



IMPEL
Conference in
Florence

Regulation and WFD
implementation
- The next steps -



Discharge of treated wastewater and its reuse

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Algarve River Basin District Administration

2016-10-05



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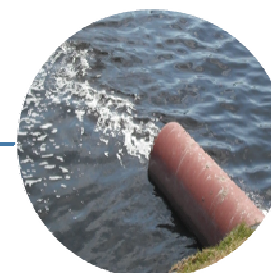
Wastewater discharge permit



Domestic,
urban or
industrial
wastewaters

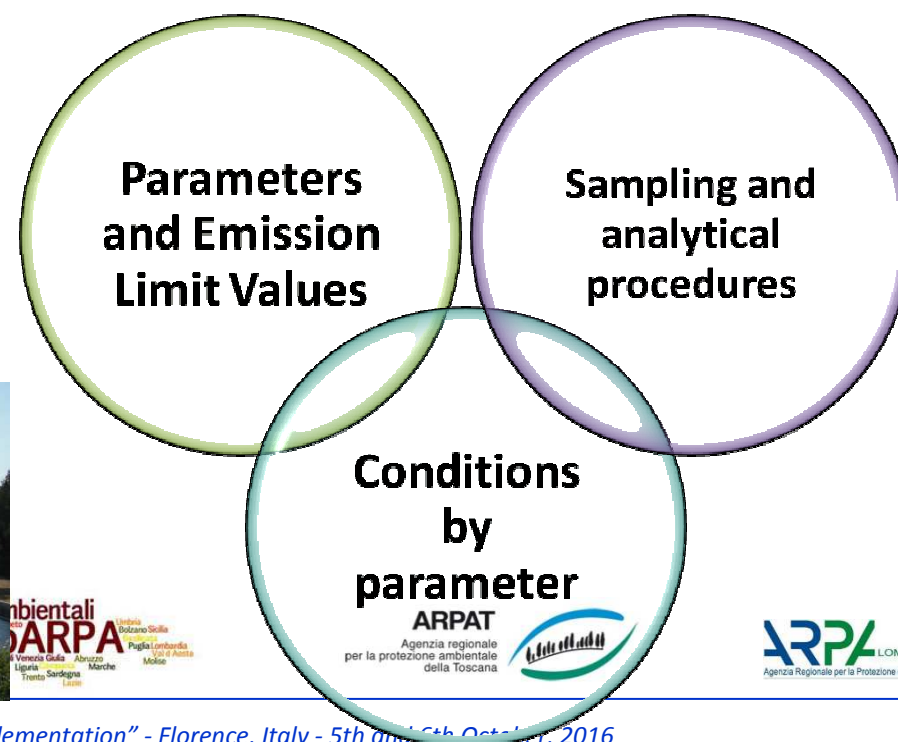
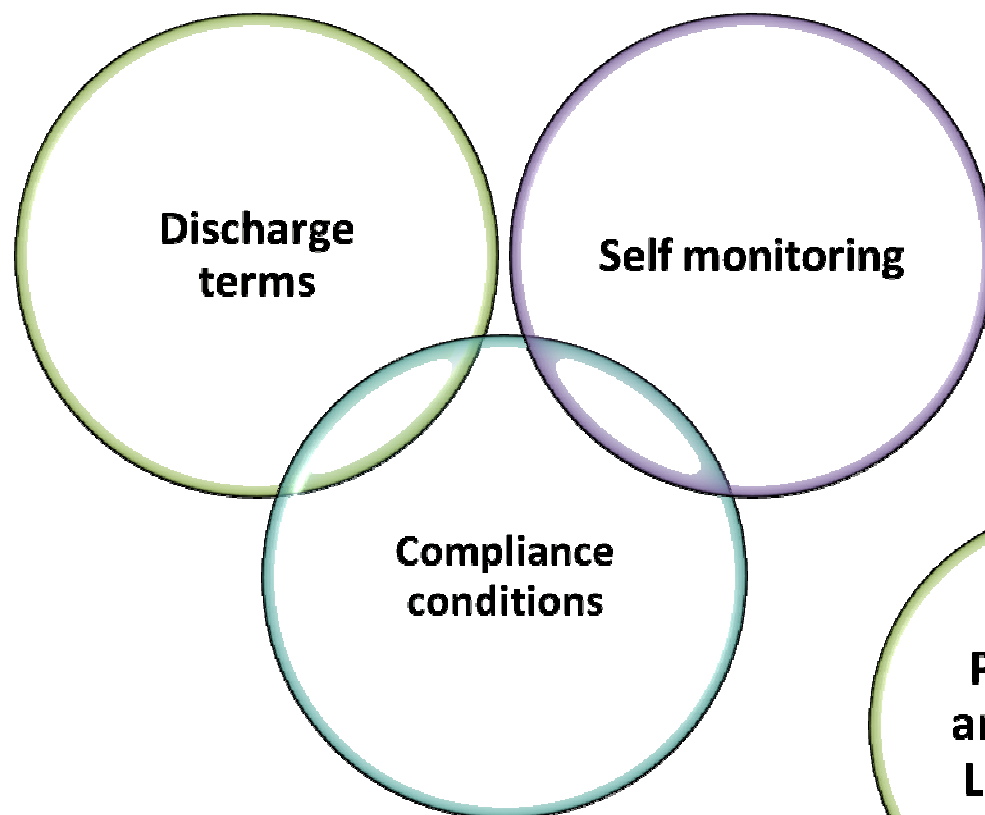
EXPIRATION
DATE: ~~1/1/1~~

