr>
<tr><td colspan="2">Remaining issues to be solved</td><td>/</td><td>/</td></tr>
</table>

3.3. Identification of potential polluters

Identification was performed due to unidentified issues in the PA, presenting threat to potential drinking water source. There are roads, sewage system and few companies identified as pollution sources in flood prone areas, which can impact on environment and waters in Dravlje valley pilot action area (Figure 9):

a. *Highway* - All Through the entire PA area runs the Western part of Ljubljana's ring road, which is one of the busiest roads in Slovenia due to the strategically important position and the concentrated economic life in the capital city. On this part of the motorway there are several retention pools, oil trappers, dischargers and a treatment plant that purifies wastewater, all are shown in Figure 9. Emptying and cleaning is carried out regularly and records are kept in DARS's archive. In times of flood, the construction retained the first water increase and later flooded them.

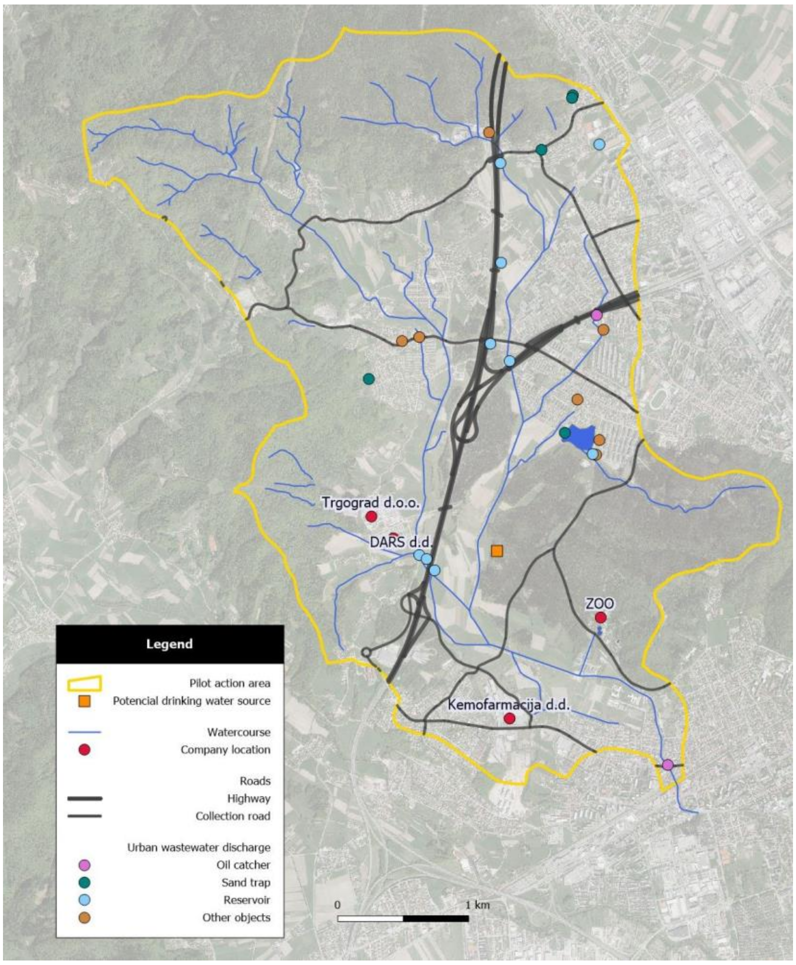

Figure 9: Locations of potential pollution sources, which can impact on environment and waters.

b. *Waste water from roads* is managed with Decree on the emission of substances in the discharge of meteoric water from public roads (Official Gazette of the Republic of Slovenia 47/2005), which define measures to reduce emissions due to discharge of meteoric waste water from public roads, limits of emissions into water and public sewer system for meteoric waste water from public roads and evaluation and measurement of emissions.

c. Use of *pesticides on the roadsides* could also have negative impact on water quality.

d. *Sewage system and individual small wastewater treatment plants* (WWTP) are present in the PA area, but some septic tanks can still be found (Table 3). The sewage network must be regularly supervised because a leaking network may cause environmental pollution (VOKA, 2017a).

Table 3: Type of households connections in the PAA.

Type of connection	No. of people	No. of households
Sewage system	20494	3250
Individual WWTP	84	23
Septic tank	1676	478
Total	22256	3751

Figure 11 shows sewage system in the Dravlje PA area and all associated technological facilities. Within Dravlje PA area is one small WWTP, called Smodinovec, with capacity 70 PE and secondary treatment - biological treatment with activated sludge (VOKA, 2017b).

e. *The Ljubljana ZOO* is operating for 70 years now and still has no connection to the public sewage system but is planned to be built later this year (2018). Their own treatment plant is very busy with operating restaurant for people and animals and 280.000 visitors per year.

f. *Kemofarmacija d.d.* – company deals mainly with medications and medical devices salesment. Their program also includes cosmetics, dietary supplements, chemicals and a variety of services for customers and suppliers. Primary wholesaling business is based on the principles of existing European good distribution practices and legislative requirements. Besides authorization to sell medicinal products, they also have a license to produce medicines. This includes the manufacturing processes within the scope of secondary repackaging of registered medicinal products for human and veterinary use. Work in accordance with ISO 9001 has been established since 1998 and upgraded in accordance with new versions of the standard. Specific categories of products, such as chemicals, medications and cooled products are stored in a special, separate room (Kemoframacija, 2017).

