

Annex 2.1.1.3 Reference Screening Questionnaire completes by MS

Responses from:

AT, Be-W, CZ, EE, ES, DE, DK, FR, IE, IT, LT, LU, PL, SE, UK

**Important: MS may provide either a general remark for reference sites or site by site information.**

Possible answers 0-6	
0	Missing info
1	Criterion not used; please specify reason in comment
2	Criterion used, Measured
3	Criterion used, Estimated
4	Criterion used, Field inspection
5	Criterion used, Expert judgement
6	Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	AT Answer	Comment on how the screening was done
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys	3, 4, 5	General remark to all criteria: for most of the sites a combination of the possible answers 2 – 5 was used, measurements or estimations were always combined with field inspections and expert judgement (exclusion of sites)
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	3, 4, 5	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	0	not used, ref sites available
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » ; the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp	3, 4, 5	
In the first stage, biological elements are not considered as selection criteria.	3, 4, 5	
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	3, 4, 5	
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.	3, 4, 5	
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	3, 4, 5	
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	3, 4, 5	
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	3, 4, 5	
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.	3, 4, 5	
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1- 3), &gt; 5 km for medium-size r. (stream order 4 – 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>	3, 4, 5	
For each pressure criteria, two thresholds are defined :		
a « reference » threshold, below which a site is considered as « probably reference » ;		
a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.		
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».	3, 4, 5	

REFCOND-Guidance "Suggested template"	AT Answer	Comment on how the screening was done
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.	3, 4, 5	
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as represented.		
<i>Artificial land use: the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)</i>		
<i>Intensive agriculture: the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex.</i>		
<i>Low intensity agricultural areas: the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas.</i>		
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies – codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>		
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.	3, 4, 5	
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values.	3, 4, 5	
No or very local discharges with only very minor ecological effects.	3, 4, 5	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc.)	3, 4, 5	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :	2	
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	2	
"Rejection" threshold : 0.8 % of artificial area in the catchment.	2	
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.	2, 3, 4, 5	
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.	3, 4, 5	
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	(2, 3, 4, 5)	not relevant
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	2	Quality class plus corresponding chemical values are used as exclusion criteria (sites exceeding a certain threshold of saprobic index are rejected)
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practice.	3, 4, 5	
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	3, 4, 5	data on pollutants not available for all sites, but information on pressures was used

REFCOND-Guidance "Suggested template"	AT Answer	Comment on how the screening was done
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	3, 4, 5	data on pollutants not available for all sites, but information on pressures was used
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification).	3, 4, 5	data on pollutants not available for all sites, but information on pressures was used
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)	3, 4, 5	
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.	3, 4, 5	data on pollutants not available for all sites, but information on pressures was used
No known discharge of specific non-synthetic pollutants upstream in the river.	3, 4, 5	
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	3, 4, 5	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	1	not relevant
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	3, 4, 5	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must	2,3,4,5	
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> ).		
Intensive agriculture : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c	2,4,5	
1) there is no significant risk of soil erosion	2,4,5	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. ( <i>See Riparian vegetation criteria line 98</i> )	2,4,5	
Between 20%and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	2,4,5	
<b>See separate table for chemical reference values.</b>		
Cattle breeding: only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.	2,4,5	
Vineyards, orchards : < 1% of the catchment area, and not situated in the riparian zone.	2,4,5	
Irrigated fields ≤ 10%	2,4,5	not relevant
<b>Forestry</b> : < 30% tree plantations (coniferous, Eucalyptus..).	1	not considered
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>	2,4,5	

REFCOND-Guidance "Suggested template"	AT Answer	Comment on how the screening was done
Acidification : no sign of acidification due to coniferous plantation (on siliceous bedrock).	2,4,5	
pH > 6. If pH < 6 , it is necessary to determine if the site is naturally acid.	2,4,5	not relevant
Eutrophication : no sign of plant proliferation (macrophytes, algae).	2,3,4,5	
Eutrophication : if possible validate with chemical values	2,3,4,5	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.	3,4,5	
<b>Suggestion for GIG</b>		
<i>definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 – 5) and 100 m for larger rivers (order ≥ 6)</i>	3,4,5	
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	3,4,5	
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	3,4,5	
Artificial areas : < 10% of the reach.	3,4,5	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. ( <i>land use definition see lines 26-29</i> ).	3,4,5	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	3,4,5	
The lateral connectivity between river and riparian corridor is maintained along the site.	3,4,5	
No direct impact of cattle trampling.	1	not relevant
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified.	2,3,4,5, 6	additional criteria: hydromorphological classifications class I and I-II (used as exclusion criteria
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	2,3,4,5	
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future.	2,3,4,5	
<b>At the basin scale:</b>		

REFCOND-Guidance "Suggested template"	AT Answer	Comment on how the screening was done
Sediment transport: No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	3,4,5	
<i>Migration barriers for fish reference sites: this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes</i>		
<i>Suggestion for fish reference conditions:</i>		
<i>"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state – for example, fish should have access to spawning grounds (which may be in</i>	3,4,5	
<i>If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type – specific list of fish species.</i>	3,4,5	
1) at the reach scale / if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference	2,3,4,5	
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials.	2,3,4,5	
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained).	2,3,4,5	
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	2,3,4,5	
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	3,4,5	
Connection to groundwater: Total lateral and vertical connection to groundwater.	3,4,5	
Substrate conditions: Correspond to related typology	3,4,5	
River profile and variation in width and depth: Correspond to related typology	2,3,4,5	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	2,3,4,5	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	2,3,4,5	
2) at the site scale:		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	2,3,4,5	
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	2,3,4,5	
Only very small artificial constructions with very minor local effects can be accepted.	2,3,4,5	
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.	2,3,4,5	

REFCOND-Guidance "Suggested template"	AT Answer	Comment on how the screening was done
<b>Suggestion for GIG</b>		
<i>At the basin scale:</i>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	2,3,4,5	
<i>At the reach scale:</i>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	2,3,4,5	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	2,3,4,5	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.	3,4,5	
<b>Suggestion for GIG</b>		
<i>At the basin scale:</i>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration (< to + or – 20% modification of th	2,3,4,5	
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	2,3,4,5	
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	2,3,4,5	
<i>At the reach scale</i>		
No by-passed section with residual flow (legal minimum discharge)	2,3,4,5	
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	2,3,4,5	
Absence of flow regulation (dam) on the reach itself.	2,3,4,5	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.	3,4,5	
No impairment by invasive plant or animal species.	3,4,5	
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific communities.</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	3,4,5	
<b>Fisheries and aquaculture</b>		

REFCOND-Guidance "Suggested template"	AT Answer	Comment on how the screening was done
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.	3,4,5	
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.	3,4,5	
No impact from fish farming.	3,4,5	
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	3,4,5	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line 184)	3,4,5	
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	3,4,5	
No or very limited direct pollution by aquaculture plants.	3,4,5	
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.	3,4,5	
<b>Suggestion for GIG</b>		
No biomanipulation.	3,4,5	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)	3,4,5	
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	3,4,5	

**Important: MS may provide either a general remark for reference sites or site by site information.**

Possible answers 0-6			
0	missing info		
1	Criterion not used; please specify reason in comment		
2	Criterion used, Measured		
3	Criterion used, Estimated		
4	Criterion used, Field inspection		
5	Criterion used, Expert judgement		
6	Alternative criterion used, please specify in comment		

REFCOND-Guidance "Suggested template"	Belgium-Wallonia	Comment on how the screening was done
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	Agree	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	Agree	used for hydromorphological references (and fishes communities)
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » ; the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « <b>Insignificant imp</b>	Agree	

REFCOND-Guidance "Suggested template"	Belgium-Wallonia	Comment on how the screening was done
In the first stage, biological elements are not considered as selection criteria.	OK	
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	5	
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.	OK	
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	OK	
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	Agree	
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	Agree	
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.	OK	
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1- 3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>	OK	
For each pressure criteria, two thresholds are defined :		
a « reference » threshold, below which a site is considered as « probably reference » ;	2	
a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.	2 and 5	
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».	2 and 5	Some "possible" sites are considered as reference sites if they have only some parameters between the reference and the rejection threshold. Expert judgement has been used for this selection.
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.	2	
It is proposed to <b>use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area</b> . However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin	Agree	Corinne Land Cover Categories used in the modelling software "PEGASE"
<i>Artificial land use : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc. )</i>	2	CLC Class 1 (in PEGASE)
<i>Intensive agriculture : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex</i>	2	CLC classes corresponding to cultural areas (including fodder crop cultures and orchards) (in PEGASE)
<i>Low intensity agricultural areas : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>	6	CLC classes corresponding to meadows and pastures (in PEGASE)
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>	2	CLC classes corresponding to natural areas. Distinction occurs between "forests" and "other open lands"(in PEGASE)
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.	Agree	
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values	2	
No or very local discharges with only very minor ecological effects.	2	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	2	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :		
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)		Criterion difficult to apply in Wallonia due to the high population's density. Criterion available for only 7 water bodies in the RC3 rivers. Validation has been done by physico-chemical parameters (when available) and expert judgement.
	2 and 6	

REFCOND-Guidance "Suggested template"	Belgium-Wallonia	Comment on how the screening was done
"Rejection" threshold : 0.8 % of artificial area in the catchment.	6	Same coment as above
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.	Agree	
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.	Agree	
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	Agree	
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	1	
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best pract)	Agree	
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	3 and 5	Missing information for some sites
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	3 and 5	Missing information for some sites
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	3 and 5	
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)	Agree	
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.	3	Missing information for some sites
No known discharge of specific non-synthetic pollutants upstream in the river.	Agree	
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	Agree	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	5	
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	3 and 5	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.	Agree	
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. <b>In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must</b>	Agree	
The land use upstream of the reference site must comply with the following criteria. <i>(land use definition see lines 26-29)</i>		
Intensive agriculture : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c	Agree	intensive agricultural areas usually below 15 % of the catchment area for the RC3.
1) there is no significant risk of soil erosion	5	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. <i>(See Riparian vegetation criteria line 98)</i>	Agree	
Between 20%and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	Agree	
<b>See separate table for chemical reference values.</b>		
Cattle breeding: only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.	6	Data about outdoor cattle breeding are not available. Reference threshold = < 1,2

REFCOND-Guidance "Suggested template"	Belgium-Wallonia	Comment on how the screening was done
Vineyards, orchards : < 1% of the catchment area, and not situated in the riparian zone.	3	Not appropriate for RC3
Irrigated fields ≤ 10%	1	Not appropriatein Wallonia
Forestry : < 30% tree plantations (coniferous, Eucalyptus..).	6	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>	6	Data not available for coniferous forests. Field inspection and expert judgement used. Validation by pH of the streams.
Acidification : no sign of acidification due to coniferous plantation (on siliceous bedrock).	Agree	
pH > 6. If pH < 6 , it is necessary to determine if the site is naturally acid.	Agree	
Eutrophication : no sign of plant proliferation (macrophytes, algae).	Agree	
Eutrophication : if possible validate with chemical values	Agree	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.	Agree	
<b>Suggestion for GIG</b>		
<i>definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)</i>	6	Criterion difficult to apply in Wallonia. Reference threshold : natural riparian corridor < 6 meters for small streams, 12 meters for medium size and large rivers. Criterion estimated from aerial photographs and expert judgement.
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	6	same comment as above
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	6	same comment as above
Artificial areas : < 10% of the reach.	Agree	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. <i>(land use definition see lines 26-29)</i> .	6	same comment as above
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	6	same comment as above
The lateral connectivity between river and riparian corridor is maintained along the site.	5 and 6	same comment as above
No direct impact of cattle trampling.	2 and 5	
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified	Agree	An adaptation of the "Qualphy" method has been used in Wallonia. All the requested criteria have been used and measured by this mean.
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	Agree	same comment as above
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future .	Agree	same comment as above
<b>At the basin scale:</b>		
Sediment transport : No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	3 and 5	
<b>Migraton barriers for fish reference sites : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</b>	2	An adaptation of the "Qualphy" method has been used in Wallonia. All the requested criteria have been used and measured by this mean.

