



# Water for life and livelihoods

River Basin Management Plan  
Thames River Basin District

Annex I: Designating artificial and  
heavily modified water bodies

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## I.1 Introduction

This annex explains the criteria used to designate water bodies in the Thames River Basin District as artificial or heavily modified. The criteria used for designation of freshwater water bodies can be found in section I.2 and the criteria for estuarine and coastal water bodies can be found in section I.3. Section I.4 discusses how results of a liaison panel consultation on designation were incorporated and further quality checks made to results. Section I.5 outlines how designation of new and split water bodies was made and I.6 maps the artificial and heavily modified water bodies in the Thames River Basin District.

### The need to designate water bodies as heavily modified or artificial

Article 4(3) of the Water Framework Directive (WFD) states that water bodies may be designated as artificial or heavily modified in the river basin management plans. The WFD recognises that some water bodies have been significantly physically modified to support various uses which provide valuable social and economic benefits. In many cases these modifications cannot be removed without having a major negative effect on the social and economic benefits that these uses bring. If achieving 'good status' would require changes to a water body's hydromorphology that would have significant adverse effects on the social or economic activity, then it can be designated as a artificial or heavily modified water body. Before designation it also needs to be established that due to technical or disproportionate cost reasons there is no significantly better environmental option for delivering the social and economic benefits (European Union CIS guidance document no. 4, 2003). The WFD also recognises that many artificial bodies of water need to be managed in terms of their environmental quality and hydrology.

Artificial and Heavily Modified Water Bodies (AWB/HMWBs) have to achieve an alternative objective of "good ecological potential" (GEP). The objective of GEP is similar to good status but takes into account the constraints imposed by the social and/or economic uses.

### Definitions

Article 2 (8) of the WFD defines an artificial water body as a 'body of surface water created by human activity'. Article 2 (9) defines a heavily modified water body as a 'body of surface water which as a result of physical alterations by human activity is substantially changed in character, as designated by the Member State in accordance with the provisions of Annex II (of the WFD).'

The definitions presented in the WFD are expanded on further in Common Implementation Strategy guidance documentation. In order to address the challenges of WFD in a co-operative and coordinated way, the Member States, agreed on a Common Implementation

Strategy (CIS). CIS Guidance documents and technical reports have been produced to assist member states in implementing the WFD. CIS guidance document no. 4 focuses on the 'Identification and Designation of Heavily Modified and Artificial Water Bodies' and can be found at:

[http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework\\_directive/guidance\\_documents/guidancesnos4sheavilysmo/ EN 1.0 &a=d](http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents/guidancesnos4sheavilysmo/ EN 1.0 &a=d)

Paragraph 3.1.1 of CIS guidance No. 4 ("the CIS guidance") states that:

'In order to be a heavily modified water body, a water body must be:

- Physically altered by human activity;
- Substantially changed in character;
- Designated under Article 4(3)'.

In general, the changes to the hydromorphology need to be long-term and alter the morphological and hydrological characteristics in order to represent a substantial change in the character of a water body.

Paragraph 3.1.2 of the CIS guidance interprets an Artificial Water Body as:

'A surface water body which has been created in a location where no water body existed before and which has not been created by the direct physical alteration or movement or realignment of an existing water body'.

The guidance clarifies that this does not mean that there was only dry land present before. Minor ponds, tributaries or ditches may have been present, which were not regarded as discrete and significant elements of surface water. Significant water bodies that have changed water category due to modifications are considered to be heavily modified water bodies. For instance a river dammed to form a reservoir is a heavily modified river not an artificial lake.

## **I.2 Freshwater water bodies**

### **Introduction**

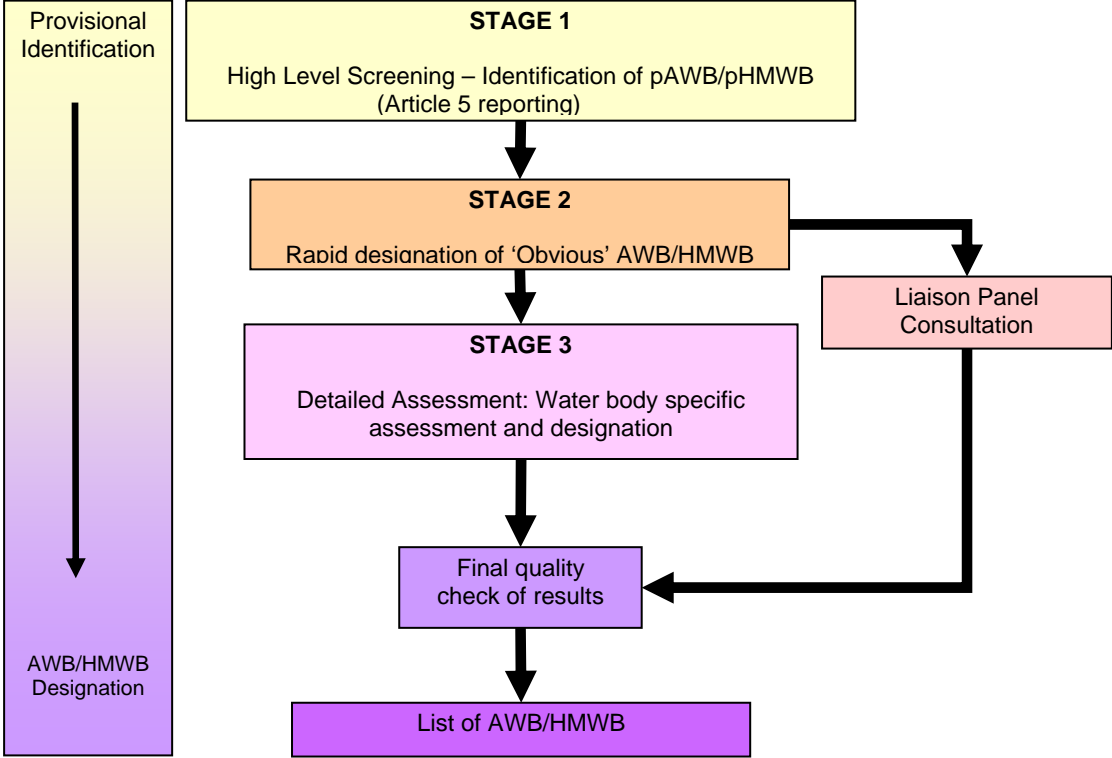
A two-stage approach was developed to apply the Article 4(3) designation tests to those water bodies provisionally identified as AWB/HMWB for Article 5 reporting (Figure I.1). This list of provisional AWB/HMWBs was formed of water bodies that were at risk of failing good ecological status due to morphological pressures. The risk assessment was completed as part of the river basin characterisation process. Further detail on the risk assessment approach is discussed in Annex G. The two-stage designation process comprised of a rapid designation stage to identify 'obvious' AWB/HMWBs followed by a second more detailed assessment stage.