Could
be
valid
for 10
years



Establish
terms and
conditions for
wastewater
discharges

Wastewater discharge permit



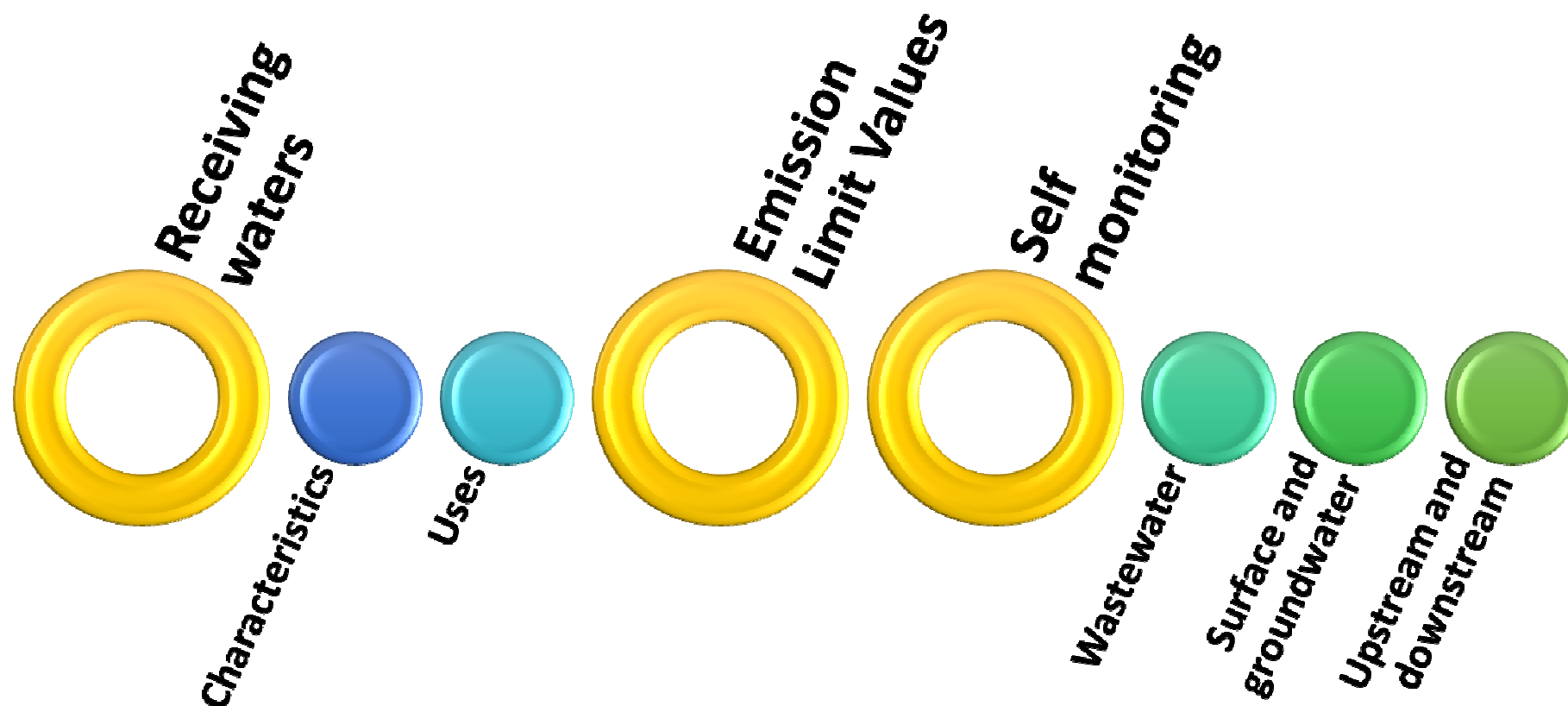
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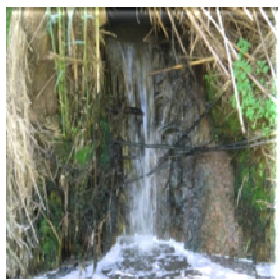


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Discharge impacts

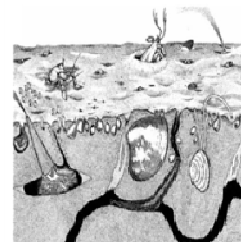


Discharge impacts



Emission Limit Values (ELV)

- Flat values (established on law)
- Adjusted values (more restrict, according receiving water characteristics and uses)
- Mixing zones



ELV (PS, PHS or Spec. Pollutants)

- ELV are expressed in concentration units (monthly or annual average) and mass units (daily maximum loads) to prevent chronic and acute effects