REFCOND-Guidance "Suggested template"	Belgium-Wallonia	Comment on how the screening was done
<i>Suggestion for fish reference conditions :</i>		
<i>"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in</i>		same comment as above
<i>If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.</i>		same comment as above
<i>1) at the reach scale ( if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):</i>		mapping of morphological alterations used
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference	Agree	
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	Agree	
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...)	Agree	
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	Agree	
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	5	
Connection to groundwater: Total lateral and vertical connection to groundwater.	5	
Substrate conditions: Correspond to related typology	Agree	
River profile and variation in width and depth: Correspond to related typology	Agree	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	2	using walloon "Qualphy" method
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	2	using walloon "Qualphy" method
<i>2) at the site scale :</i>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	Agree	
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	Agree	
Only very small artificial constructions with very minor local effects can be accepted	Agree	
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.	Agree	
<b>Suggestion for GIG</b>		
<i>At the basin scale:</i>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	2	
<i>At the reach scale:</i>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	2	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	Agree	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.	2	
<b>Suggestion for GIG</b>		
<i>At the basin scale:</i>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) ; e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th.	2	
The total storage capacity of the reservoirs in the catchment is < 5% of	2	

REFCOND-Guidance "Suggested template"	Belgium-Wallonia	Comment on how the screening was done
the mean annual discharge at the site.		
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	2	
<i>At the reach scale</i>		
No by-passed section with residual flow (legal minimum discharge)	2	
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	2	
Absence of flow regulation (dam) on the reach itself.	2	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.	2	
No impairment by invasive plant or animal species.	Agree	
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	2	
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.	Agree	
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.	Agree	
No impact from fish farming.	Agree	
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	Agree	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained ( <i>for alien species, see line 184</i> )	Agree	
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	Agree	
No or very limited direct pollution by aquaculture plants.	Agree	
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.	Agree	
<b>Suggestion for GIG</b>		
No biomanipulation.	Agree	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)	Agree	
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	Agree	

Important: MS may provide either a general remark for reference sites or site by site information.

Possible answers 0-6		
0	missing info	
1	No (i.e. not a relevant criterion for the type)	
2	Yes, Measured	
3	Yes, Estimated	
4	Yes, Field inspection	
5	Yes, Expert judgement	

REFCOND-Guidance "Suggested template"	Czech Republic	Comment
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	agree	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	not used	
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » : the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp	agree	
In the first stage, biological elements are not considered as selection criteria.	ok	
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	ok	
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.		
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	ok	
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	ok	
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	ok	
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the catchment of the site, the reach scale (i.e. the water body), and the reference site itself.	ok	
Proposed minimum length for the river reaches are: > 1 km for small rivers (stream order 1-3), > 5 km for medium-size r. (stream order 4-5), > 10 km for large rivers (stream order > 6).		
For each pressure criteria, two thresholds are defined :	ok	
a « reference » threshold, below which a site is considered as « probably reference » ;		
a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated		
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».	ok	
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.		
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin	ok	CLC was used
<i>Artificial land use</i> : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)		
<i>Intensive agriculture</i> : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex		
<i>Low intensity agricultural areas</i> : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas		
<i>Semi-natural areas</i> : Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.		
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.		

REFCOND-Guidance "Suggested template"	Czech Republic	Comment
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values		
No or very local discharges with only very minor ecological effects.	4.5	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	2	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :	ok	
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	2	
"Rejection" threshold : 0.8 % of artificial area in the catchment.	2	
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.	2	
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.	5	
For larger streams and rivers : very low point source discharge level, if point sources are present, a validation with chemical parameters is necessary. <i>See separate table for chemical reference values.</i>	1	not relevant, CR does not intercalibrate larger streams
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	1	not used
<b>Specific synthetic pollutants</b>	0.1	only restricted data on specific pollutant concentrations available
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practi		
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	0.1	
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	0.1	
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	0.1	
<b>Spec. non-synthetic pollutants</b>	0.1	only restricted data on specific pollutant concentrations available
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values-- if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.	0.1	no data
No known discharge of specific non-synthetic pollutants upstream in the river.	0.1	no data
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	4.5	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	1	not relevant, CR does not intercalibrate larger streams
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	4.5	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must		



REFCOND-Guidance "Suggested template"	Czech Republic	Comment
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> )		
Intensive agriculture : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c		
1) there is no significant risk of soil erosion	2	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and/or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. (See <i>Riparian vegetation criteria</i> line 98)		
Between 20% and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	1	all ref. sites had intensive agriculture below 20%
<b>See separate table for chemical reference values.</b>		
Cattle breeding: only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.	1	not checked
Vineyards, orchards : < 1% of the catchment area, and not situated in the riparian zone.	2	
Irrigated fields ≤ 10%	0	
Forestry : < 30% tree plantations (coniferous, Eucalyptus...).	1	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>		
Acidification : no sign of acidification due to coniferous plantation (on siliceous bedrock).		
pH > 6. If pH < 6, it is necessary to determine if the site is naturally acid.	4.2	
Eutrophication : no sign of plant proliferation (macrophytes, algae).	4	
Eutrophication : if possible validate with chemical values	0	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.		
<b>Suggestion for GiG</b>		
definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)		
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	1	no ref. sites had intensive agriculture above 20%
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	4	
Artificial areas : < 10% of the reach.	0.4	the criterion was taken into account when searching for potential ref. sites but was not measured - percentage unknown
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. ( <i>land use definition see lines 26-29</i> ).	0	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	4	
The lateral connectivity between river and riparian corridor is maintained along the site.	4	
No direct impact of cattle trampling.		
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified.		
<b>Suggestion for GiG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	4	
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future .	4	
<b>At the basin scale:</b>		
Sediment transport :No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	3.4	

REFCOND-Guidance "Suggested template"	Czech Republic	Comment
<i>Migration barriers for fish reference sites : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</i>		
<b>Suggestion for fish reference conditions :</b>		
"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in		
If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.		
<b>1) at the reach scale (if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):</b>		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total different.	0.4	the criterion was taken into account when searching for potential ref. sites but was not measured - percentage unknown
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	0.4	the criterion was taken into account when searching for potential ref. sites but was not measured - percentage unknown
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).	0.4	the criterion was taken into account when searching for potential ref. sites but was not measured - percentage unknown
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.		
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).		
Connection to groundwater: Total lateral and vertical connection to groundwater.	4.5	
Substrate conditions: Correspond to related typology	4.5	
River profile and variation in width and depth: Correspond to related typology	4.5	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	4	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	4	
<b>2) at the site scale :</b>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	4	
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	4	
Only very small artificial constructions with very minor local effects can be accepted		
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		
<b>Suggestion for GiG</b>		
<b>At the basin scale:</b>		
No dams or water storage significantly altering the low flow regime: low flow alteration < 20% of the monthly minimum flow.	3.4	no dams at small streams, larger streams not intercalibrated
<b>At the reach scale:</b>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements	3.4	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	0.4	the criterion was taken into account when searching for potential ref. sites but was not measured - percentage unknown
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.		
<b>Suggestion for GiG</b>		
<b>At the basin scale:</b>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th.	4	
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	1	no reservoirs at small streams, larger streams not intercalibrated
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	3.4	
<b>At the reach scale</b>		
No by-passed section with residual flow (legal minimum discharge)	0	



REFCOND-Guidance "Suggested template"	Czech Republic	Comment
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	3.4	
Absence of flow regulation (dam) on the reach itself.	3.4	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustaceans, mussels or any other kind of plants and animals.		
No impairment by invasive plant or animal species.		
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	4.5	
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.		
No impact from fish farming.		
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	5.	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line 194)	0	
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	0	
No or very limited direct pollution by aquaculture plants.	5	
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.		
<b>Suggestion for GIG</b>		
No biomanipulation.	5.	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)		
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	4.5	

**Important: MS may provide either a general remark for reference sites or site by site information.**

Possible answers 0-6

0	Missing info
1	Criterion not used; please specify reason in comment
2	Criterion used, Measured
3	Criterion used, Estimated
4	Criterion used, Field inspection
5	Criterion used, Expert judgement
6	Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	Germany	comments
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	agreed	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.		
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » : the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp	agreed	
In the first stage, biological elements are not considered as selection criteria.	agreed	
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	agreed	
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.	agreed	
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	agreed	
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	agreed	
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.		
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.		
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1- 3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>		
For each pressure criteria, two thresholds are defined : a « reference » threshold, below which a site is considered as « probably reference » ; a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.		
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».		
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.		
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin		
<i>Artificial land use : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)</i>		
<i>Intensive agriculture : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves complex</i>		
<i>Low intensity agricultural areas : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>		
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>		
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values		

REFCOND-Guidance "Suggested template"	Germany	comments
No or very local discharges with only very minor ecological effects.	yes	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	yes	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :		
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)		
"Rejection" threshold : 0.8 % of artificial area in the catchment.		
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.		
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.		
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>		
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	yes	Only sites showing high saprobiological quality according to type-specific Saprobic Index have been selected.
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practice)		
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	yes	
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.		
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	yes	validated via acidification index
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values-- if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.		
No known discharge of specific non-synthetic pollutants upstream in the river.		
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	yes	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.		
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	yes	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must	yes	
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> )		

REFCOND-Guidance "Suggested template"	Germany	comments
<b>Intensive agriculture</b> : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c		
1) there is no significant risk of soil erosion	yes	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. ( <i>See Riparian vegetation criteria line 98</i> )	yes	
Between 20% and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.		
<b>See separate table for chemical reference values.</b>	okay	some R-C1 sites show naturally low dis. oxyg. levels due to groundwater influence
<b>Cattle breeding</b> : only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.		
<b>Vineyards, orchards</b> : < 1% of the catchment area, and not situated in the riparian zone.	yes	
<b>Irrigated fields</b> ≤ 10%		
<b>Forestry</b> : < 30% tree plantations (coniferous, Eucalyptus...).	yes	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>		
<b>Acidification</b> : no sign of acidification due to coniferous plantation (on siliceous bedrock).		
pH > 6. If pH < 6 , it is necessary to determine if the site is naturally acid.	yes	validated via acidification index
<b>Eutrophication</b> : no sign of plant proliferation (macrophytes, algae).	yes	
<b>Eutrophication</b> : if possible validate with chemical values		
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.		
<b>Suggestion for GIG</b>		
<i>definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)</i>		
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	yes	
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	yes	
Artificial areas : < 10% of the reach.	yes	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. ( <i>land use definition see lines 26-29</i> ).	yes	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	yes	
The lateral connectivity between river and riparian corridor is maintained along the site.	yes	
No direct impact of cattle trampling.		
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified		
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	yes	

REFCOND-Guidance "Suggested template"	Germany	comments
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future .	yes	
At the basin scale:		
Sediment transport.: No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	yes	
<i>Migration barriers for fish reference sites : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</i>		
<i>Suggestion for fish reference conditions :</i>		
<i>"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in</i>		
<i>If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.</i>		
1) at the reach scale ( if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total differenc	yes	
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	yes	
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...)	yes	
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	yes	
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	yes	
Connection to groundwater: Total lateral and vertical connection to groundwater.	yes	
Substrate conditions: Correspond to related typology	yes	
River profile and variation in width and depth: Correspond to related typology	yes	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	yes	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	yes	
2) at the site scale :		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	yes	
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	yes	
Only very small artificial constructions with very minor local effects can be accepted	yes	
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		
<b>Suggestion for GIG</b>		
At the basin scale:		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	yes	
At the reach scale:		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	yes	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	yes	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		
Flow regulation that has the potential to recover to natural flow in near future.		