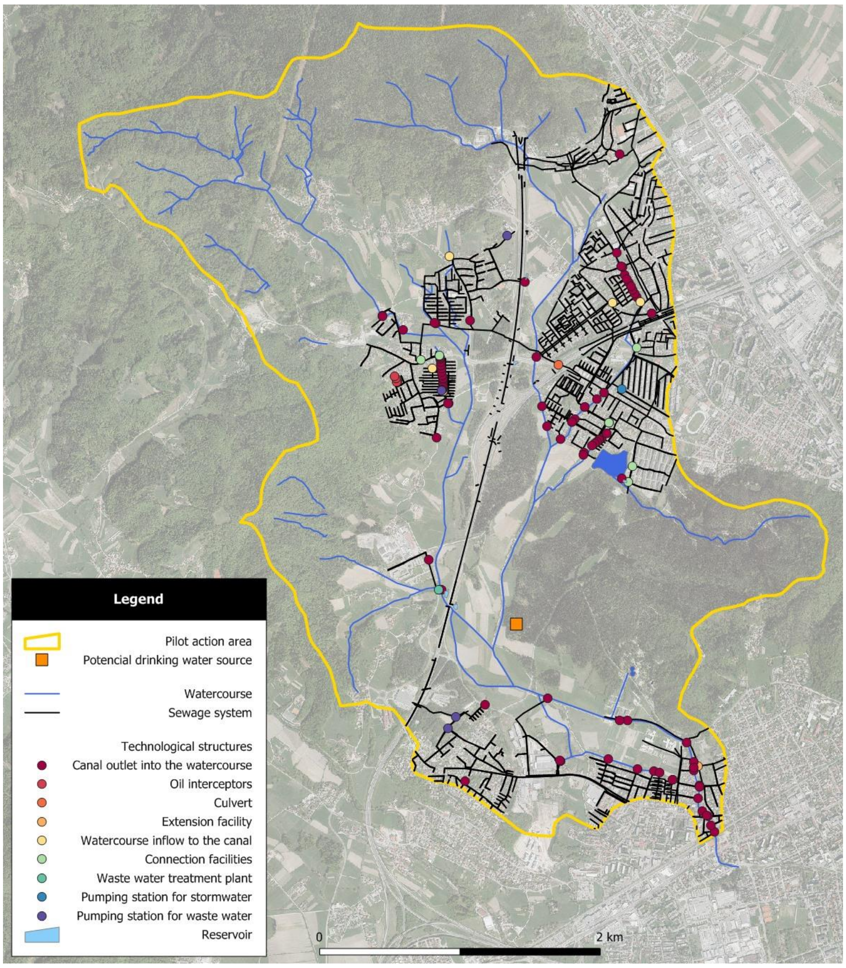

Figure 10: Sewage system with technological structures (GURS, GJI, 6.3.2017).

g. *Trgograd d.o.o.* – company, which monitors all phases of work, from production to incorporation of asphalt mixture, with their own control and laboratory (Figure 11). The capacity of the asphalt plant Smodinovec is 180 tonnes of mixture per hour. They have a production of low temperature asphalt mixtures with the use of foamed bitumen and the use of recycled asphalt in the asphalt mixtures (Trgograd, 2017).

h. DARS d.d. Avtocestna baza Ljubljana – is a grit material storage for the highway maintenance. Despite internal control of waste and exhausts, authorities control of activities impacting on environment and local waters should be established.

Figure 11: Asphalt production in business zone Smodinovec (Google maps, 2017).

4. Conclusions

Management actions examined in the PA, description of conducted (or running) activities, leading towards identified solutions for case-specific adaptations of management concepts, regarding the implementation of best management practices for drinking water protection in pilot action PA2.1 Well field Dravlje valley in Ljubljana, are presented in (1).

Table 4: Proposed solutions and recommendations to existing land use management practices and flood/drought management practices

<table>
<tr><td colspan="4">Proposed solutions and recommendations to existing land use management practices and flood/drought management practices</td></tr>
<tr><td rowspan="12">Activities</td><td colspan="3">(1) Stakeholder involvement: Further implementation of BMP’s in will be strategically planned through further discussion with stakeholders and with cooperation of a social scientist and a spatial planner in order to enable final implementation of measures</td></tr>
<tr><td>BMP1: Redefinition of time ban of fertilizers and manure application</td><td>BMP2: Forestry subsidies and encouraging foresters to younger their forests</td><td>BMP3: Prevent legalization of construction on flood areas</td></tr>
<tr><td>BMP4: Reducing river banks vegetation</td><td>BMP5: Collection and treatment of road rainwater discharge, particularly within drinking water protection areas</td><td>BMP6: Joined and integrated management of drinking water resources (horizontal and vertical co-operation)</td></tr>
<tr><td>BMP7: Strict implementation and inspection of DWPZ restrictions</td><td>BMP8: Define limitation of salinity of road water run-off</td><td></td></tr>
<tr><td colspan="3">(2) Modelling: Based upon the modelling results mitigation measures will be proposed for the improved protection of potential drinking water source</td></tr>
<tr><td>BMP1: Sealed wells heads on flood areas evaluated according to Hydrological / Hydraulical model</td><td>BMP2: Collecting torrential water in wider channels, small retention pond (transient marsh Mali Rožnik) managed according to Hydrological / Hydraulical model</td><td>BMP3: Water balance status will be determined with Hydrological / Hydraulical modelling</td></tr>
<tr><td colspan="3">BMP4: With Hydrogeological modelling DWPZ areas will be determined.</td></tr>
<tr><td colspan="3">BMP5: The steps necessary to protect the potential water source will be written.</td></tr>
<tr><td colspan="3">(3) Identification: identification of issues presenting threat to potential drinking water source in PA</td></tr>
<tr><td colspan="3">BMP1: Register of potential point pollution sources</td></tr>
</table>

5. References

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