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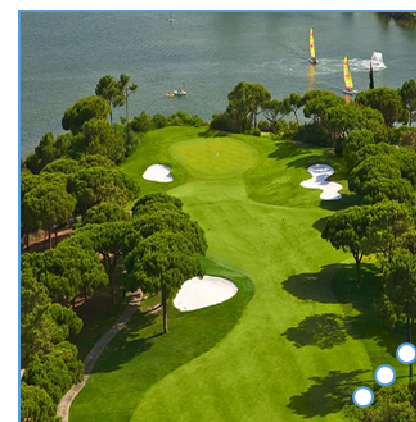
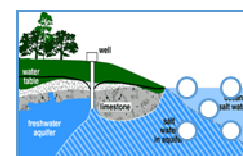
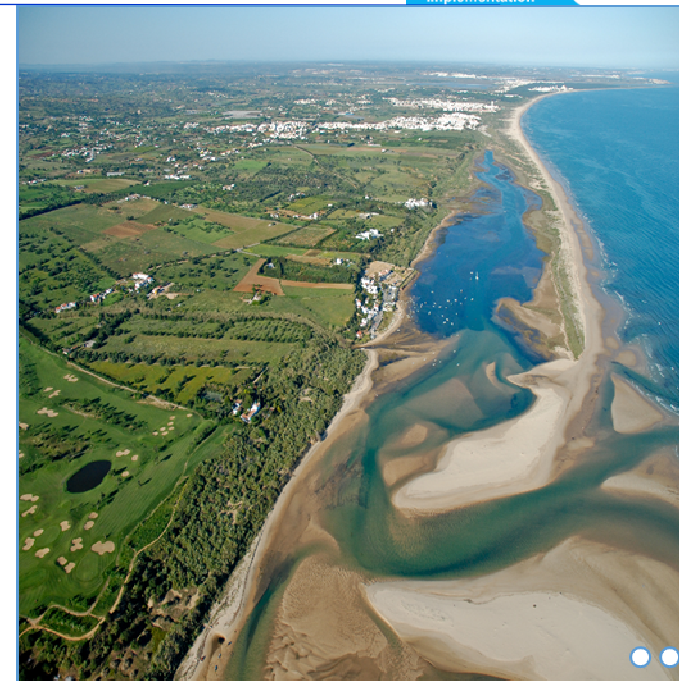
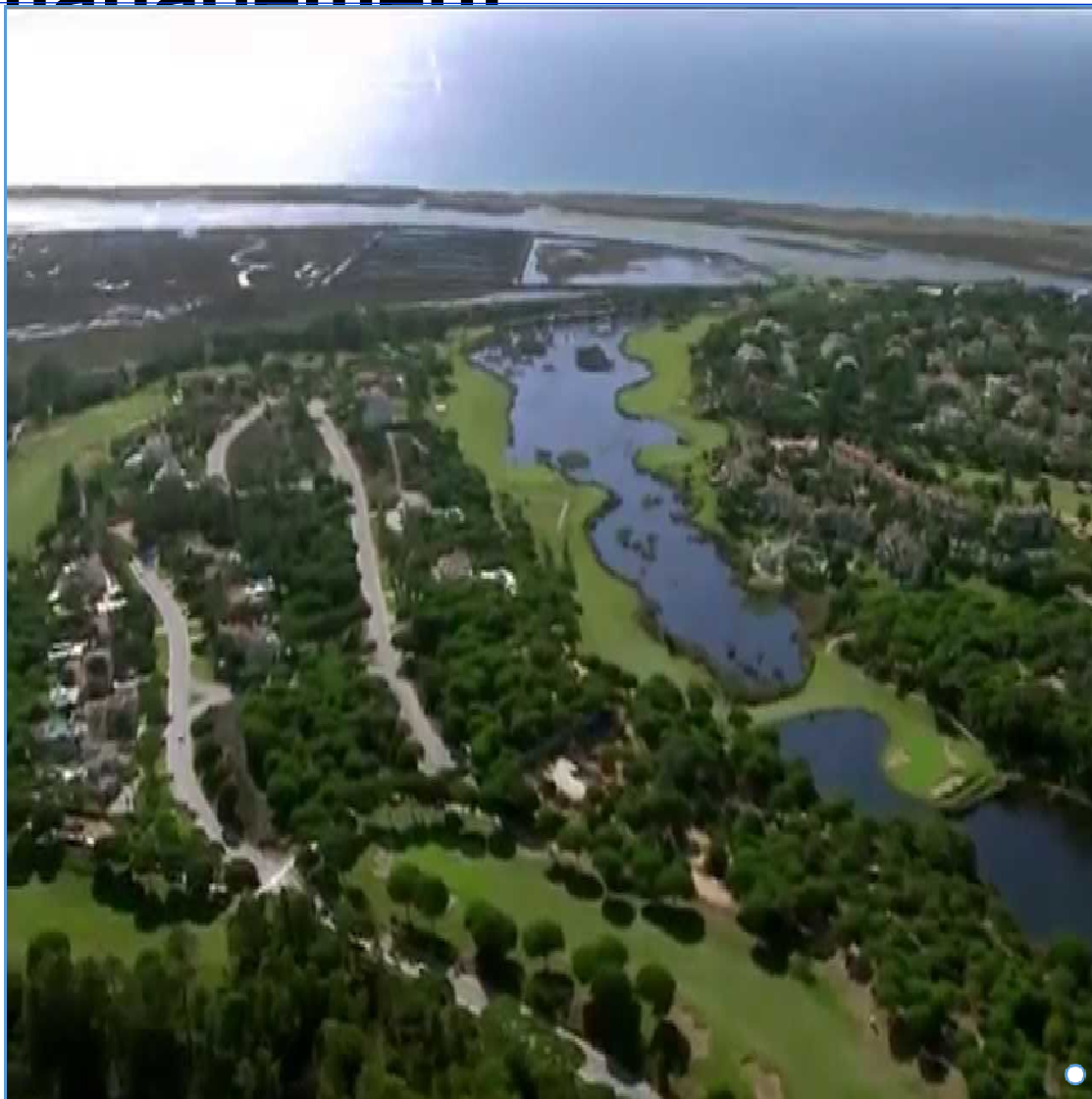


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Quinta do Lago – Wastewater management

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○ Luxury Resorts

○○ Ria Formosa Lagoon



○ Golf courses



○ Clam production



○ Saline intrusion

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Discharge

Agglomeration: 27000 e.p.
Sensitive area (clams
production): Microbiological
removal

Eutrophication risk (inside
mixing zone and in neap
tides): Nutrients (N, P)
removal