REFCOND-Guidance "Suggested template"	Germany	comments
<b>Suggestion for GIG</b>		
At the basin scale:		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th	yes	
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	yes	
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	yes	
At the reach scale		
No by-passed section with residual flow (legal minimum discharge)	yes	
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	yes	
Absence of flow regulation (dam) on the reach itself.	yes	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.		
No impairment by invasive plant or animal species.		
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	yes	
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.		
No impact from fish farming.		
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	yes	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line 184)	yes	
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	yes	
No or very limited direct pollution by aquaculture plants.	yes	
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.		
<b>Suggestion for GIG</b>		
No biomanipulation.	yes	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)		
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	yes	

Important: MS may provide either a general remark for reference sites or site by site information.	
Possible answers 0-6	
0	missing info
1	Criterion not used; please specify reason in comment
2	Criterion used, Measured
3	Criterion used, Estimated
4	Criterion used, Field inspection
5	Criterion used, Expert judgement
6	Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	MS ESTONIA Answer	Comment on how the screening was done
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	OK	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	1	no reliable data
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » ; the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp	OK	
In the first stage, biological elements are not considered as selection criteria.	5	
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	4	
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.	4	
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	5	
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	4	
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	5	
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.	5	
Proposed minimum length for the river reaches are : > 1 km for small rivers (stream order 1- 3), > 5 km for medium-size r. (stream order 4 - 5), > 10 km for large rivers (stream order > 6).	OK	
For each pressure criteria, two thresholds are defined :	5	
a « reference » threshold, below which a site is considered as « probably reference » ;	5	
a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.	5	
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».	5	
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.	5	
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin	OK	
<i>Artificial land use : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)</i>	OK	
<i>Intensive agriculture : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex</i>	OK	
<i>Low intensity agricultural areas : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>	OK	
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>	OK	
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		

REFCOND-Guidance "Suggested template"	MS ESTONIA Answer	Comment on how the screening was done
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values	5	
No or very local discharges with only very minor ecological effects.	5	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	2	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :	OK	
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	OK	
"Rejection" threshold : 0.8 % of artificial area in the catchment.	OK	
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.	OK	
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.	OK	
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	2	
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	1	
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practi		
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	2	
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	2	
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	2	
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be can be estimated; if not, the limit of detection (quantitative) can be used tentatively.	3	
No known discharge of specific non-synthetic pollutants upstream in the river.	3	
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.		
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.		
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.		
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must	2	
The land use upstream of the reference site must comply with the following criteria (land use definition see lines 26-29)	2	

REFCOND-Guidance "Suggested template"	MS ESTONIA Answer	Comment on how the screening was done
Intensive agriculture : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c		
1) there is no significant risk of soil erosion	2	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. (See <i>Riparian vegetation criteria line 98</i> )	3	
Between 20%and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	2	
3		
<b>See separate table for chemical reference values.</b>		
Cattle breeding: only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.	3	
Vineyards, orchards : < 1% of the catchment area, and not situated in the riparian zone.	1	no problem for Estonia
Irrigated fields ≤ 10%	1	no problem for Estonia
Forestry : < 30% tree plantations (coniferous, Eucalyptus...).	3	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>	3	
Acidification : no sign of acidification due to coniferous plantation (on siliceous bedrock).	2	
pH > 6. If pH < 6 , it is necessary to determine if the site is naturally acid.	1	no problem for Estonia
Eutrophication : no sign of plant proliferation (macrophytes, algae).	4	
Eutrophication : if possible validate with chemical values	2	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.		
<b>Suggestion for GIG</b>		
definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)	OK	
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	OK	
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	OK	
Artificial areas : < 10% of the reach.	OK	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. (and use definition see lines 26-29)	OK	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	OK	
The lateral connectivity between river and riparian corridor is maintained along the site.	OK	
No direct impact of cattle trampling.	OK	
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodifi		
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	5	
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future .	5	
<b>At the basin scale:</b>		
Sediment transport _No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	5	

REFCOND-Guidance "Suggested template"	MS ESTONIA Answer	Comment on how the screening was done
<i>Migration barriers for fish reference sites: this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</i>	4	
<b>Suggestion for fish reference conditions :</b>		
"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in	4	
If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.	4	
1) at the reach scale. (if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total differenc		
3		
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	3	
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).	3	
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	3	
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	3	
Connection to groundwater: Total lateral and vertical connection to groundwater.	3	
Substrate conditions: Correspond to related typology	5	
River profile and variation in width and depth: Correspond to related typology	5	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	3	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	3	
<b>2) at the site scale :</b>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	3	
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	3	
Only very small artificial constructions with very minor local effects can be accepted	3	
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	3	
<b>At the reach scale:</b>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	3	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	3	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.		
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration (< to + or - 20% modification of th	3	
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	3	
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	3	
<b>At the reach scale</b>		
No by-passed section with residual flow (legal minimum discharge)	3	

REFCOND-Guidance "Suggested template"	MS ESTONIA Answer	Comment on how the screening was done
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2) Absence of flow regulation (dam) on the reach itself.	3	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, molluscs or any other kind of plants and animals.		
No impairment by invasive plant or animal species.		
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
	OK	
<i>Proposed definition of alien species: non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>	OK	
<i>Proposed definition of invasive species: alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
	OK	
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	4	
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.		
No impact from fish farming.		
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	5	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i.e. the type specific fish population is maintained (for alien species, see line 184)	5	
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	5	
No or very limited direct pollution by aquaculture plants.	3	
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.		
<b>Suggestion for GIG</b>		
No biomanipulation.	OK	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)		
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	3	

**Important: MS may provide either a general remark for reference sites or site by site information.**

Possible answers 0-6

0	missing info
1	No (i.e. not a relevant criterion for the type)
2	Yes, Measured
3	Yes, Estimated
4	Yes, Field inspection
5	Yes, Expert judgement

REFCOND-Guidance "Suggested template"	Spain Comment	
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	Agree	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	not used	
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » : the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp	Agree	
In the first stage, biological elements are not considered as selection criteria.	OK	
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	OK	
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.	OK	
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	OK	
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	OK	
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	OK	
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.	OK	
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1-3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>		
For each pressure criteria, two thresholds are defined :	OK	
a « reference » threshold, below which a site is considered as « probably reference » ;	OK	
a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.	OK	
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».	OK	
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.	OK	
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin	OK	
<i>Artificial land use : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)</i>	OK	
<i>Intensive agriculture : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex</i>	OK	
<i>Low intensity agricultural areas : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>	OK	
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>	OK	
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values		
No or very local discharges with only very minor ecological effects.	OK	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	OK	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		

REFCOND-Guidance "Suggested template"	Spain Comment	
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 28 ). The following thresholds can be used :	OK	
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	2	
"Rejection" threshold : 0.8 % of artificial area in the catchment.	2	
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary	2	
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.	2	
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	2	
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	1	
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practice.		
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use		
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	0	not applicable-NOT PRESENT IN THE CATCHMENT
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	2	not applicable-NOT PRESENT IN THE CATCHMENT
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)	OK	
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.	2	
No known discharge of specific non-synthetic pollutants upstream in the river.	OK	
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	OK	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	0	no information
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	0	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must		
The land use upstream of the reference site must comply with the following criteria (land use definition see lines 26-29)		
Intensive agriculture : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c		Threshold for agriculture (intensive + non intensive) in small catchments is <25%. For median and big rivers the GIG CB thresholds are meet.
1) there is no significant risk of soil erosion	2	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. (See Riparian vegetation criteria line 98)	3	
Between 20%and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	3	
	2	
<b>See separate table for chemical reference values.</b>		

REFCOND-Guidance "Suggested template"	Spain Comment	
<b>Cattle breeding</b> : only non-intensive (outdoor) cattle breeding, < 1.25 animal (cattle) units per ha of the catchment area.	3	
<b>Vineyards, orchards</b> : < 1% of the catchment area, and not situated in the riparian zone.	2	
<b>Irrigated fields</b> ≤ 10%	2	
<b>Forestry</b> : < 30% tree plantations (coniferous, Eucalyptus...).	2	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>		
<b>Acidification</b> : no sign of acidification due to coniferous plantation (on siliceous bedrock).	4	
pH > 6. If pH < 6 , it is necessary to determine if the site is naturally acid.	5	
	2	some sites naturally acidic (granitic)
<b>Eutrophication</b> : no sign of plant proliferation (macrophytes, algae).	2	
<b>Eutrophication</b> : if possible validate with chemical values	2	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.	OK	
<b>Suggestion for GIG</b>		
<i>definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)</i>		
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	4	
In non agricultural landscape (intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	4	
Artificial areas : < 10% of the reach.	4	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. (land use definition see lines 26-29).	4	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	4	
The lateral connectivity between river and riparian corridor is maintained along the site.	4	
No direct impact of cattle trampling.	4	
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodifi		
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.		
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future .		
<b>At the basin scale:</b>		
<b>Sediment transport</b> :No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	5	
<b>Migration barriers for fish reference sites</b> : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.		
<b>Suggestion for fish reference conditions :</b>		
"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in	0	
<i>If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type-specific list of fish species.</i>	0	
<b>1) at the reach scale (if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):</b>		



REFCOND-Guidance "Suggested template"	Spain Comment	
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... <i>The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference.</i>	5	
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	5	
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).	5	
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	5	
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	5	
Connection to groundwater: Total lateral and vertical connection to groundwater.	5	
Substrate conditions: Correspond to related typology	5	
River profile and variation in width and depth: Correspond to related typology	5	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	5	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	5	
<b>2) at the site scale:</b>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	4	
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	4	
Only very small artificial constructions with very minor local effects can be accepted	4	
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.	5	
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	5	
<b>At the reach scale:</b>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	5	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	5	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.	OK	
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th	2	No dams. Only weirs
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	5	
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	5	
<b>At the reach scale</b>		
No by-passed section with residual flow (legal minimum discharge)	4	
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	4	
Absence of flow regulation (dam) on the reach itself.	4	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.	5	
No impairment by invasive plant or animal species.	5	

REFCOND-Guidance "Suggested template"	Spain Comment	
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	5	
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.	OK	
No impact from fish farming.	OK	
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	3	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line 184)	5	
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	5	
No or very limited direct pollution by aquaculture plants.	5	
<b>Biomaniipulation</b>		
<b>REFCOND-Guidance</b>		
No biomaniipulation.	0	
<b>Suggestion for GIG</b>		
No biomaniipulation.	0	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)	5	
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	5	

**Important: MS may provide either a general remark for reference sites or site by site information.**

Possible answers 0-6

0	Missing info
1	Criterion not used; please specify reason in comment
2	Criterion used, Measured
3	Criterion used, Estimated
4	Criterion used, Field inspection
5	Criterion used, Expert judgement
6	Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	France	France comments
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in		
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	Agree	Agree
	1	not used

REFCOND-Guidance "Suggested template"	France	France comments
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » ; the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp	Agree	Agree
In the first stage, biological elements are not considered as selection criteria.	OK	OK
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures. a	OK	OK
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.	OK	OK
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	OK	OK
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	OK	OK
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	OK	OK
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the catchment of the site, the reach scale (i.e. the water body), and the reference site itself.	OK	OK
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1- 3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>		
For each pressure criteria, two thresholds are defined :	OK	OK
a « reference » threshold, below which a site is considered as « probably reference » ;	OK	OK
a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.	OK	OK
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».	OK	OK
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.	OK	OK
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin	OK	OK
<i>Artificial land use : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)</i>	OK	OK
<i>Intensive agriculture : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex</i>	OK	OK
<i>Low intensity agricultural areas : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>	OK	OK
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>	OK	OK
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values	5	
No or very local discharges with only very minor ecological effects.	5	OK
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	5	OK
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :	2	OK
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	2	OK
"Rejection" threshold : 0.8 % of artificial area in the catchment.	2	OK
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.	2	OK
<b>See separate table for chemical reference values.</b>		