The rapid designation stage applied the 4(3) tests to a small number of priority water body uses. The rapid designation stage was developed following the principles outlined in the UK TAG paper, 'Criteria and Guidance for the Designation of heavily modified water bodies':

[www.wfduk.org/tag\\_guidance/article\\_4/heavily\\_modified\\_wb/view](http://www.wfduk.org/tag_guidance/article_4/heavily_modified_wb/view)

For water bodies where it was not possible to designate using the rapid process a further detailed process was applied. The detailed designation process also applied the Article 4(3) tests but to a wider set of water body uses and gathered more supporting information and justifications for designation. The process is described in Figure I.1.

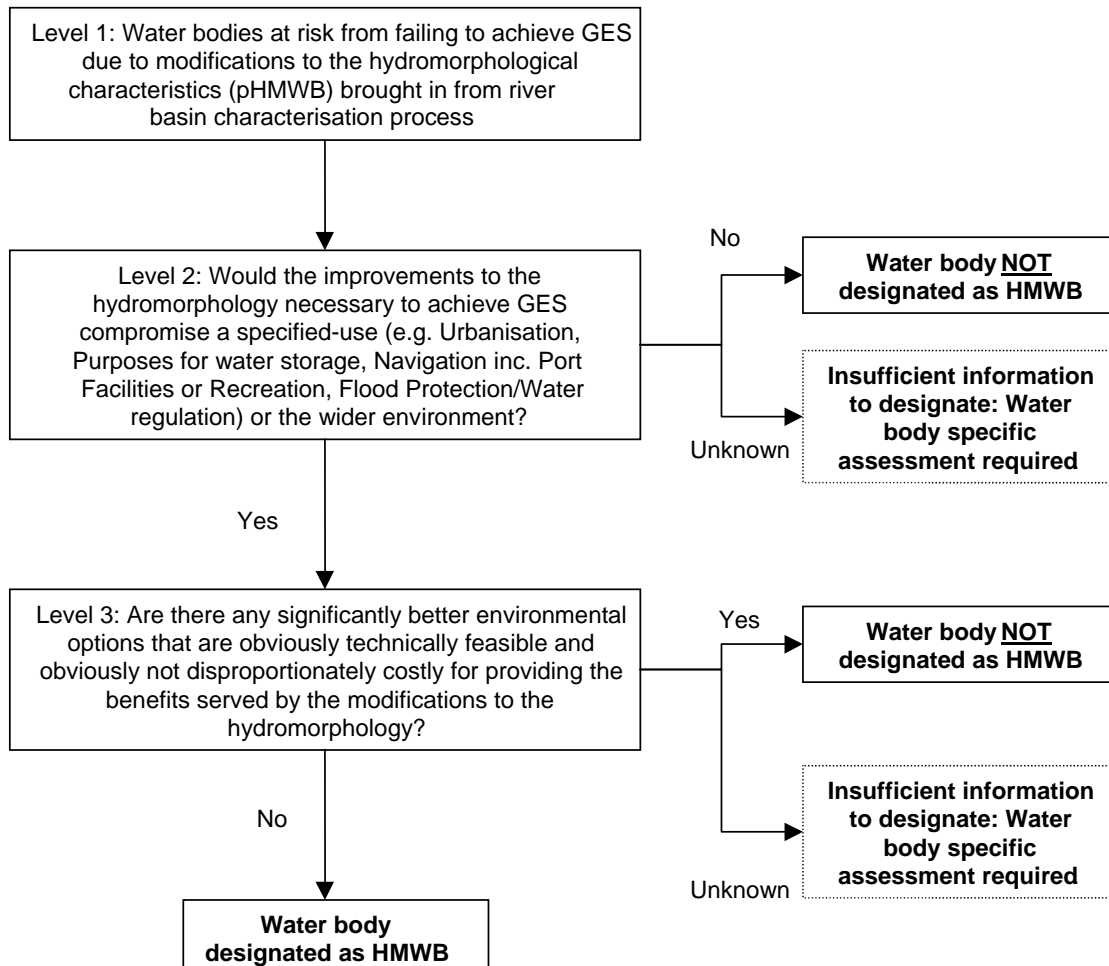
**Figure I.1 Summary of steps in the designation of artificial water bodies and heavily modified water bodies for freshwater water bodies**



## Overview of the rapid designation process for heavily modified water bodies

The process is described in Figure I.2:

Figure I.2 **Outline of the rapid designation process for freshwater heavily modified water bodies**



Boxes that have a dashed outline will be covered outside of the rapid designation process.