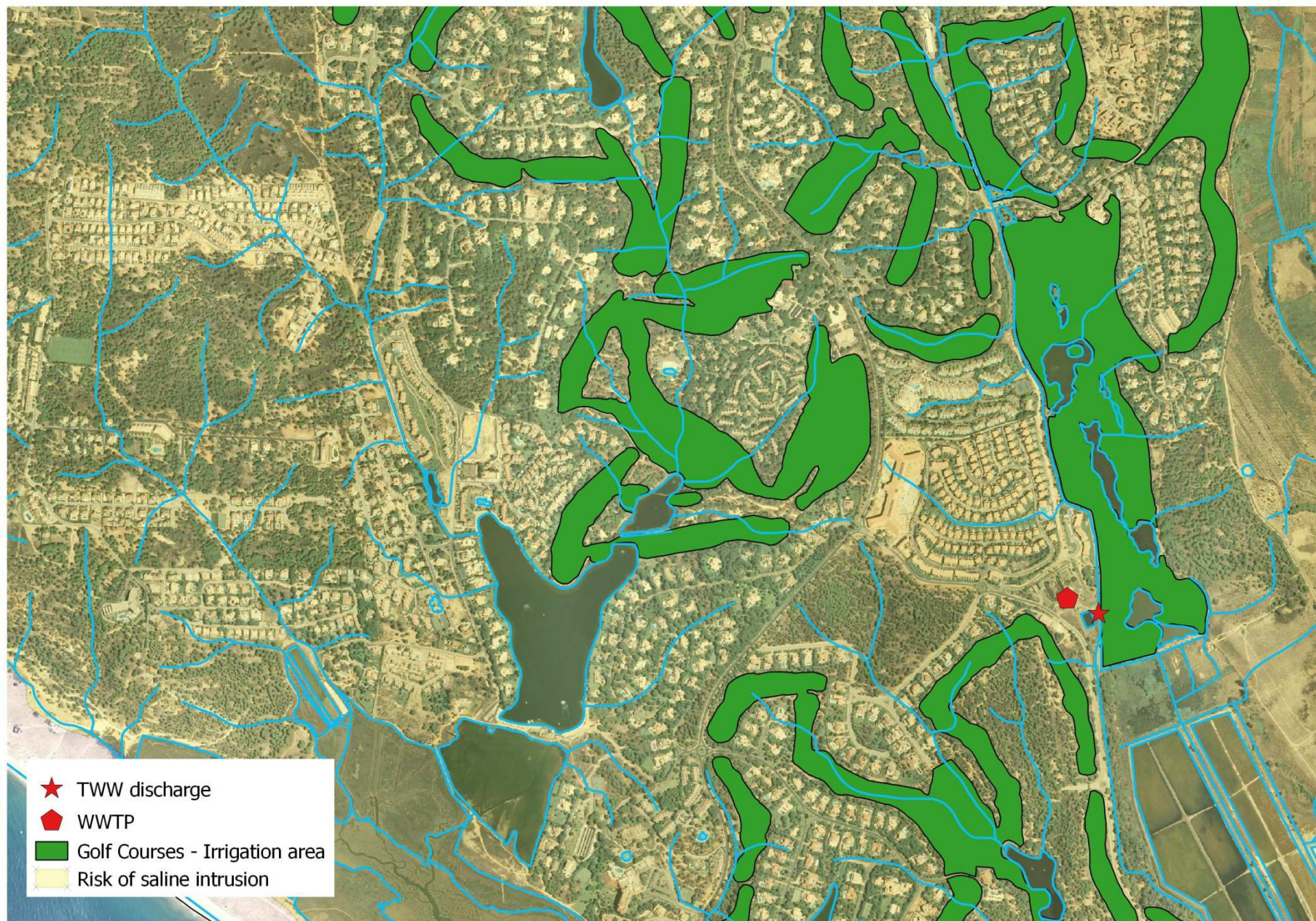
Reuse

Quantitative approach: To
reduce freshwater
consumption, namely
groundwater

Qualitative approach: To
reduce direct discharge loads
over surface water and to
protect groundwater against
saline intrusion