REFCOND-Guidance "Suggested template"	France	France comments
For small streams : no known point source discharge, or very localised impact with self purification.	5	OK
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	2	OK
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	1	not used
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best pract)		
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	0	data available for only 25% of the sites
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	0	data available for only 25% of the sites
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	5	OK
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.	0	data available for only 25% of the sites
No known discharge of specific non-synthetic pollutants upstream in the river.	3	OK
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	5	OK
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	0	no data available
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	5	OK
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must		
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> )		
<i>Intensive agriculture</i> : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c	2	OK
1) there is no significant risk of soil erosion	2	OK
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. ( <i>See Riparian vegetation criteria line 98</i> )	2	OK
Between 20%and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	2	OK
<b>See separate table for chemical reference values.</b>		
<b>Cattle breeding:</b> only non-intensive (outdoor) cattle breeding: < 1.25 animal (cattle) units per ha of the catchment area.	2	OK
<b>Vineyards, orchards</b> : < 1% of the catchment area, and not situated in the riparian zone.	2	OK
<b>Irrigated fields</b> ≤ 10%	1	not considered
<b>Forestry</b> : < 30% tree plantations (coniferous, Eucalyptus..).	1	not considered

REFCOND-Guidance "Suggested template"	France	France comments
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>	1	
Acidification : no sign of acidification due to coniferous plantation (on siliceous bedrock).	5	OK
pH > 6. If pH < 6, it is necessary to determine if the site is naturally acid.	5	OK
Eutrophication : no sign of plant proliferation (macrophytes, algae).	5	OK
Eutrophication : if possible validate with chemical values	2	OK
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.		
<b>Suggestion for GIG</b>		
<i>definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)</i>		
<u>At the reach scale:</u>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	2	OK
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	2	OK
Artificial areas : < 10% of the reach.	2	OK
<u>At the site scale :</u>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. <i>(land use definition see lines 26-29)</i>	3	OK
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	3	OK
The lateral connectivity between river and riparian corridor is maintained along the site.	3	OK
No direct impact of cattle trampling.	1	not considered
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified		
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	3	OK
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future.	3	OK
<u>At the basin scale:</u>		
Sediment transport : No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	5	expert evaluation
<i>Migration barriers for fish reference sites : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</i>		
<i>Suggestion for fish reference conditions :</i>		
<i>"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in</i>		
<i>If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.</i>		
<u>1) at the reach scale ( if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):</u>		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference	3	OK

REFCOND-Guidance "Suggested template"	France	France comments
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	3	OK
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).	3	OK
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	3	OK
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	5	OK
Connection to groundwater: Total lateral and vertical connection to groundwater.	0	
Substrate conditions: Correspond to related typology	1	not considered
River profile and variation in width and depth: Correspond to related typology	1	not considered
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	1	not considered for invertebrates
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	5	OK
<u>2) at the site scale :</u>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	4	OK
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	4	
Only very small artificial constructions with very minor local effects can be accepted	4	OK
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		
<b>Suggestion for GIG</b>		
<u>At the basin scale:</u>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	3	OK
<u>At the reach scale:</u>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	3	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	3	OK
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.		
<b>Suggestion for GIG</b>		
<u>At the basin scale:</u>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th	3	OK
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	5	
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	3	OK
<u>At the reach scale</u>		
No by-passed section with residual flow (legal minimum discharge)	4	OK
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	3	OK
Absence of flow regulation (dam) on the reach itself.	4	OK
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	France	France comments
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.		
No impairment by invasive plant or animal species.		
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	5	OK
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.		
No impact from fish farming.		
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	3	OK
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line 164)	3	OK
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	3	
No or very limited direct pollution by aquaculture plants.	3	OK
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.		
<b>Suggestion for GIG</b>		
No biomanipulation.	5	OK
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)		
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	4	OK

<b>Important: MS may provide either a general remark for reference sites or site by site information.</b>	
Possible answers 0-6	
0	missing info
1	Criterion not used; please specify reason in comment
2	Criterion used, Measured
3	Criterion used, Estimated
4	Criterion used, Field inspection
5	Criterion used, Expert judgement
6	Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	IRELAND	
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in		
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.		
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » ; the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp		
In the first stage, biological elements are not considered as selection criteria.		
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a		
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.		
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.		
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.		
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.		
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.		
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1- 3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>		
For each pressure criteria, two thresholds are defined :		
a « reference » threshold, below which a site is considered as « probably reference » ;		
a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.		
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».		
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.		
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin		
<i>Artificial land use : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)</i>		
<i>Intensive agriculture : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex</i>		
<i>Low intensity agricultural areas : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>		
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>		
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.	4	
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-	4	

REFCOND-Guidance "Suggested template"	IRELAND	
natural background values		
No or very local discharges with only very minor ecological effects.	2	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	4	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :		
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	1	CLC1 - <0.01% of catchment
"Rejection" threshold : 0.8 % of artificial area in the catchment.		
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.		
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.	4,5	
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	4	
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	2	Only highest quality rating (Q5) accepted as reference state
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practice)	5	
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	0	Data not available for all reference sites
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	0	Data not available for all reference sites
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	2	
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.		
No known discharge of specific non-synthetic pollutants upstream in the river.		
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	4	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	4	
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	4	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must	4	
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> )		

REFCOND-Guidance "Suggested template"	IRELAND	
<b>Intensive agriculture</b> : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be considered.	3	CLC21, CLC23, CLC24
1) there is no significant risk of soil erosion	1	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. ( <i>See Riparian vegetation criteria line 98</i> )	3	
Between 20%and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	3	
<b>See separate table for chemical reference values.</b>		
<b>Cattle breeding</b> : only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.	3	
<b>Vineyards, orchards</b> : < 1% of the catchment area, and not situated in the riparian zone.	1	Not applicable
<b>Irrigated fields</b> ≤ 10%	1	Not applicable
<b>Forestry</b> : < 30% tree plantations (coniferous, Eucalyptus...).	3	CLC31 used
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>		
<b>Acidification</b> : no sign of acidification due to coniferous plantation (on siliceous bedrock).	2	
pH > 6. If pH < 6 , it is necessary to determine if the site is naturally acid.	2	
<b>Eutrophication</b> : no sign of plant proliferation (macrophytes, algae).	2	
<b>Eutrophication</b> : if possible validate with chemical values		
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.	4	Having adjacent natural vegetation appropriate to the type and geographical location of the river
<b>Suggestion for GIG</b>		
<i>definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)</i>		
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	3	
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	3	
Artificial areas : < 10% of the reach.	3	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. ( <i>land use definition see lines 26-29</i> ).	4,5	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	4,5	
The lateral connectivity between river and riparian corridor is maintained along the site.	4,5	
No direct impact of cattle trampling.	4,5	
	4,5	
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified conditions.		
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	3,4,5	

REFCOND-Guidance "Suggested template"	IRELAND	
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future .	3,4,5	
<b>At the basin scale:</b>		
Sediment transport.: No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	4,5	
<i>Migration barriers for fish reference sites : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</i>		
<i>Suggestion for fish reference conditions :</i>		
<i>"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in</i>		
<i>If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.</i>		
<b>1) at the reach scale / if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):</b>		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc.... <i>The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total differenc</i>		5
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials		5
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).		5
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.		
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).		4
Connection to groundwater: Total lateral and vertical connection to groundwater.	4,5	
Substrate conditions: Correspond to related typology	4,5	
River profile and variation in width and depth: Correspond to related typology	4,5	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	4,5	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	4,5	
<b>2) at the site scale :</b>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.		4
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).		4
Only very small artificial constructions with very minor local effects can be accepted		4
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.	3,4	
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	3,4	
<b>At the reach scale:</b>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	3,4	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	3,4	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	IRELAND	
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.		
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th		5
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.		5
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)		5
<b>At the reach scale</b>		
No by-passed section with residual flow (legal minimum discharge)		4
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)		4
Absence of flow regulation (dam) on the reach itself.		4
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.		
No impairment by invasive plant or animal species.		
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	5	No impairment by invasive plant or animal species
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.		
No impact from fish farming.		
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.		2
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i.e. the type specific fish population is maintained (for alien species, see line 184)		5
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.		5
No or very limited direct pollution by aquaculture plants.		2
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.		
<b>Suggestion for GIG</b>		
No biomanipulation.	2	No biomanipulation nor lime addition
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	IRELAND	
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)	4	
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	4	

#### R-C1 Italy

Important: MS may provide either a general remark for reference sites or site by site information.

- 0 missing info
- 1 Criterion not used; please specify reason in comment
- 2 Criterion used, Measured
- 3 Criterion used, Estimated
- 4 Criterion used, Field inspection
- 5 Criterion used, Expert judgement
- 6 Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	R-C1 Italy	comments
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys	agree	
<b>Suggestion for GIG</b>	agree	
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	agree	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.		hystoric data not used
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » ; the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp		
In the first stage, biological elements are not considered as selection criteria.	agree	
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	agree	
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.	agree	
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	2	
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	2	
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	2	According to WFD System A
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.	2	These rivers are lowland spring fed rivers. Catchment measures were estimated, because in this river type it is difficult to define a catchment. Usually half the distance between two adjacent rivers is considered as the catchment limit. Other two scales

REFCOND-Guidance "Suggested template"	R-C1 Italy	comments
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1- 3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>	6	reach scale between 500 and 1000m
For each pressure criteria, two thresholds are defined : a « reference » threshold, below which a site is considered as « probably reference » ; a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.		
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».		
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.	5	
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin	6	In this river type due to the difficulty in defining the catchment CORINE was not used. Field inspections were carried out applying the River Habitat Survey method and Index of Fluvial Functioning. In particular, the Index of Fluvial Functioning allows in
<i>Artificial land use : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc..)</i>		
<i>Intensive agriculture : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex</i>		
<i>Low intensity agricultural areas : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>		
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>		
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values	2	% O2, NH4, NO3, always below GIG thresholds. PO4 often exceeding, mainly due to infiltration from groundwater. Average values used.
No or very local discharges with only very minor ecological effects.		
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	4	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :		
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	3	Estimated from IFF, according to which a near natural landscape is present
"Rejection" threshold : 0.8 % of artificial area in the catchment.		
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.		