Further specified uses were addressed in the detailed designation process.

## Overview of the rapid designation process for artificial water bodies

A water body should be designated as artificial if the ability to achieve ‘good ecological status’ is limited through the designated use or through changes necessary for this use.

However, not all man-made water bodies have to be designated. Paragraph 6.8.1 of the CIS guidance explains:

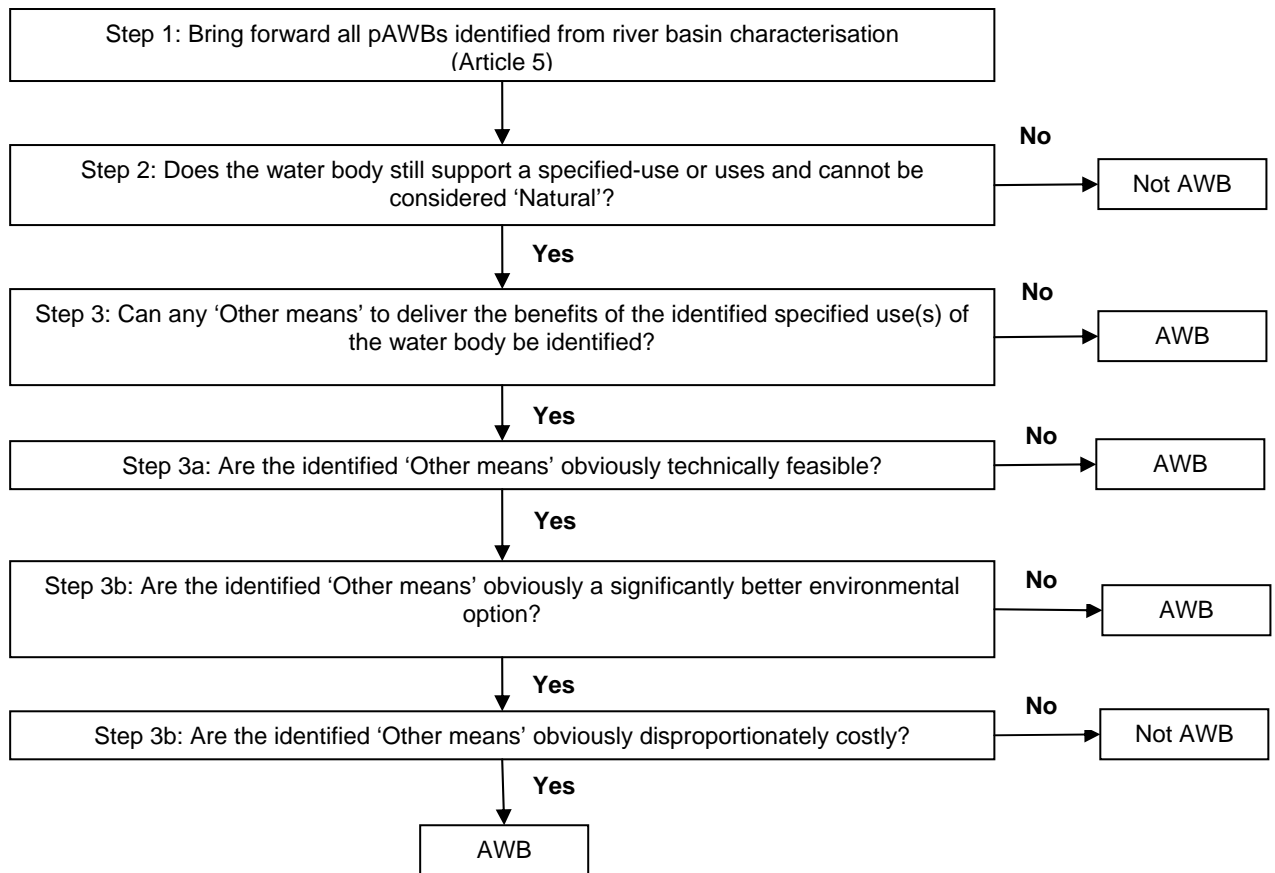
‘There may be some circumstances where long established water bodies, which are subject to little or no pressures, are indistinguishable from natural waters. Under such circumstances it may be appropriate to consider their current biological condition as high ecological status (HES) or good ecological status (GES)’.

Water bodies that are considered as provisional artificial water bodies are shown in Figure I.3. The process for designating ‘obvious’ artificial water bodies is shown in Figure I.4

Figure I.3 **Water bodies that are considered as provisional artificial water bodies**

Category	Types	Includes
Lake	Lake	Flooded gravel pits Flooded surface mine workings Flooded clay pits Flooded peat workings Large ornamental lakes Large recreational lakes Pumped storage reservoirs Drainage ditches/channels
River	Canal Surface water transfers (open channels only)	Completely artificial dug canals Water diversions Leats Reservoir feeders
Estuarine and coastal waters	Docks and Harbours	Dug docks Flooded clay pits (which experience some saline intrusion) Storage reservoirs

Figure I.4 **Outline of rapid artificial water body designation process**



### Overview of the detailed designation process

Where a decision on designation was not possible using the rapid process, water bodies were fed through to the detailed designation process.