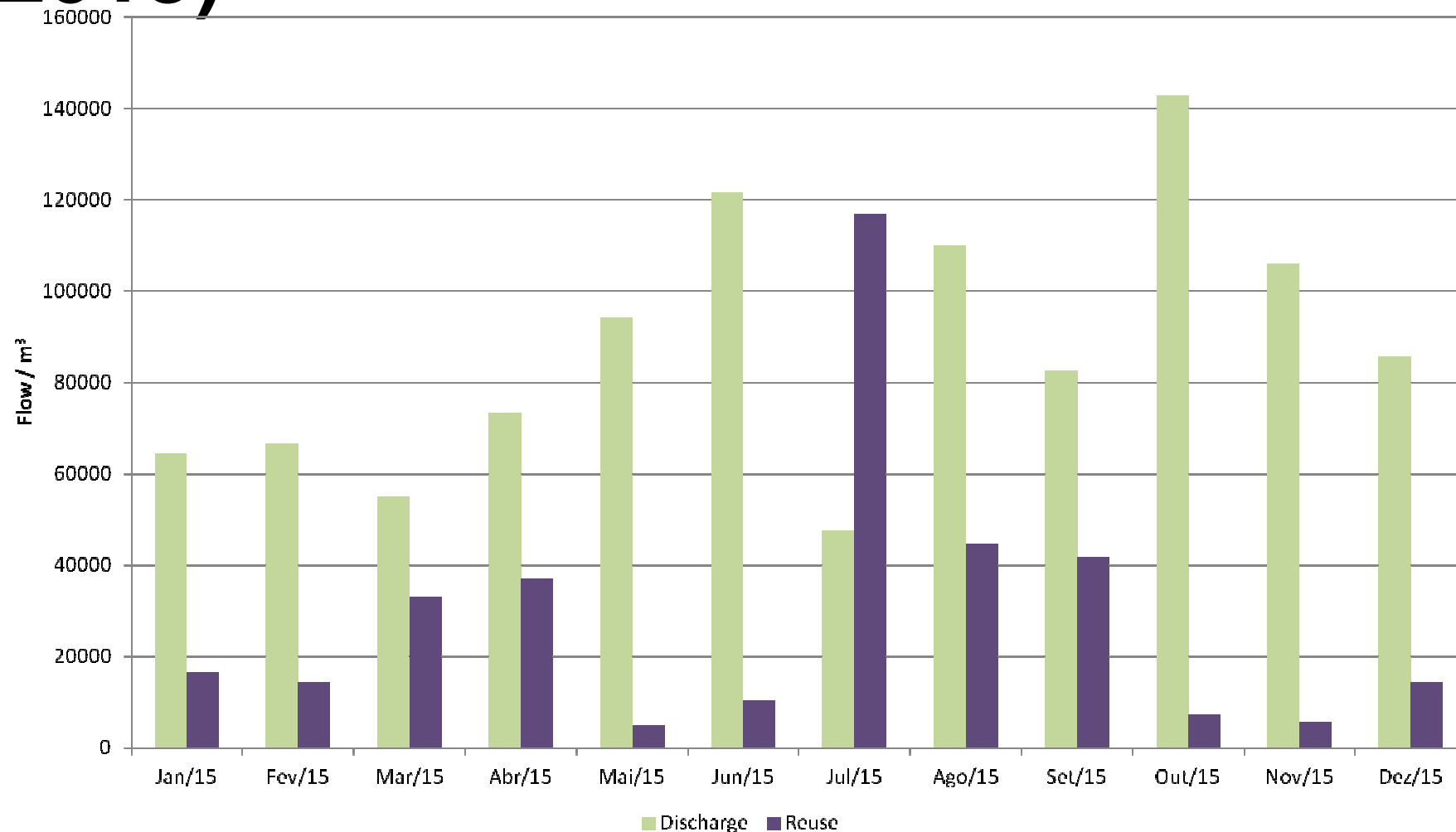


Quinta do Lago



- ★ TWW discharge
- ⬠ WWTP
- Golf Courses - Irrigation area
- Risk of saline intrusion

Discharge and reuse flows (2015)



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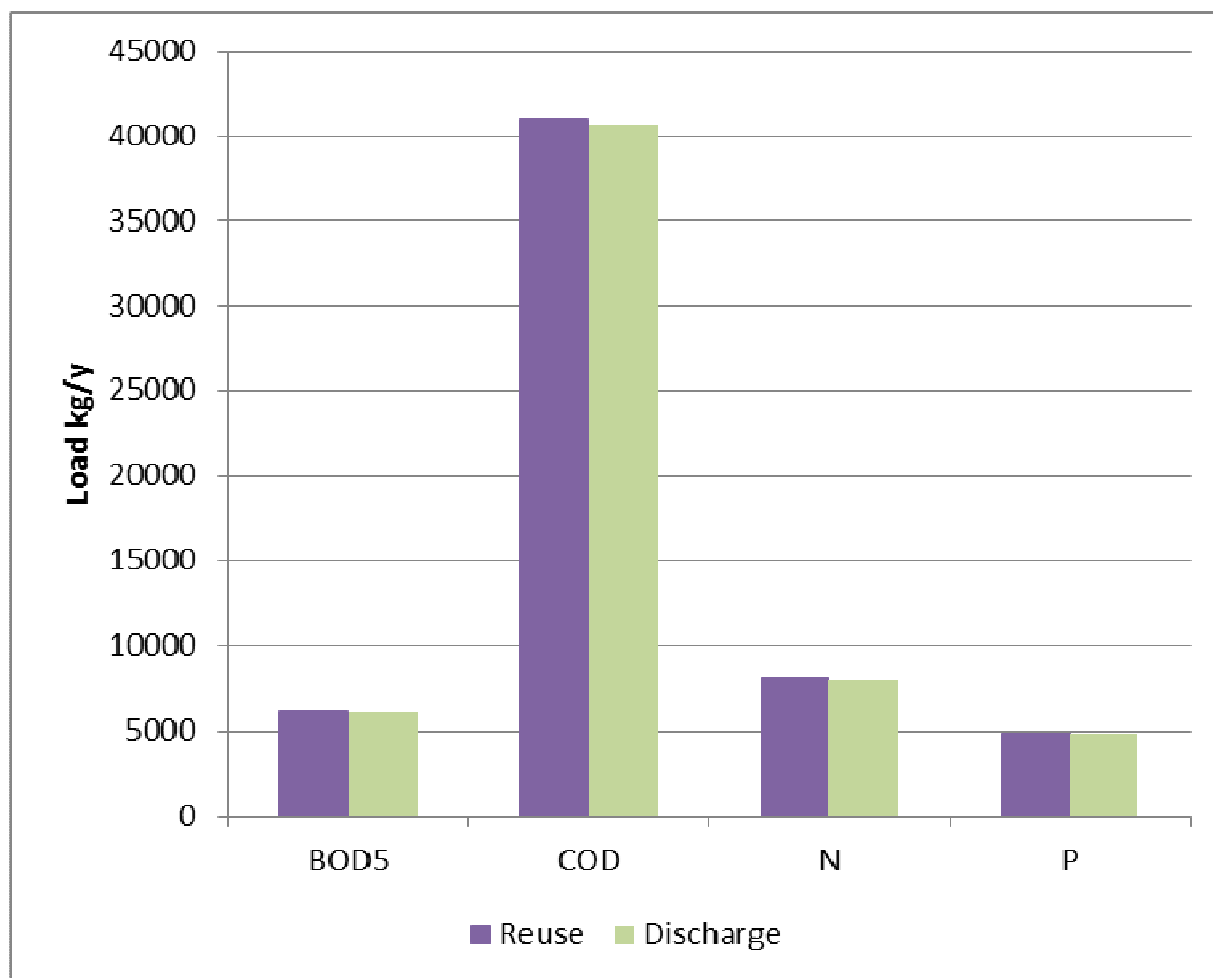