REFCOND-Guidance "Suggested template"	R-C1 Italy	comments
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.		
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	4	
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.		
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practice)		
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use		
	3	some occasional measures only
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.		
	5	
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)		No effects of atmospheric deposition loads expected on invertebrate communities
	5	
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.		% O2, NH4, NO3, always below GIG thresholds. PO4 always exceeding, mainly due to infiltration from groundwater. Trace metals occasionally measured
	2	
No known discharge of specific non-synthetic pollutants upstream in the river.		
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	5	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.		
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	5	pesticide measured occasionally.
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must		In this river type due to the difficulty in defining the catchment CORINE was not used. Field inspections were carried out applying the River Habitat Survey method and Index of Fluvial Functioning.
	4	

REFCOND-Guidance "Suggested template"	R-C1 Italy	comments
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> )		
Intensive agriculture : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c	4	derived from RHS and IFF application
1) there is no significant risk of soil erosion	5	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and/or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. ( <i>See Riparian vegetation criteria line 98</i> )		derived from RHS and IFF application
4		
Between 20%and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.		
<b>See separate table for chemical reference values.</b>		
Cattle breeding: only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.	4	
Vineyards, orchards. : < 1% of the catchment area, and not situated in the riparian zone.	4	derived from RHS and IFF application
Irrigated fields ≤ 10%	4	derived from RHS and IFF application
Forestry : < 30% tree plantations (coniferous, Eucalyptus..).	2	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>		
Acidification : no sign of acidification due to coniferous plantation (on siliceous bedrock).	1	no coniferous plantation in the area
pH > 6. If pH < 6 , it is necessary to determine if the site is naturally acid.	2	
Eutrophication : no sign of plant proliferation (macrophytes, algae).	2	
Eutrophication : if possible validate with chemical values	2	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.	4	derived from RHS, IFF application and field inspection
<b>Suggestion for GIG</b>		
definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)		derived from RHS and IFF application. Riparian vegetation in one site < 30m, but average stream width: ca 3m for that site.
	4	
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.		derived from RHS and IFF application. In one site on one bank agriculture is more than 10%. But riparian vegetation is anyway present
	4	
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.		
Artificial areas : < 10% of the reach.		derived from RHS and IFF application. When these data are not available field inspection were carried out
	2	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. ( <i>land use definition see lines 26-29</i> ).	3	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	3	

REFCOND-Guidance "Suggested template"	R-C1 Italy	comments
The lateral connectivity between river and riparian corridor is maintained along the site.	3	
No direct impact of cattle trampling.		
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified	2	Derived from RHS data or estimated from IFF data, jointly with field survey
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	2	Derived from RHS data or estimated from IFF data, jointly with field survey
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future.	2	Derived from RHS data or estimated from IFF data, jointly with field survey
<b>At the basin scale:</b>		
Sediment transport: No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	4	
<i>Migration barriers for fish reference sites: this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</i>	0	
<i>Suggestion for fish reference conditions:</i>		
<i>"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in</i>	0	
<i>If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.</i>	0	
<b>1) at the reach scale / if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):</b>		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... <i>The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference</i>	4	Usually derived from field inspections. Where RHS data are available measured.
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	4	Usually derived from field inspections. Where RHS data are available measured.
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).	4	Usually derived from field inspections. Where RHS data are available measured.
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.		
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	4	Usually derived from field inspections. Where RHS data are available measured.
Connection to groundwater: Total lateral and vertical connection to groundwater.	4	Usually derived from field inspections. Where RHS data are available measured.
Substrate conditions: Correspond to related typology	4	Usually derived from field inspections. Where RHS data are available measured.
River profile and variation in width and depth: Correspond to related typology	4	Usually derived from field inspections. Where RHS data are available measured.

REFCOND-Guidance "Suggested template"	R-C1 Italy	comments
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	4	Usually derived from field inspections. Where RHS data are available measured.
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	4	Usually derived from field inspections. Where RHS data are available measured.
<b>2) at the site scale:</b>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	4	Usually derived from field inspections. Where RHS data are available measured.
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	4	Usually derived from field inspections. Where RHS data are available measured.
Only very small artificial constructions with very minor local effects can be accepted	4	Usually derived from field inspections. Where RHS data are available measured.
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		water abstraction for irrigation, with no significant alterations in flow level. Only one site affected
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	2	
<b>At the reach scale:</b>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	4	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	4	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.	2	Sometimes estimated
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th	2	
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	2	
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	3	
<b>At the reach scale</b>		
No by-passed section with residual flow (legal minimum discharge)	4	Sometimes measured
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	2	
Absence of flow regulation (dam) on the reach itself.	2	Sometimes estimated
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	R-C1 Italy	comments
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.	5	when measured very low abundances in one site of exotic fish species
No impairment by invasive plant or animal species.		
<b>Suggestion for GiG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.		
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.		
No impact from fish farming.		
<b>Suggestion for GiG</b>		
No intensive (commercial) fishery.	5	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line 184)	5	
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	5	
No or very limited direct pollution by aquaculture plants.	5	
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.	5	
<b>Suggestion for GiG</b>		
No biomanipulation.	5	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)	4	
<b>Suggestion for GiG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	4	

<b>Important: MS may provide either a general remark for reference sites or site by site information.</b>	
Possible answers 0-6	
0	
1	Criterion not used; please specify reason in comment

2	Criterion used, Measured
3	Criterion used, Estimated
4	Criterion used, Field inspection
5	Criterion used, Expert judgement
6	Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	LT Answer	Comment on how the screening was done
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GiG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	OK	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	not used	
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » : the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp	OK	
In the first stage, biological elements are not considered as selection criteria.	OK	Partially considered (1st it was looked at pressure criteria, but afterwards additional reference sites with high biological quality indices were chosen for testing)
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	OK	
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.	OK	
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	OK	
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	OK	
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	OK	
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the catchment of the site, the reach scale (i.e. the water body), and the reference site itself.	OK	
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1- 3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>		
For each pressure criteria, two thresholds are defined :		
a « reference » threshold, below which a site is considered as « probably reference » ;	OK	
a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.	OK	
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».	OK	but not exact numbers specified here were applied
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.	OK	
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin	OK	
<i>Artificial land use : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)</i>	OK	
<i>Intensive agriculture : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex</i>	OK	
<i>Low intensity agricultural areas : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>	OK	

REFCOND-Guidance "Suggested template"	LT Answer	Comment on how the screening was done
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>	OK	
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values	OK	
No or very local discharges with only very minor ecological effects.	OK	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	OK	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :	OK	
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	not used (these particular values showed here)	
"Rejection" threshold : 0.8 % of artificial area in the catchment.	not used	
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.	not used	
<b>See separate table for chemical reference values.</b>	5	
For small streams : no known point source discharge, or very localised impact with self purification.	OK	
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>		
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	OK	
	not used	
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practice)		
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	Checked where data is available	
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	Checked where data is available	
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	not considered	
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.	Checked where data is available	
No known discharge of specific non-synthetic pollutants upstream in the river.	OK	
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	OK	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	OK	
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	OK	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	LT Answer	Comment on how the screening was done
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must	OK	
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> )		
Intensive agriculture : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c		<40 % of farmland (both intensive and extensive) criteria was used
1) there is no significant risk of soil erosion	OK	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and/or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. ( <i>See Riparian vegetation criteria line 98</i> )		
Between 20% and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	not considered	
	OK	
<b>See separate table for chemical reference values.</b>	5	
Cattle breeding: only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.	not considered	
Vineyards, orchards : < 1% of the catchment area, and not situated in the riparian zone.	not considered	
Irrigated fields ≤ 10%	not considered	
Forestry : < 30% tree plantations (coniferous, Eucalyptus...).	not considered	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>	not considered	
Acidification : no sign of acidification due to coniferous plantation (on siliceous bedrock).	OK	
pH > 6. If pH < 6, it is necessary to determine if the site is naturally acid.	OK	
Eutrophication : no sign of plant proliferation (macrophytes, algae).	not considered (no data, only existing knowledge on eutrophication in particular place was used)	
Eutrophication : if possible validate with chemical values	OK	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.		
<b>Suggestion for GIG</b>		
<i>definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)</i>		
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	The mere presence of riparian forest was considered satisfactory	
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	The mere presence of riparian forest was considered satisfactory	
Artificial areas : < 10% of the reach.	The mere presence of riparian forest was considered satisfactory	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. ( <i>land use definition see lines 26-29</i> ).	The mere presence of riparian forest was considered satisfactory	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	The mere presence of riparian forest	

REFCOND-Guidance "Suggested template"	LT Answer	Comment on how the screening was done
The lateral connectivity between river and riparian corridor is maintained along the site.	was considered satisfactory	
No direct impact of cattle trampling.	The mere presence of riparian forest was considered satisfactory	
	not considered (no information)	
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified		
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	OK	
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future.	OK	
<b>At the basin scale:</b>		
Sediment transport : No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	OK	
<i>Migration barriers for fish reference sites : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</i>		
<i>Suggestion for fish reference conditions :</i>		
<i>"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in</i>		
<i>If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.</i>		
<i>1) at the reach scale ( if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):</i>		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... <i>The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference</i>	OK	
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	OK	(not necessarily 10 % exactly)
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).	not considered	
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	not considered	
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	not considered, but it is believed there are no such problems	
Connection to groundwater: Total lateral and vertical connection to groundwater.	not considered	
Substrate conditions: Correspond to related typology	not considered	
River profile and variation in width and depth: Correspond to related typology	not considered	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	OK	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	OK	
<b>2) at the site scale :</b>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	OK	
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	OK	
Only very small artificial constructions with very minor local effects can be accepted	OK	
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	LT Answer	Comment on how the screening was done
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	not considered	
<b>At the reach scale:</b>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	not considered	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	not considered	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.		
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th	OK	
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	not considered	
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	not considered	
<b>At the reach scale</b>		
No by-passed section with residual flow (legal minimum discharge)	OK	
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	OK	
Absence of flow regulation (dam) on the reach itself.	OK	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.		
No impairment by invasive plant or animal species.		
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	not considered	
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.		
No impact from fish farming.		
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	OK	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line	OK	

REFCOND-Guidance "Suggested template"	LT Answer	Comment on how the screening was done
184)		
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	OK	
No or very limited direct pollution by aquaculture plants.	OK	
<b>Bio-manipulation</b>		
<b>REFCOND-Guidance</b>		
No bio-manipulation.		
<b>Suggestion for GIG</b>		
No bio-manipulation.	OK	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)		
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	not considered	

<b>Important: MS may provide either a general remark for reference sites or site by site information.</b>		
Possible answers 0-6		
0	missing info	
1	Criterion not used; please specify reason in comment	
2	Criterion used, Measured	
3	Criterion used, Estimated	
4	Criterion used, Field inspection	
5	Criterion used, Expert judgement	
6	Alternative criterion used, please specify in comment	

REFCOND-Guidance "Suggested template"	LU	Comment on how the screening was done
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	Agree	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	not used	
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » ; the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « insignificant imp	Agree	
In the first stage, biological elements are not considered as selection criteria.	2	
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	2 and 5	
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.	2	
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	2	
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.	2	
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	2	

REFCOND-Guidance "Suggested template"	LU	Comment on how the screening was done
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.	3	
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1- 3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>		
For each pressure criteria, two thresholds are defined : a « reference » threshold, below which a site is considered as « probably reference » ; a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.	2 and 5	
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».	2 and 5	Sites that have all criteria below the reference threshold are considered as reference sites; possible reference sites (most criteria below the reference threshold and only some parameters between the reference and rejection threshold) are retained only a
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.	3	
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin	2	
<i>Artificial land use : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)</i>	2	
<i>Intensive agriculture : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex</i>	2	
<i>Low intensity agricultural areas : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>	2	
<i>Semi-natural areas: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>	2	
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values	3	
No or very local discharges with only very minor ecological effects.	3	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	3	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :		
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)		information needed for the evaluation of the land use at the catchment level is often missing for Luxembourg's streams. The reason is that, considering the littleness of the country, most river basins have some parts of their catchments in neighbouring co
"Rejection" threshold : 0.8 % of artificial area in the catchment.	1	Same coment as above
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.	1	Same coment as above
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.	3	
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary.	3	
<i>See separate table for chemical reference values.</i>		
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	1	
<b>Specific synthetic pollutants</b>		



REFCOND-Guidance "Suggested template"	LU	Comment on how the screening was done
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practice)		
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	0	Missing information for numerous sites
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	0	Missing information for numerous sites
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	3	
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be estimated; if not, the limit of detection (quantitative) can be used tentatively.	0	Missing information for numerous sites
No known discharge of specific non-synthetic pollutants upstream in the river.	3	
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	3	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	0	no data available
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	3	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must.	3	
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> )		
Intensive agriculture : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be considered	2	
1) there is no significant risk of soil erosion	3 and 4	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. ( <i>See Riparian vegetation criteria line 98</i> )	2	
Between 20% and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	2	
<b>See separate table for chemical reference values.</b>		
Cattle breeding: only non-intensive (outdoor) cattle breeding: < 1.25 animal (cattle) units per ha of the catchment area.	3	
Vineyards, orchards : < 1% of the catchment area, and not situated in the riparian zone.	2	
Irrigated fields ≤ 10%	1	Not appropriate
<b>Forestry</b> : < 30% tree plantations (coniferous, Eucalyptus...).	0	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>	3	
Acidification : no sign of acidification due to coniferous plantation (on siliceous bedrock).	2	
pH > 6. If pH < 6, it is necessary to determine if the site is naturally acid.	2	