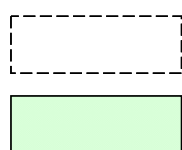
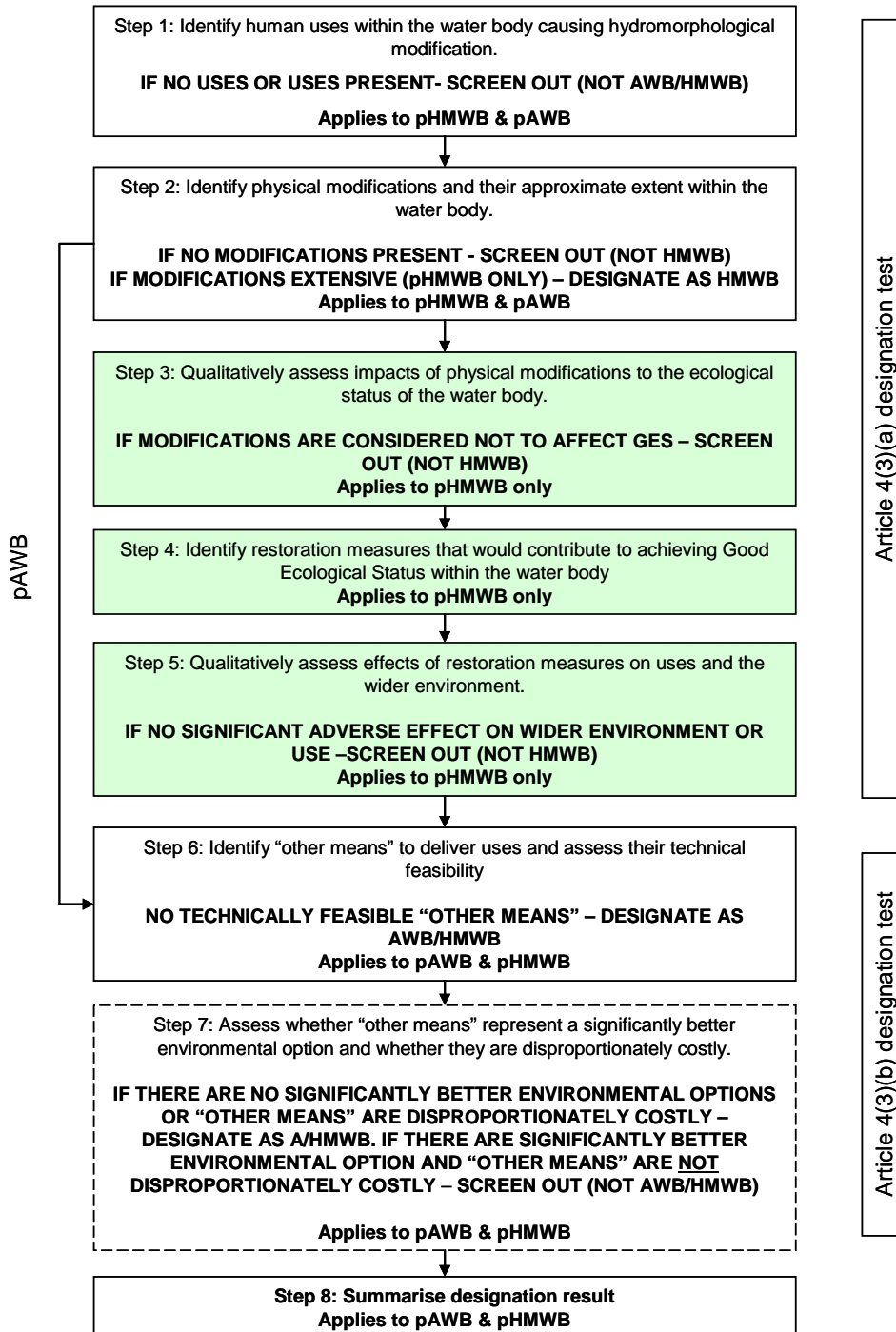
The detailed designation process took into account all eleven specified uses outlined in Article 4(3);

1. Wider environment
2. Navigation including port facilities
3. Recreation
4. Drinking water supply
5. Power generation
6. Irrigation
7. Water regulation, subdivided into i) strategic water transfers and ii) impoundment releases
8. Flood protection
9. Land drainage
10. Urbanisation
11. Other equally important sustainable human development activities

Several specified uses may be extensive within a water body. For example a riverine water body may be used extensively for Navigation, Flood Protection and Urbanisation.

The detailed artificial and heavily modified water body designation process comprised of eight steps (Figure I.5). The steps highlighted in light green did not apply to artificial water bodies. Further detail on the steps can be found below.