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Discharge and reuse loads (2015)

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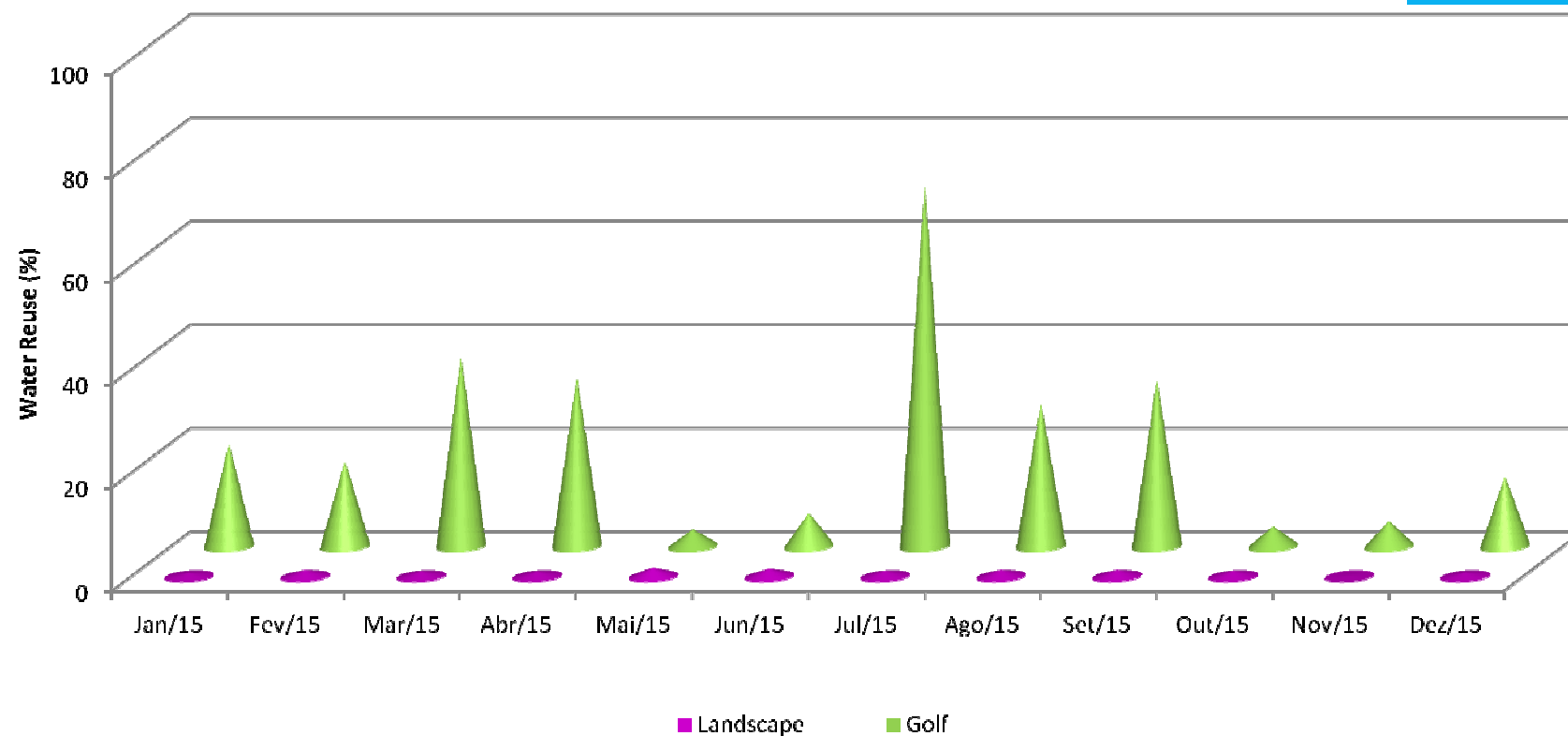
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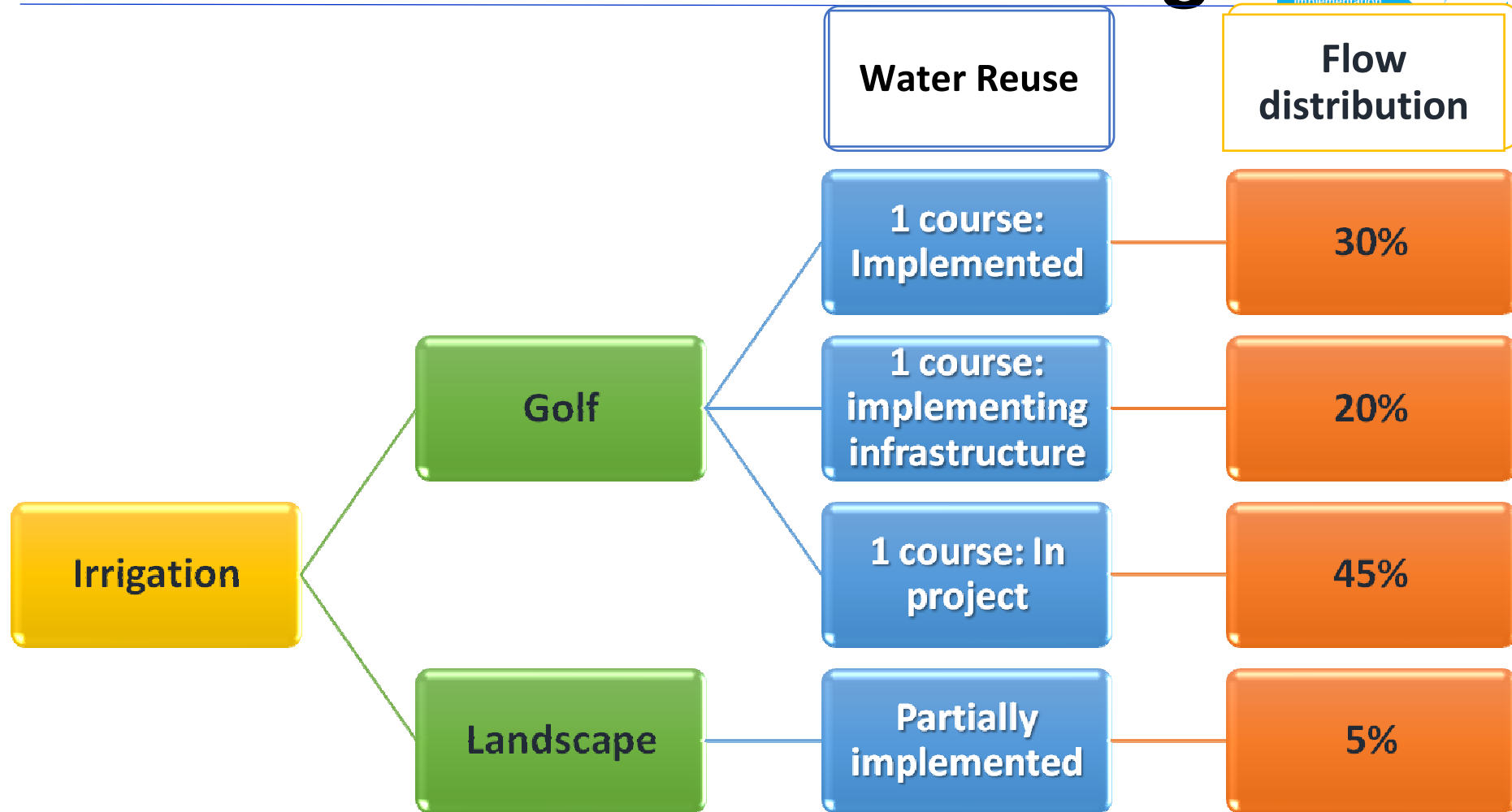