REFCOND-Guidance "Suggested template"	LU	Comment on how the screening was done
Eutrophication : no sign of plant proliferation (macrophytes, algae).	3	
Eutrophication : if possible validate with chemical values	2	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.		
<b>Suggestion for GIG</b>		
<i>definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)</i>		
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	2	
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	2	
Artificial areas : < 10% of the reach.	2	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. ( <i>land use definition see lines 26-29</i> ).	3	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	3	
The lateral connectivity between river and riparian corridor is maintained along the site.	3	
No direct impact of cattle trampling.	3	
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified		
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	3 and 5	
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future.	3 and 5	
<b>At the basin scale:</b>		
Sediment transport : No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	3 and 5	
<b>Migration barriers for fish reference sites : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</b>		
<b>Suggestion for fish reference conditions :</b>		
<i>"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in the floodplain). The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference.</i>		
<i>1) at the reach scale / if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach;</i>		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference.	4	
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	4	



REFCOND-Guidance "Suggested template"	LU	Comment on how the screening was done
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).	4	
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	4	
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	4	
Connection to groundwater: Total lateral and vertical connection to groundwater.	0	
Substrate conditions: Correspond to related typology	4	
River profile and variation in width and depth: Correspond to related typology	4	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	4	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	4	
<b>2) at the site scale :</b>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	4	
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	4	
Only very small artificial constructions with very minor local effects can be accepted	4	
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		
<b>Suggestion for GIG</b>		
<u>At the basin scale:</u>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	3	
<u>At the reach scale:</u>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements	3	
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	3	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.		
<b>Suggestion for GIG</b>		
<u>At the basin scale:</u>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th	3	
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	0	
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	3	
<u>At the reach scale</u>		
No by-passed section with residual flow (legal minimum discharge)	4	
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	4	
Absence of flow regulation (dam) on the reach itself.	4	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.		
No impairment by invasive plant or animal species.		

REFCOND-Guidance "Suggested template"	LU	Comment on how the screening was done
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species'; and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	4	
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.		
No impact from fish farming.		
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	3	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line 184)	3	
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	3	
No or very limited direct pollution by aquaculture plants.	3	
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.		
<b>Suggestion for GIG</b>		
No biomanipulation.	3	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)		
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	4	

**Important: MS may provide either a general remark for reference sites or site by site information.**

Possible answers 0-6

0	Missing info
1	Criterion not used; please specify reason in comment
2	Criterion used, Measured
3	Criterion used, Estimated
4	Criterion used, Field inspection
5	Criterion used, Expert judgement
6	Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	POLAND answers	Comment on how the screening was done
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GIG</b>		

REFCOND-Guidance "Suggested template"	POLAND answers	Comment on how the screening was done
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in		
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	1	data not available
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » ; the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp		
In the first stage, biological elements are not considered as selection criteria.		
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a		
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.		
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.		
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.		
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.		
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself. <i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1-3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>		
For each pressure criteria, two thresholds are defined : a « reference » threshold, below which a site is considered as « probably reference » ; a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated. Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».		
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.		
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin		
<i><b>Artificial land use</b> : the sum of all the categories of <b>CLC class 1</b>. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc...)</i>		
<i><b>Intensive agriculture</b> : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex</i>		
<i><b>Low intensity agricultural areas</b> : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas</i>		
<i><b>Semi-natural areas</b>: Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.</i>		
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values No or very local discharges with only very minor ecological effects. No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)		
<i>The following criteria can be used to validate very low levels of point source pollution :</i> Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :	2	acc. CORINE landcover
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4%		

REFCOND-Guidance "Suggested template"	POLAND answers	Comment on how the screening was done
and 0.8% : see line 19-22)		
"Rejection" threshold : 0.8 % of artificial area in the catchment.		
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.		
<b>See separate table for chemical reference values.</b>	2	observed values compared with chemical reference values
For small streams : no known point source discharge, or very localised impact with self purification.	5	not known any point sources of pollution
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	1	river type not intercalibrated
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	1	used on phytoplankton data but not compliant with WFD requirement, not taken into account
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practi		
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	1	by definition, absence of substances in the reference sites
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	1	data not available
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values- If this can be can estimated; if not, the limit of detection (quantitative) can be used tentatively. No known discharge of specific non-synthetic pollutants upstream in the river.		
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	5	expert judgement
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	1	river type not intercalibrated
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	5	expert judgement
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must		
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> ) <b>Intensive agriculture</b> : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c	2	acc. CORINE landcover
1) there is no significant risk of soil erosion		
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. (See <i>Riparian vegetation criteria line 98</i> )		

REFCOND-Guidance "Suggested template"	POLAND answers	Comment on how the screening was done
Between 20% and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.		
<b>See separate table for chemical reference values.</b>		
	2	observed values compared with chemical reference values
Cattle breeding: only non-intensive (outdoor) cattle breeding: < 1.25 animal (cattle) units per ha of the catchment area.	1	data not available
Vineyards, orchards: < 1% of the catchment area, and not situated in the riparian zone.	2	acc. CORINE landcover
Irrigated fields ≤ 10%	2	acc. CORINE landcover
Forestry: < 30% tree plantations (coniferous, Eucalyptus..).	2	acc. CORINE landcover
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>		
Acidification: no sign of acidification due to coniferous plantation (on siliceous bedrock).	1	not a problem in Poland
pH > 6. If pH < 6, it is necessary to determine if the site is naturally acid.	1	not a problem in Poland
Eutrophication: no sign of plant proliferation (macrophytes, algae).		field inspection, data taken from site protocols
	4	observed values compared with chemical reference values
Eutrophication: if possible validate with chemical values	2	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.		
<b>Suggestion for GIG</b>		
definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)		
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	2	acc. CORINE landcover
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	2	acc. CORINE landcover
Artificial areas: < 10% of the reach.	2	acc. CORINE landcover
<b>At the site scale:</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. (land use definition see lines 26-29).	2 & 4	acc. CORINE landcover and field inspection
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	4	field inspection, data taken from site protocols
The lateral connectivity between river and riparian corridor is maintained along the site.	4	field inspection, data taken from site protocols
	4	field inspection, data taken from site protocols
No direct impact of cattle trampling.	4	field inspection, data taken from site protocols
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified		
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.		
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future.		

REFCOND-Guidance "Suggested template"	POLAND answers	Comment on how the screening was done
<b>At the basin scale:</b>		
Sediment transport: No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	5	expert judgement
Migration barriers for fish reference sites: this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.	1	data not available
<b>Suggestion for fish reference conditions:</b>		
"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in	1	data not available
If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.	1	data not available
1) at the reach scale / if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference	1	data not available
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	4	field inspection, data taken from site protocols
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...)	4	field inspection, data taken from site protocols
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.		
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	1	data not available
Connection to groundwater: Total lateral and vertical connection to groundwater.	1	data not available
Substrate conditions: Correspond to related typology	4	field inspection
River profile and variation in width and depth: Correspond to related typology	4	field inspection
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	5	expert judgement
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	5	expert judgement
<b>2) at the site scale:</b>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	4	field inspection, data taken from site protocols
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	4	field inspection, data taken from site protocols
Only very small artificial constructions with very minor local effects can be accepted	4	field inspection, data taken from site protocols
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	5	expert judgement
<b>At the reach scale:</b>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.	5	expert judgement
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	1	data not available
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.		

REFCOND-Guidance "Suggested template"	POLAND answers	Comment on how the screening was done
<b>Suggestion for GIG</b>		
<u>At the basin scale:</u>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th	5	expert judgement
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	1	data not available
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	1	data not available
<u>At the reach scale</u>		
No by-passed section with residual flow (legal minimum discharge)	1	data not available
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	1	data not available
Absence of flow regulation (dam) on the reach itself.	5	expert judgement
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.		
No impairment by invasive plant or animal species.		
<b>Suggestion for GIG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.		based on macroinvertebrate data, no alteration in the type-specific composition
	2	
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.		
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.		
No impact from fish farming.		
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.	5	expert judgement
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained ( <i>for alien species, see line 184</i> )	1	data not available
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.		by definition, reference sites do not have intensive fishing or stocking of fish
	6	
No or very limited direct pollution by aquaculture plants.		by definition, reference sites do not have intensive fishing or stocking of fish
	6	
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.		
<b>Suggestion for GIG</b>		
No biomanipulation.	5	expert judgement
<b>Other pressures</b>		
<b>Recreation uses</b>		

REFCOND-Guidance "Suggested template"	POLAND answers	Comment on how the screening was done
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)		
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	5	expert judgement

**Important: MS may provide either a general remark for reference sites or site by site information.**

Possible answers 0-6

0	Missing info
1	Criterion not used; please specify reason in comment
2	Criterion used, Measured
3	Criterion used, Estimated
4	Criterion used, Field inspection
5	Criterion used, Expert judgement
6	Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	MS Sweden Answer	Comment on how the screening was done
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys	3	
<b>Suggestion for GIG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospherc deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in	1	
If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.	0	
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » ; the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp	3	
In the first stage, biological elements are not considered as selection criteria.	2	
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a	1	Only phys-chem criteria used in defining references
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.		
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.	1	This is wrong in my opinion - the biological variation might be larger than within high-good boundaries.
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.		
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.	2	
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.	3	
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1- 3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>	5	Reach level info not available
For each pressure criteria, two thresholds are defined :		
a « reference » threshold, below which a site is considered as « probably reference » ;		
a « rejection » threshold, corresponding to a high probability of significant impact, above which a site is eliminated.		