Figure I.5 Outline of detailed artificial and heavily modified water body designation process



Step to be undertaken at national level

Step not applicable to pAWB

**Abbreviations used:**  
 AWB – Artificial Water Body  
 HMWB – Heavily Modified Water Body  
 pAWB – provisional Artificial Water Body (identified via river basin characterisation)  
 pHMWB – provisional Heavily Modified Water Bodies (identified via river basin characterisation)



Further detail on the steps outlined in Figure I.5:

- Step one involved setting out the links between the pressures identified in the provisional identification of artificial and heavily modified water bodies, and the human uses associated with these pressures. Where water bodies did not have a specified use (and therefore could not have Article 4(3) tests applied), the water body was screened out from further assessment. The water bodies screened out were passed back into the broader river basin management process and have a target objective of good ecological status. Those which are not screened out remained as provisional artificial and heavily modified water bodies and continue to step two.
- Step two involved the identification of those physical modifications that could result in changes to the hydromorphology of the water body. These changes needed to be long-term and substantially alter the water body morphological and hydrological characteristics. These modifications also needed to have a specified use as determined in Article 4(3). If there were no such physical modifications then the water body was screened out as not heavily modified. For provisional heavily modified water bodies, if there were extensive modifications present that had an associated specified use then it was assumed they would meet the Article 4(3) tests and the water body could be designated as heavily modified and screened out from further tests, provided the justification for the designation was recorded. For provisional artificial water bodies, as the water bodies are artificial, by default there must be extensive modifications associated with the water body, therefore it was not appropriate to apply this step.
- Step three involved bringing together information regarding morphological modifications (from step two) and expert judgement from the Environment Agency ecology and biodiversity teams regarding the perceived ecological status of the water body. These teams were asked to assess how morphological modifications are affecting ecological status. Where water bodies are thought to be able to achieve good ecological status with existing hydromorphological modifications, the water body was screened out as not heavily modified. Those which were not screened out remained as provisional artificial or heavily modified water bodies and continued to step four.
- Step four identified any potential hydromorphological restoration actions that could result in the water body achieving good ecological status. This step was informed by the expert knowledge of linkages between modifications and the ecology identified in step three.
- In step five, information that had been gathered from earlier steps is pulled together in order to qualitatively assess the effects of restoration actions on the specified uses or the wider environment. Water bodies where restoration actions would not significantly affect the use or the wider environment in a negative way were screened out as not designated. These restoration actions to achieve good ecological status should go forward to the river basin management process (and be assessed as to their technical feasibility and cost effectiveness). The remaining water bodies were then assessed further in step six.
- Step six looked for 'other means' of delivering the benefits of the specified uses. If the 'other means' for providing the intended uses benefits were found to be technically infeasible then the water body can be designated as artificial or heavily modified as the water body had met the requirements of Article 4(3)(b). Otherwise the water body is assessed further in step seven.
- Step seven considered the environmental benefit and monetary cost of any 'other means'. Where the 'other means' were disproportionately costly or a worse environmental option, then water bodies could be designated as artificial or heavily

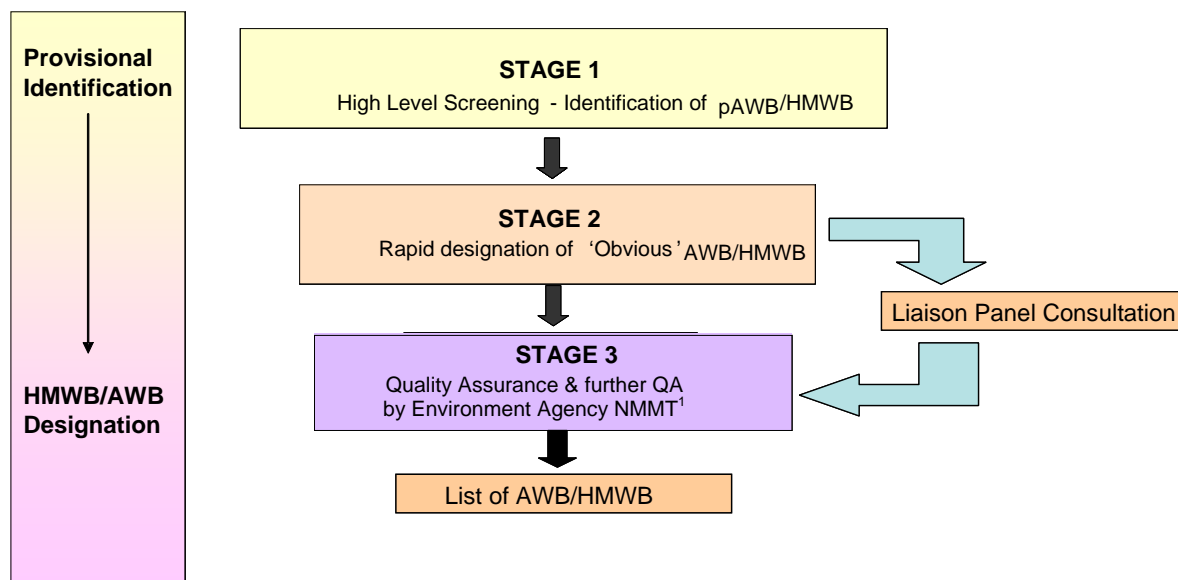
modified. If the 'other means' identified were a better environmental option and were not disproportionately costly then the water body could not be designated and screened out of further assessment. Only a small number of water bodies reached step seven to undergo these economic tests, most had been screened out at earlier stage.

- The final step (step eight) compiled all the steps undertaken during the detailed assessment and reports whether the water body was designated as an 'artificial water body', 'heavily modified water body' or 'not artificial or heavily modified water body' and any relevant comments supporting the designation.

### I.3 Estuarine and coastal waters water bodies

The designation of Artificial and Heavily Modified Water Bodies for Estuarine and Coastal Waters process is described in Figure I.6 below.