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Water reuse



Water reuse in Quinta do Lago



Risk assessment (human health protection)

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Qualitative assessment to reduce contact risk to an acceptable level

Surrogate parameters and respective thresholds (E coli / Helminth eggs)

Multi barrier approach (treatment levels and conditions for irrigation: type, climacteric adverse conditions, distance to houses, appropriate schedules, vector control, ...)

Surveillance monitoring (irrigation water)



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Risk assessment (environmental protection)

- Quality standards (chemical + microbiological parameters)
 - Self Monitoring
 - Compliance validation
 - Water bodies protection (e.g., disinfection by-products)
- Receiving water self monitoring
 - Surface and groundwater: Flow + Parameters (Reuse permit)
 - Groundwater: Quantitative parameters (Groundwater abstraction permit)

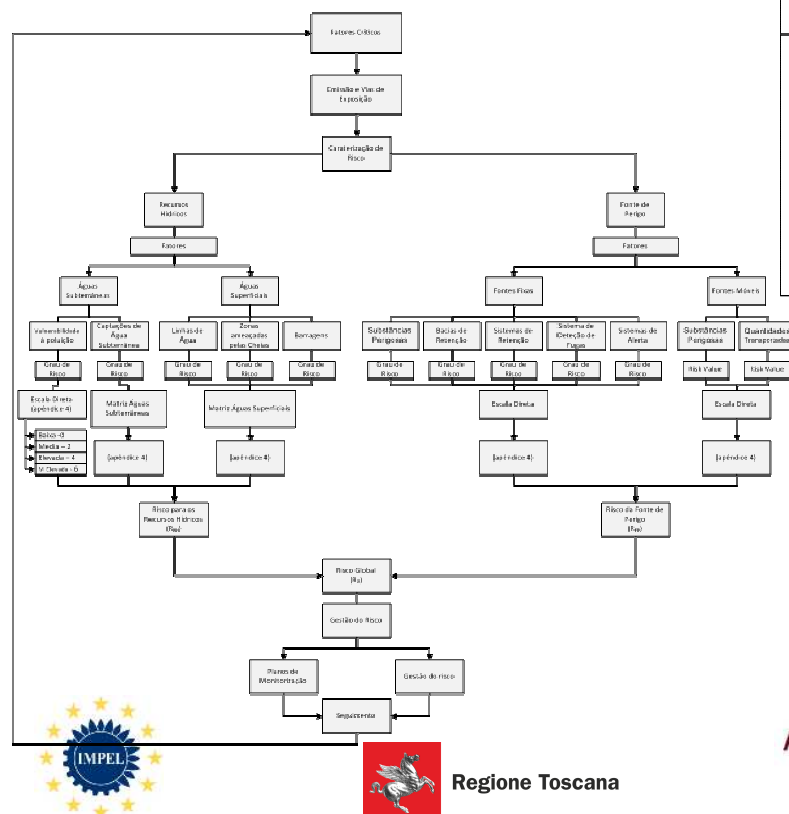


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Examples of methodologies

ISO 16075-1-3:2015: Guidelines for Treated Wastewater Use for Irrigation