REFCOND-Guidance "Suggested template"	MS Sweden Answer	Comment on how the screening was done
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».	2	
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.	1	Impacted rivers not in reference state
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin	6	Swedish land-use data and not CORINE used
<i>Artificial land use</i> : the sum of all the categories of <b>CLC class 1</b> . (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc..)	2	
<i>Intensive agriculture</i> : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex	2	
<i>Low intensity agricultural areas</i> : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas	0	
<i>Semi-natural areas</i> : Forest and natural areas, wetlands, water bodies - codes CLC codes : <b>3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5</b> .	0	
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.	2	Measured through water chemistry
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values	2	Measured through water chemistry
No or very local discharges with only very minor ecological effects.	2	Measured through water chemistry
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	0	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :	2	
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	6	urban land-use < 0.1% according to Swedish criteria
"Rejection" threshold : 0.8 % of artificial area in the catchment.	6	urban land-use < 0.1% according to Swedish criteria
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.	1	
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.	2	Measured through water chemistry
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	2	Measured through water chemistry
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.	1	
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	MS Sweden Answer	Comment on how the screening was done
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practice.	0	
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	0	
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	0	
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	2	
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Natural background level/load (see reference above)		
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values– if this can be can estimated; if not, the limit of detection (quantitative) can be used tentatively.	0	
No known discharge of specific non-synthetic pollutants upstream in the river.	0	
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	0	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	0	
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	0	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.	2	
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must	2	
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> )		
<i>Intensive agriculture</i> : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c	2	
1) there is no significant risk of soil erosion	0	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. ( <i>See Riparian vegetation criteria line 98</i> )	2	
Between 20%and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	2	
<b>See separate table for chemical reference values.</b>		
<i>Cattle breeding</i> : only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.	0	
<i>Vineyards, orchards</i> : < 1% of the catchment area, and not situated in the riparian zone.	1	
<i>Irrigated fields</i> ≤ 10%	0	

REFCOND-Guidance "Suggested template"	MS Sweden Answer	Comment on how the screening was done
Forestry : < 30% tree plantations (coniferous, Eucalyptus..).	0	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria.</b>		
Acidification : no sign of acidification due to coniferous plantation (on siliceous bedrock).	2	
pH > 6. If pH < 6 , it is necessary to determine if the site is naturally acid.	6	Tested using both pH > 6 and according to Bernes
Eutrophication : no sign of plant proliferation (macrophytes, algae).	0	
Eutrophication : if possible validate with chemical values	2	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		
Having adjacent natural vegetation appropriate to the type and geographical location of the river.	2	
<b>Suggestion for GIG</b>		
definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)	2	
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	0	
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	0	
Artificial areas : < 10% of the reach.	0	
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. (land use definition see lines 26-29).	2	
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	0	
The lateral connectivity between river and riparian corridor is maintained along the site.	0	
No direct impact of cattle trampling.	0	
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified.	2	
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	0	
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future.	0	
<b>At the basin scale:</b>		
Sediment transport : No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...).	0	

REFCOND-Guidance "Suggested template"	MS Sweden Answer	Comment on how the screening was done
Migration barriers for fish reference sites : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.	0	
<b>Suggestion for fish reference conditions :</b>		
"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in	0	
If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.	0	
1) at the reach scale ( if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):	0	
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total differenc	0	
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	0	
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).	0	
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	0	
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	3	
Connection to groundwater: Total lateral and vertical connection to groundwater.	0	
Substrate conditions: Correspond to related typology	2	
River profile and variation in width and depth: Correspond to related typology	0	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	0	
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	0	
2) at the site scale :		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	2	
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	0	
Only very small artificial constructions with very minor local effects can be accepted	0	
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.	0	
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	0	
<b>At the reach scale:</b>	0	
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.		
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	0	
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	MS Sweden Answer	Comment on how the screening was done
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.	0	
<b>Suggestion for GiG</b>		
<u>At the basin scale:</u> No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration ( < to + or - 20% modification of th	0	
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	0	
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	0	
<u>At the reach scale</u> No by-passed section with residual flow (legal minimum discharge)	0	
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	0	
Absence of flow regulation (dam) on the reach itself.	0	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.	0	
No impairment by invasive plant or animal species.	0	
<b>Suggestion for GiG</b>		
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>	0	
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>	0	
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>	0	
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	0	
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.	0	
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.	0	
No impact from fish farming.	0	
<b>Suggestion for GiG</b>		
No intensive (commercial) fishery.	0	
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line 184)	0	
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.	0	
No or very limited direct pollution by aquaculture plants.	0	
<b>Biomanipulation</b>		

REFCOND-Guidance "Suggested template"	MS Sweden Answer	Comment on how the screening was done
<b>REFCOND-Guidance</b>		
No biomanipulation.	0	
<b>Suggestion for GiG</b>		
No biomanipulation.	0	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)	0	
<b>Suggestion for GiG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	0	

**Important: MS may provide either a general remark for reference sites or site by site information.**

Possible answers 0-6

0	Missing info
1	Criterion not used; please specify reason in comment
2	Criterion used, Measured
3	Criterion used, Estimated
4	Criterion used, Field inspection
5	Criterion used, Expert judgement
6	Alternative criterion used, please specify in comment

REFCOND-Guidance "Suggested template"	UK Answer	Comment on how the screening was done
High status or reference conditions is a state in the present or in the past corresponding to very low pressure, without the effects of major industrialisation, urbanisation and intensification of agriculture, and with only very minor modification of phys		
<b>Suggestion for GiG</b>		
Totally unaffected sites do not exist anymore (at least due to the world wide atmospheric deposition). As "close-to-pristine" state is unlikely to be encountered, (except perhaps in some national parks), the concept of "pristine state" is not relevant in If an historic database has to be used, this should be from a time period without intensive industries, hydraulic engineering and agriculture.		
Selection criteria for reference sites are based on « anthropic pressures », that must be « null or very low » : the problem is to define a very low pressure level that leads to insignificant or very low impact at the ecosystem level. « Insignificant imp		
In the first stage, biological elements are not considered as selection criteria.		
In the second stage, those sites whose aquatic communities exhibit statistically low biological values are carefully checked for pressures, and dubious sites are eliminated. The checking process must consider possible errors in evaluating the pressures, a		
If, after checking, no significant pressure or possible error is encountered, these sites are considered as representative of the type's natural variability.		
However, any samples falling outside the range of "good ecological status" should not be included in the calculation of the reference value for the biological quality element considered.		
Impacts on rivers or within the catchment should not affect the original characteristics, so that the aquatic community is only altered minimally. Type-specific communities and conditions should be represented.		
A river stretch that is considered for the selection of a reference site must be situated within one national type. It must have biological populations representative of the type.		
Pressures likely to affect the reference site must be evaluated at the three relevant spatial scales : the <b>catchment</b> of the site, the <b>reach</b> scale (i.e. the water body), and the <b>reference site</b> itself.		
<i>Proposed minimum length for the river reaches are: &gt; 1 km for small rivers (stream order 1-3), &gt; 5 km for medium-size r. (stream order 4 - 5), &gt; 10 km for large rivers (stream order &gt; 6).</i>		
For each pressure criteria, two thresholds are defined :		
a « reference » threshold, below which a site is considered as « probably reference » ;		
a « rejection » threshold, corresponding to a high probability of significant impact,		



REFCOND-Guidance "Suggested template"	UK Answer	Comment on how the screening was done
above which a site is eliminated.		
Sites that have all criteria below the reference threshold are considered as reference sites; sites having most criteria below the reference threshold and only some parameters between the reference and rejection threshold are « possible reference sites ».		
Impacts on rivers or within the catchment area should have only local effects to be considered in Reference State.		
It is proposed to use the CORINE Land Cover (CLC) classification for the evaluation of the land use in the catchment and riparian area. However, the land cover represents a "driving force" more than a "pressure", and thus must be understood as representin		
<i>Artificial land use</i> : the sum of all the categories of CLC class 1. (Urban areas continuous and discontinuous, industrial and commercial zones, communication infrastructures and networks, mines, etc.)		
<i>Intensive agriculture</i> : the sum of the CLC categories corresponding to a high potential impact from agricultural activities: arable land (including irrigated land), permanent crops (with associated annual crops), vineyards, orchards, olive groves, complex		
<i>Low intensity agricultural areas</i> : the sum of the CLC categories corresponding to a lower potential impact from agricultural activities: pastures, land principally occupied by agriculture, with significant areas of natural vegetation, agro-forestry areas		
<i>Semi-natural areas</i> : Forest and natural areas, wetlands, water bodies - codes CLC codes : 3.1.1, 3.1.2, 3.1.3, 3.2, 3.3, 4 and 5.		
<b>Point source pollution</b>		
<b>Other effluents/discharges (Urban pollution)</b>		
<b>REFCOND-Guidance</b>		
No or very local discharges with only very minor ecological effects.	4,5	
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values	4,5	
No or very local discharges with only very minor ecological effects.	4,5	
No known industrial cause of particular pollution (e.g. NaCl, thermal pollution, etc...)	4,5	
<i>The following criteria can be used to validate very low levels of point source pollution :</i>		
Very low level of urbanisation, evaluated by the percentage area of artificial areas in the catchment CLC class 1 : see line 26 ). The following thresholds can be used :		
"Reference" threshold : < 0.4% of artificial land use in the catchment area. (Between 0.4% and 0.8% : see line 19-22)	1	CORINE data not available - UK land cover survey too fine resolution to use
"Rejection" threshold : 0.8 % of artificial area in the catchment.	1	CORINE data not available - UK land cover survey too fine resolution to use
Above 0.8%, a validation with physico-chemical parameters at the site scale is necessary.		
<b>See separate table for chemical reference values.</b>		
For small streams : no known point source discharge, or very localised impact with self purification.	4,5	
For larger streams and rivers : very low point source discharge level. If point sources are present, a validation with chemical parameters is necessary. <b>See separate table for chemical reference values.</b>	2,4,5	
Alternatively, the saprobiological water quality class (according to types or ecoregions) can be used to validate "very minor" ecological effects. If this criteria is used, it must be explained.		all reference sites were chosen in Chemical Class A
<b>Specific synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		
Pressures resulting in concentrations close to zero or at least below the limits of detection of the most advanced analytical techniques in general use (A Selection process for relevant pollutants in a river basin is presented as an example of best practi	1	Specific pollutants must be identified by each member stae. UK has not identified its specific pollutants yet - legislation is still draft
<b>Suggestion for GIG</b>		
Substances mentioned in Annex X and/or in annex VIII of the WFD should have concentrations at least below the limits of detection of the most advanced analytical techniques in general use	1	Annex X & VIII replaced by new directive which is only available in draft
Measured values of other anthropogenic, synthetic substances should be below quality objectives or near natural background concentrations, except for those from atmospheric sources.	1	Only very crude data on natural background concentrations is available.
The impact of atmospheric pollution on reference river stretches must not be detectable (e.g. depletion of the aquatic community due to acidification)	4,5	
<b>Spec. non-synthetic pollutants</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	UK Answer	Comment on how the screening was done
Natural background level/load (see reference above)	1	Specific pollutants must be identified by each member stae. UK has not identified its specific pollutants yet - legislation is still draft
<b>Suggestion for GIG</b>		
Only minor impairments of the physical and chemical conditions, this means: Near-natural background values-- if this can be can estimated; if not, the limit of detection (quantitative) can be used tentatively.	1	Only very crude data on natural background concentrations is available.
No known discharge of specific non-synthetic pollutants upstream in the river.	4,5	
<i>If no chemical data are available, the following criteria can be used to validate the very low level of general toxic pressures :</i>		
- For small streams : no known toxic pollution discharge.	4,5	
- For larger streams and rivers : no suspected toxic pollution discharge; if (actual or ancient) toxic pollution sources exist in the basin, ratio PEC / PNEC < 1.	4,5	
In agricultural areas, sites with a known pollution risk by pesticides (according to existing risk maps) are avoided.	4,5	
<b>Diffuse source pollution</b>		
<b>Land-use intensification: Agriculture, forestry</b>		
<b>REFCOND-Guidance</b>		
Pre-intensive agriculture or impacts compatible with pressures pre-dating any recent land-use intensification. Pressures pre-dating any recent intensification in airborne inputs that could lead to water acidification.		
<b>Suggestion for GIG</b>		
The share of anthropogenic land use in the catchment area (agriculture, afforestation) must be small and shows only local effects. In the case of type-specific floodplains, lateral and vertical connectivity has to be maintained. The reference sites must	4,5	
The land use upstream of the reference site must comply with the following criteria ( <i>land use definition see lines 26-29</i> )		
<i>Intensive agriculture</i> : <20% of the catchment area as reference threshold. Rejection threshold : > 50% of intensive agriculture in the catchment. However, in flat lowlands agricultural landscapes, sites with 20% to 50% of intensive agriculture can be c	2	CORINE data only available for Northern Ireland - For Great Britain, LandCover Survey 2000 land use data used instead and converted to nearest CORINE category
1) there is no significant risk of soil erosion	1	
2) the valley floors are mainly occupied by low intensity agricultural area (mainly pastures) and /or semi-natural areas, and riparian corridors are globally preserved at the reach and site scales. ( <i>See Riparian vegetation criteria line 98</i> )	1	
Between 20%and 50% of intensive agriculture, a validation with physico-chemical parameters at the site scale is strongly recommended.	2	CORINE data only available for Northern Ireland - For Great Britain, LandCover Survey 2000 land use data used instead and converted to nearest CORINE category
<b>See separate table for chemical reference values.</b>		
<i>Cattle breeding</i> : only non-intensive (outdoor) cattle breeding; < 1.25 animal (cattle) units per ha of the catchment area.	1	Data not available
<i>Vineyards, orchards</i> : < 1% of the catchment area, and not situated in the riparian zone.	2	CORINE data only available for Northern Ireland - For Great Britain, LandCover Survey 2000 land use data used instead and converted to nearest CORINE category
<i>Irrigated fields</i> ≤ 10%	2,1	CORINE data only available for Northern Ireland - For Great Britain, LandCover Survey 2000 land use data used instead and converted to nearest CORINE category
<i>Forestry</i> : < 30% tree plantations (coniferous, Eucalyptus..).	2	
If tree plantations > 30% in the catchment, even with no sign of acidification, the riparian corridor must be protected and composed of the type specific natural vegetation. <b>See Riparian vegetation criteria</b>	1	Data not available
<i>Acidification</i> : no sign of acidification due to coniferous plantation (on siliceous bedrock).	4,5	
pH > 6. If pH < 6 , it is necessary to determine if the site is naturally acid.	2	
<i>Eutrophication</i> : no sign of plant proliferation (macrophytes, algae).	4,5	Eutrophic sites not chosen as RIVPACS reference sites
<i>Eutrophication</i> : if possible validate with chemical values	2	
<b>See separate table for chemical reference values.</b>		
<b>Riparian zone vegetation</b>		
<b>REFCOND-Guidance</b>		