Figure I.6. **Summary of steps in the designation of estuarine and coastal water bodies** (¹ National Marine Monitoring Team)



Estuarine and Coastal Water Bodies were designated as Artificial and Heavily Modified Water Bodies for the following uses (outlined in the following sections)

- Flood protection use
- Navigation, ports and harbours use
- Coast protection use
- Marine aggregate extraction use
- Marine shell and fin fisheries use

The thresholds that were applied to the relationships between physical pressures, morphological change and ecological impacts were based on expert judgement.

## **Flood protection use**

Water bodies were assessed that had significant flood risk management assets that modify the hydromorphological characteristics to protect land. The removal of these assets could therefore compromise the benefits provided by flood protection.

The assessment was based on three separate elements relating to:

- the extent of reclaimed land protected by shoreline flood protection assets;
- barrages and barriers across the width of the main water body or forming a boundary with another water body which provide flood protection benefits; and
- sluices across the width of the main water body or forming a boundary with another water body which provide flood protection benefits.

It is recognised that there are a large number of sluices associated with coastal and estuarine flood protection structures but these generally do not form the boundary with an adjacent water body. The view has been taken that such structures are only likely to be significant in the context of heavily modified water body designation where they span the width of the main water body or form a boundary with an adjacent water body. In addition to barrages/barriers and sluices, there are also a number of weirs in estuarine and coastal waters. However, none of these are considered to provide any flood protection benefit. Their main purpose has generally been to maintain water levels in the vicinity of upstream towns/villages, and they are therefore not considered further in the assessment.

## **Navigation, ports and harbours use**

Water bodies were assessed that had a significant navigation, ports or harbour use that modifies the hydromorphological characteristics of the water body.

The assessment tested whether the actions to achieve good ecological status in these water bodies would compromise the benefits of navigation or ports and harbours.

The key criteria that have been used for the assessment were:

- the extent of navigation dredging in the water body - maintenance of navigable depth in previously deepened areas is critical to maintenance of the navigation use;
- the extent and intensity of dredge material disposal in the water body - disposal of dredge material is critical to the maintenance of the navigation use; and
- the extent of reclaimed areas behind quay lines - loss of quay line will directly affect specified use (unless there is significant long-term spare capacity).

Where the answer to any question was uncertain, the decision on whether to designate as a heavily modified water body for navigation or port and harbour use was deferred and the water body designated using expert judgement from Environment Agency area and national staff (taking into account any stakeholder comments available for the water body).

## **Coast protection use**

Water bodies were assessed that contained significant coast protection structures/structures associated with the manipulation of sediment transport. The assessment examines whether the actions to achieve good ecological status in these water bodies would compromise the benefits provided by the coast protection structures.

The key criteria that have been used for the assessment were:

- the extent of influence of manipulators of sediment transport on inshore waters within the water body; and
- the extent of infrastructure development afforded protection by coast protection structures.

They typically include soft cliff protection structures (linear defences) and beach erosion structures (groynes, offshore breakwaters). In some locations, coast protection is also delivered through beach nourishment. In some instances coast protection structures may also provide a flood defence function.

Where the answer to any question was uncertain, the decision on whether to designate as a heavily modified water body for reasons of coast protection was deferred and subject to more detailed assessment during the Environment Agency quality assurance and stakeholder consultation.

### **Marine aggregate extraction use**

Water bodies were assessed that were subject to marine aggregate extraction. Where such pressures were deemed to be significant, the assessment tested whether the actions to achieve good ecological status in these water bodies would compromise the benefits provided by the activity.

The key criteria that have been used for the assessment were:

- the extent of water body area licensed for marine aggregate extraction (Marine aggregate extraction generally occurs offshore and most licensed sites are out of the 1nm from baseline WFD boundary). However, a small number of extractions do take place within WFD water body boundaries including:
  - sub tidal extraction of sand and gravel;
  - intertidal extraction of sand; and
  - subtidal extraction of marl.
- the extent of water body area subject to active extraction or sediment disturbance in the past decade.

Where the answer to any question is uncertain, the decision on whether to designate as a heavily modified water body for reasons of marine aggregate extraction was subject to a more detailed examination using expert judgement from Environment Agency area and national staff (taking into account any stakeholder comments available for the water body).

### **Marine shellfisheries use**

Water bodies were assessed that were subject to marine shellfisheries use. Where such pressures are deemed to be significant, the assessment tested whether the actions to achieve good ecological status in these water bodies would compromise the benefits provided by the activity.

The criteria that has been used for the assessment was the extent of the shell fishing beds within designated shellfish waters within the water body.

The main hydromorphological impacts of shellfisheries include presence of structures (for cultivated shellfisheries) and bed disturbance during harvesting of shellfish (dredging, suction dredging). The alleviation of the pressures associated with shellfisheries can be achieved through reductions in the amount and intensity of harvesting and/or through controls on harvesting methods.

The assessment was based on the following information:

- extent of shellfish beds within designated shellfish waters in the water body; and
- threshold of 15% of total water body area to identify whether the water body is at risk of failing good ecological status.
- whether the shell fishing activities within the water body are likely to cause significant seabed disturbance and cover an area of greater than 15% of the water body area, (information supplied by the local Sea Fisheries Committee)

Where a water body is at risk from shellfisheries bed disturbance pressures (either alone or in combination with other forms of physical modification), two further specific tests need to be applied for a water body to be designated as heavily modified:

- would a reduction in extent of harvesting activity or change in harvesting method have a significant adverse effect on shellfisheries activity;
- would all environmentally better and technically feasible alternatives be disproportionately costly?