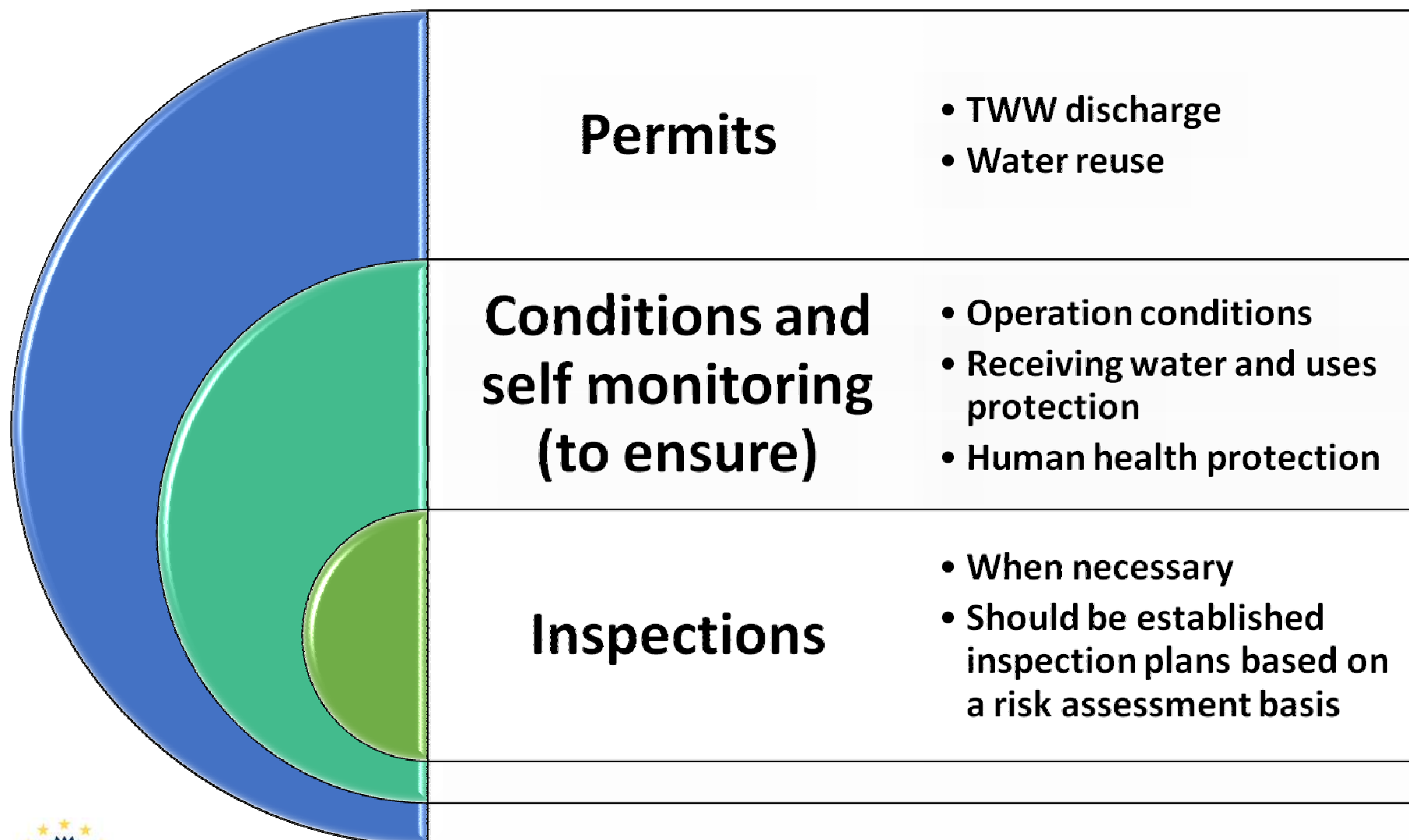


Infiltration rate			No infiltration to groundwater	Low infiltration to groundwater	Medium infiltration to groundwater	High infiltration to groundwater
			I	II	III	IV
Sensitivity to Groundwater	Shallow aquifer or no clay protection	I	1	2	3	3
	Deep aquifer with clay protection	II	1	2	2	3
	Deep aquifer with significant clay protection	III	1	1	2	2
	No aquifer with hydrological continuity to the area	IV	1	1	2	2
Sensitivity to Surface Water			3	3	2	1
			IV	III	II	I
			High surface runoff	Medium Surface runoff	Low surface runoff	No surface runoff
			Surface runoff			

Model Risk Assessment for Water Resources (A. Rebelo, I. Ferra, I. Gonçalves, A. M. Marques – A risk assessment model for water resources: Releases of dangerous and hazardous substances. Journal of Environmental Management. Vol. 140 (2014), p. 51-59)

Chloroform formation model (A. Rebelo, I. Ferra, A. Marques, M. M. Silva – Wastewater reuse: modeling chloroform formation. Environmental Science and Pollution Research:1-7 (2016) doi:10.1007/s11356-016-7749-z)

Final remarks





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THANK YOU!

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