REFCOND-Guidance "Suggested template"	UK Answer	Comment on how the screening was done
Having adjacent natural vegetation appropriate to the type and geographical location of the river.		
<b>Suggestion for GIG</b>		
<i>definition of the riparian zone: the minimum width of the riparian zone (or corridor) to be considered is 30m for small streams (order 1-3), 50m for medium size rivers (order 4 - 5) and 100 m for larger rivers (order ≥ 6)</i>		
<b>At the reach scale:</b>		
In agricultural landscape (Intensive agriculture between 20% and 50%), intensive agriculture land cover < 10% of the reach. Riparian corridor land use > 90% semi natural or low intensity agricultural areas.	2	CORINE data only available for Northern Ireland - For Great Britain, LandCover Survey 2000 land use data used instead and converted to nearest CORINE category
In non agricultural landscape (Intensive agriculture < 20%): valley floor and riparian corridor occupied by semi natural or low intensity agricultural areas.	1,4,5	Data not available but RIVPACS reference sites only located where riparian corridor is noatural or semi-natural
Artificial areas : < 10% of the reach.	2	CORINE data only available for Northern Ireland - For Great Britain, LandCover Survey 2000 land use data used instead and converted to nearest CORINE category
<b>At the site scale :</b>		
The riparian zone of the site is entirely bordered by the type specific natural vegetation or semi-natural land cover, with the possible exception of access to the river site. <i>(land use definition see lines 26-29)</i>	4,5	RIVPACS reference sites only located where riparian corridor is noatural or semi-natural
Riparian vegetation zone continuity: uninterrupted or with few interruptions (access to the site).	4,5	RIVPACS reference sites only located where riparian corridor is noatural or semi-natural
The lateral connectivity between river and riparian corridor is maintained along the site.	4,5	RIVPACS reference sites only located where riparian corridor is noatural or semi-natural
No direct impact of cattle trampling.		
<b>Morphological alterations</b>		
<b>River morphology</b>		
<b>REFCOND-Guidance</b>		
Level of direct morphological alteration, e.g. artificial instream and bank structures, river profiles, and lateral connectivity compatible with ecosystem adaptation and recovery to a level of biodiversity and ecological functioning equivalent to unmodified		
<b>Suggestion for GIG</b>		
The type-specific hydromorphological conditions are maintained (including the elements mentioned in annex V of the WFD), leading to the conservation of all types of associated physical habitats.	3,4,5	
The natural morphological dynamic is maintained, with no or very minor anthropogenic influence. Slightly altered morphological conditions have a high potential to return to natural flow conditions without human action in near future	3,4,5	
<b>At the basin scale:</b>		
Sediment transport: No dams which significantly modify the sediment regime (sediment retention) leading to morphological alterations, evidenced by signs of incision of the river bed (e.g. incision > 0.2m * stream order, bare bed rock appearing...)	4,5	
<i>Migration barriers for fish reference sites : this issue has to be addressed specifically by the fish experts for the definition of reference conditions for fishes.</i>		
<i>Suggestion for fish reference conditions :</i>		
<i>"Continuity" for fish should be related to the maintenance of river and stream continuity to facilitate movement of type specific species that should be present in reference state - for example, fish should have access to spawning grounds (which may be in</i>	1	
<i>If this condition is not fulfilled and some migratory species have disappeared, these species should be added to the type -specific list of fish species.</i>	1	
<b>1) at the reach scale ( if no general mapping of morphological alterations exists, an expert evaluation is required for the selected reach):</b>		
Flow impedance: < 10% of the reach is affected by flow impedance, due to hydraulic effects of weirs, sluices, etc... The % of the reach affected by flow impedance can be evaluated by the ratio of the sum of weirs' heights (in meters) to the total difference	1,5	Not measured, but RIVPACS sites not located where flow impedance is obvious
Channelisation: < 10% of the reach is affected by "hard works" (like modification of longitudinal and / or transverse profiles, narrow embankment, loss of lateral connectivity...), otherwise, bed and banks composed of natural materials	5	Not measured, but RIVPACS sites not located where extensive hard works are obvious
Stabilisation: < 20% of the reach is affected by "soft works" (like bank protection on one side, distant dikes, bank maintenance, not affecting the longitudinal and / or transverse profile, and lateral connectivity globally maintained...).	1	

REFCOND-Guidance "Suggested template"	UK Answer	Comment on how the screening was done
If both types of works are combined (lines 134 and 135) < 10% of the reach must be affected.	1	
Siltation: reaches with anomalous siltation suspected, due to agricultural soil erosion, should be avoided (expert judgment).	5	RIVPACS sire not located where anolalous siltation is obvious
Connection to groundwater: Total lateral and vertical connection to groundwater.	4,5	RIVPACS sire not located where conditions are un-natural
Substrate conditions: Correspond to related typology	4,5	RIVPACS sire not located where conditions are un-natural
River profile and variation in width and depth: Correspond to related typology	4,5	RIVPACS sire not located where conditions are un-natural
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows undisturbed migration of aquatic organisms (including resident fish populations).	4,5	RIVPACS sire not located where conditions are un-natural
River continuity: At the reach scale, the continuity of the river is not disturbed by anthropogenic barriers and allows free sediment transport.	4,5	RIVPACS sire not located where conditions are un-natural
<b>2) at the site scale :</b>		
The site is not situated in a zone directly or indirectly impacted by a nearby artificial structure upstream or downstream.	4	RIVPACS sire not located where conditions are un-natural
Lacking any instream structural modifications (weirs or dams) that affect the longitudinal and lateral connectivity, and natural movement of river bed, sediment load, water and biota (except for natural waterfalls).	4	RIVPACS sire not located where conditions are un-natural
Only very small artificial constructions with very minor local effects can be accepted	4	RIVPACS sire not located where conditions are un-natural
<b>Water abstraction</b>		
<b>REFCOND-Guidance</b>		
Levels of abstraction resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements.		
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams or water storage significantly altering the low flow regime; low flow alteration < 20% of the monthly minimum flow.	2	Comparison with of actual and natural folw modelled by LowFlow2000
<b>At the reach scale:</b>		
Only very minor reductions in flow level changes having no more than very minor effects on the quality elements.		
No significant water abstraction in the reach. The cumulative effect of water regulation and abstraction at the basin and reach scales is < 20% of low flow discharge.	2	Comparison with of actual and natural modelled by LowFlow2000
<b>River flow regulation</b>		
<b>REFCOND-Guidance</b>		
Levels of regulation resulting in only very minor reductions in flow levels or lake level changes having no more than very minor effects on the quality elements. Flow regulation that has the potential to recover to natural flow in near future.		
<b>Suggestion for GIG</b>		
<b>At the basin scale:</b>		
No dams which significantly modify the natural hydrological flow regime (flow regulation) : e.g. suppression of frequent floods (<5 years) with anomalous development of vegetation in the channel, or low flow alteration (< to + or - 20% modification of th	5	Not measured, RIVPACS sites are not located where conditions are un-natural
The total storage capacity of the reservoirs in the catchment is < 5% of the mean annual discharge at the site.	1,5	Not tested, however, RIVPACS reference sites were not located downstream from large reservoirs
No change of the natural (type specific) annual flow characteristics (seasonality of high and low flow)	5	
<b>At the reach scale</b>		
No by-passed section with residual flow (legal minimum discharge)	5	
No significant hydropower peaking effect (ratio Q hydropeaking / Q baseflow < 2)	5	
Absence of flow regulation (dam) on the reach itself.	4	
<b>Biological pressures</b>		
<b>Introductions of alien species</b>		
<b>REFCOND-Guidance</b>		
Introductions compatible with very minor impairment of the indigenous biota by introduction of fish, crustacea, mussels or any other kind of plants and animals.		
No impairment by invasive plant or animal species.		
<b>Suggestion for GIG</b>		

REFCOND-Guidance "Suggested template"	UK Answer	Comment on how the screening was done
<i>NB: the issue is: to give a sound definition of 'alien species' and 'type-specific species' and to make clear if the one can shift into the other, and if so on what conditions. We consider this as an item that should be discussed and solved on a European</i>		
<i>Proposed definition of alien species : non indigenous species recently introduced (i.e. during the XXth century) or in early stage of dissemination in the river reach, not known to present a risk of being invasive.</i>		
<i>Proposed definition of invasive species : alien species in stage of active colonisation, which are quantitatively predominant in their respective community, and whose development significantly alter the composition and abundance of the type specific commu</i>		
At the site scale, no invasive species, but alien species which are not at the invasive stage are tolerated.	1	I have no information whether this criterion was used in the selection of RIVPACS reference sites
<b>Fisheries and aquaculture</b>		
<b>REFCOND-Guidance</b>		
Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.	1	I have no information whether this criterion was used in the selection of RIVPACS reference sites
Stocking of non indigenous fish should not significantly affect the structure and functioning of the ecosystem.	1	I have no information whether this criterion was used in the selection of RIVPACS reference sites
No impact from fish farming.	1	I have no information whether this criterion was used in the selection of RIVPACS reference sites
<b>Suggestion for GIG</b>		
No intensive (commercial) fishery.		
Fisheries, fish management and / or aquaculture plants which have no significant impact on fish populations are tolerated, i. e. the type specific fish population is maintained (for alien species, see line 184)		
Fishing or stocking of fish is limited, and must have no impact on the ecosystem functioning.		
No or very limited direct pollution by aquaculture plants.	2,5	RIVPACS sites not located where there are known problems or impaired chemical quality
<b>Biomanipulation</b>		
<b>REFCOND-Guidance</b>		
No biomanipulation.	5	
<b>Suggestion for GIG</b>		
No biomanipulation.	5	
<b>Other pressures</b>		
<b>Recreation uses</b>		
<b>REFCOND-Guidance</b>		
No intensive use of reference sites for recreation purposes (no intensive camping, swimming, boating, etc.)	1,4	Not tested, but RIVPACS reference sited not located where there is obvious human disturbance
<b>Suggestion for GIG</b>		
No nearby intensive recreational use at the site scale: No regular bathing activities or motor boating. Occasional recreational uses (such as camping, swimming, boating, etc.) should lead to no or very minor impairment of the ecosystem.	4,5	