Consultation with Sea Fisheries Committees has indicated that the answer to both of these questions would generally be “Yes”. For the purposes of this assessment, if a water body has been identified as “at risk” because of shellfisheries pressure, it has been designated as a heavily modified water body.

Where responses have not yet been provided by the relevant Sea Fisheries Committees, the water body was flagged as “Unsure” and the final designation decision was made taking into account any received stakeholder and Environment Agency area comments before quality assurance.

### **Marine fin fisheries use**

Water bodies were assessed that were thought to be supporting significant fin fisheries activities. The criterion used for the fin fisheries assessment was:

- the extent of fin fishing activities including Otter and Beam trawling known to cause significant seabed disturbance

Where responses were not provided by the relevant Sea Fisheries Committee, the water body was flagged as “Unsure”. These were then further assessed as part of the Environment Agency quality assurance using any additional information from the stakeholder consultation.

## **I.4 Liaison panel review and further quality check of results**

### **Liaison panel review**

After the rapid designation stage was complete, these interim results formed the basis of a liaison panel consultation. Liaison panels were invited to comment on the results from the rapid designation and provide any additional evidence they held on water bodies. Any information provided by the liaison panels was used to augment the existing information held within the Environment Agency. Where designation results from the liaison panels and the rapid designation process were contradictory the water body information was reviewed and designation results were modified where appropriate.

### **Quality check of designation results**

A further quality check of the designation results was undertaken as part of the ecological potential classification process. This was the first time the water body designations were used operationally in order to classify artificial and heavily modified water bodies. Through this process various corrections were made where designations were found to be inaccurate.

### **Cross check with ecological status of the water body**

After the designation process was completed the Environment Agency made a cross check of the designation results and the ecological status of the water body. In some cases it was found that a water body has been designated as heavily modified yet the biological elements surveyed are showing good ecological status. Where this was the case the HMWB designation was removed. Further biological monitoring will be carried out between 2010 and 2012 to confirm that it was right to remove the designation.

## **I.5 Designation of additional water bodies**

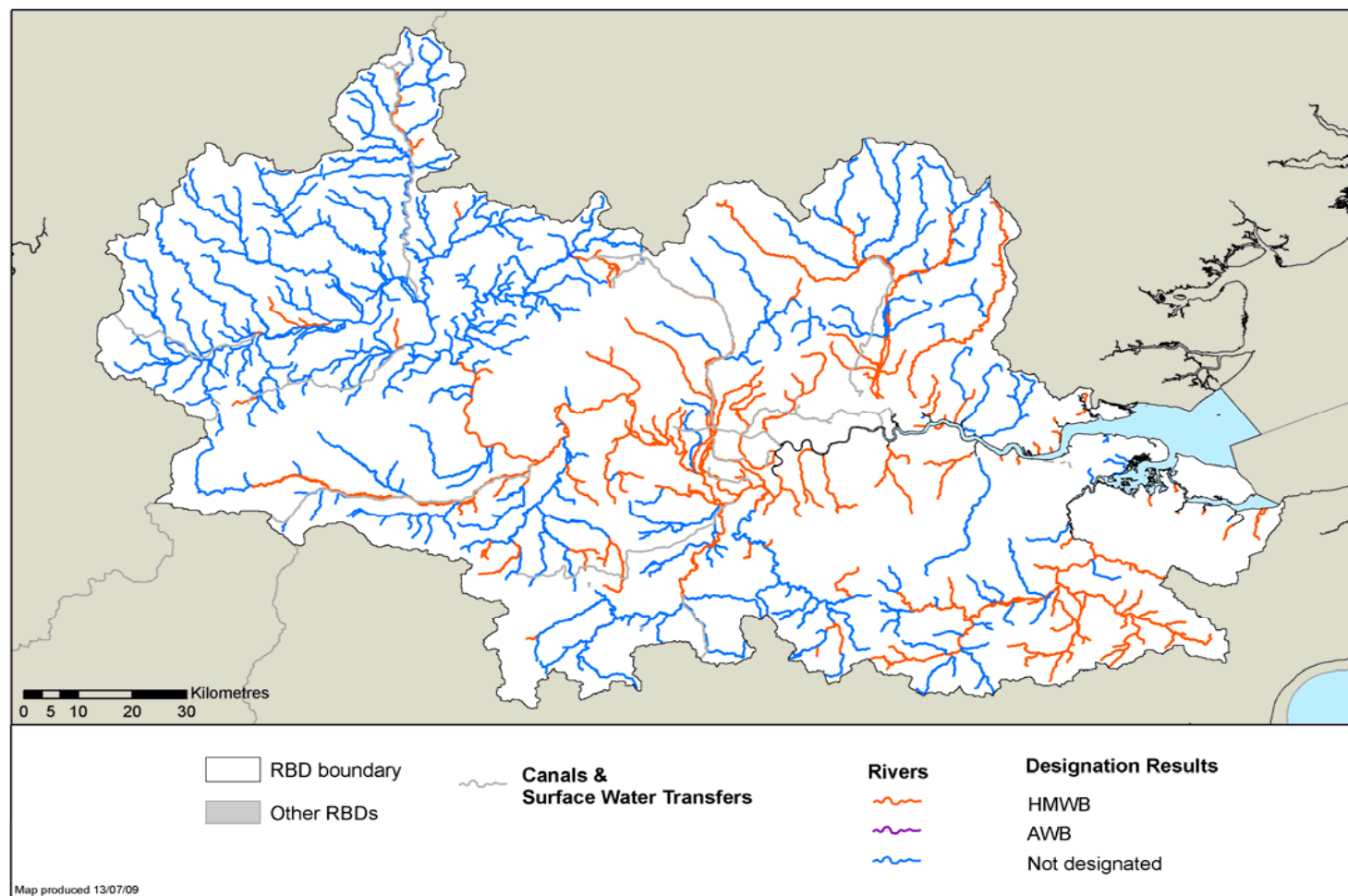
In March 2008, the Secretary of State agreed to the inclusion of additional water bodies and the re-delineation or splitting of a small number of existing water bodies. These water bodies were not identified in time to be included in the designation process described above. Due to resource constraints and limited data availability, these water bodies have been assessed as part of a much simpler designation process, largely based on the results of the hydromorphology risk assessments. Annex G discusses risk assessment in more detail.

Any water body with an 'at risk' or 'probably at risk' classification from the hydromorphology risk assessment process is designated as a provisional HMWB. Further map and aerial photography based analysis is used to identify provisional AWBs (based on physical indicators) which may include changing a previously identified pHMWB to a pAWB. An additional map-based assessment was used to provide a 'reality check' on the provisional designation status before the water bodies are finally identified as HMWBs or AWBs.

Water body use (or reason for designation) is based on the pressures identified in the hydromorphology risk assessment process and any further available information relating to use (e.g. conservation designation, drinking water protected area or freshwater fisheries protected area). The list of uses assigned to freshwater and coastal/estuarine water bodies is the same as that used in the full designation process described above.

## I.6 Results

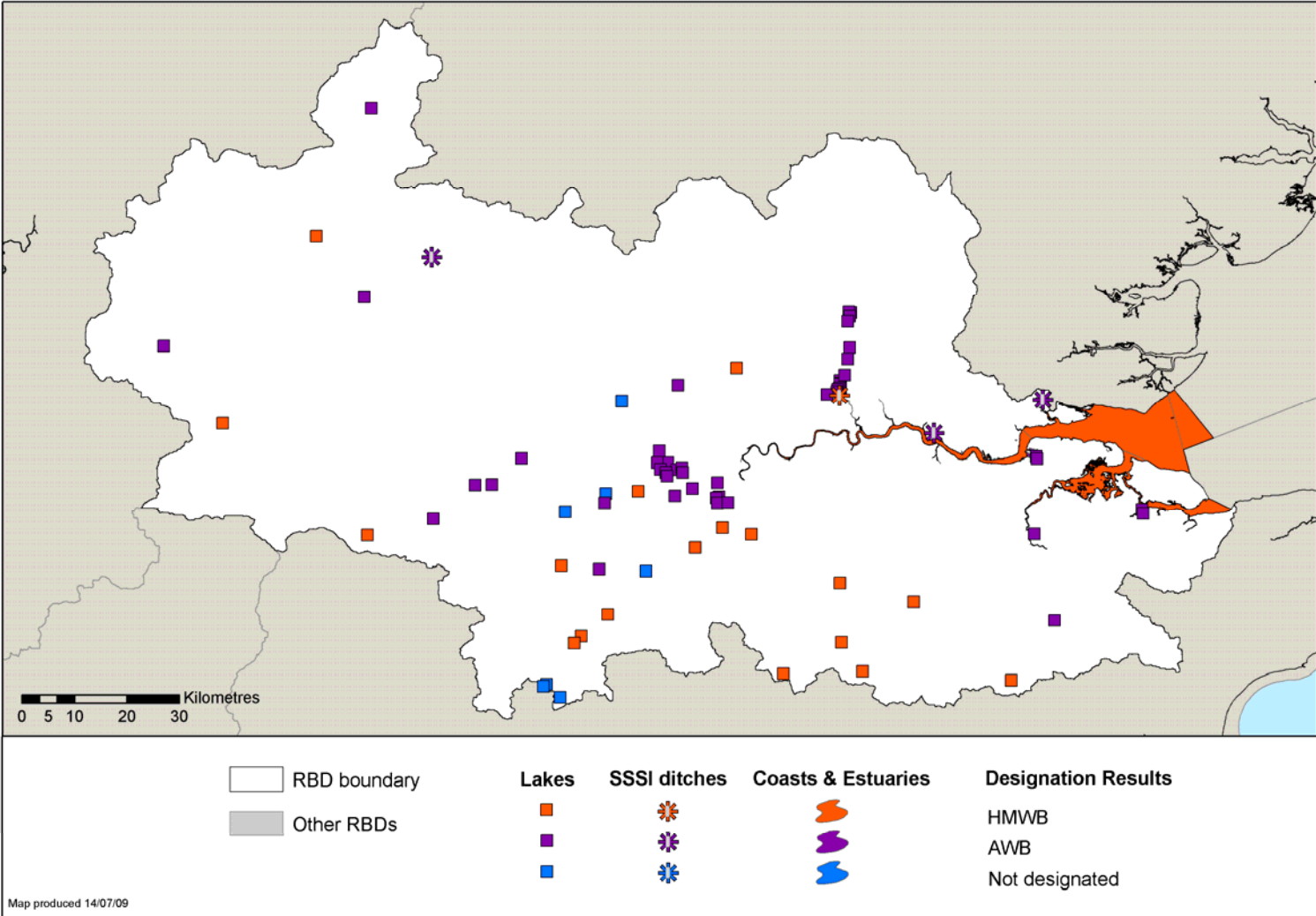
Figure I.7 The designation status for riverine water bodies



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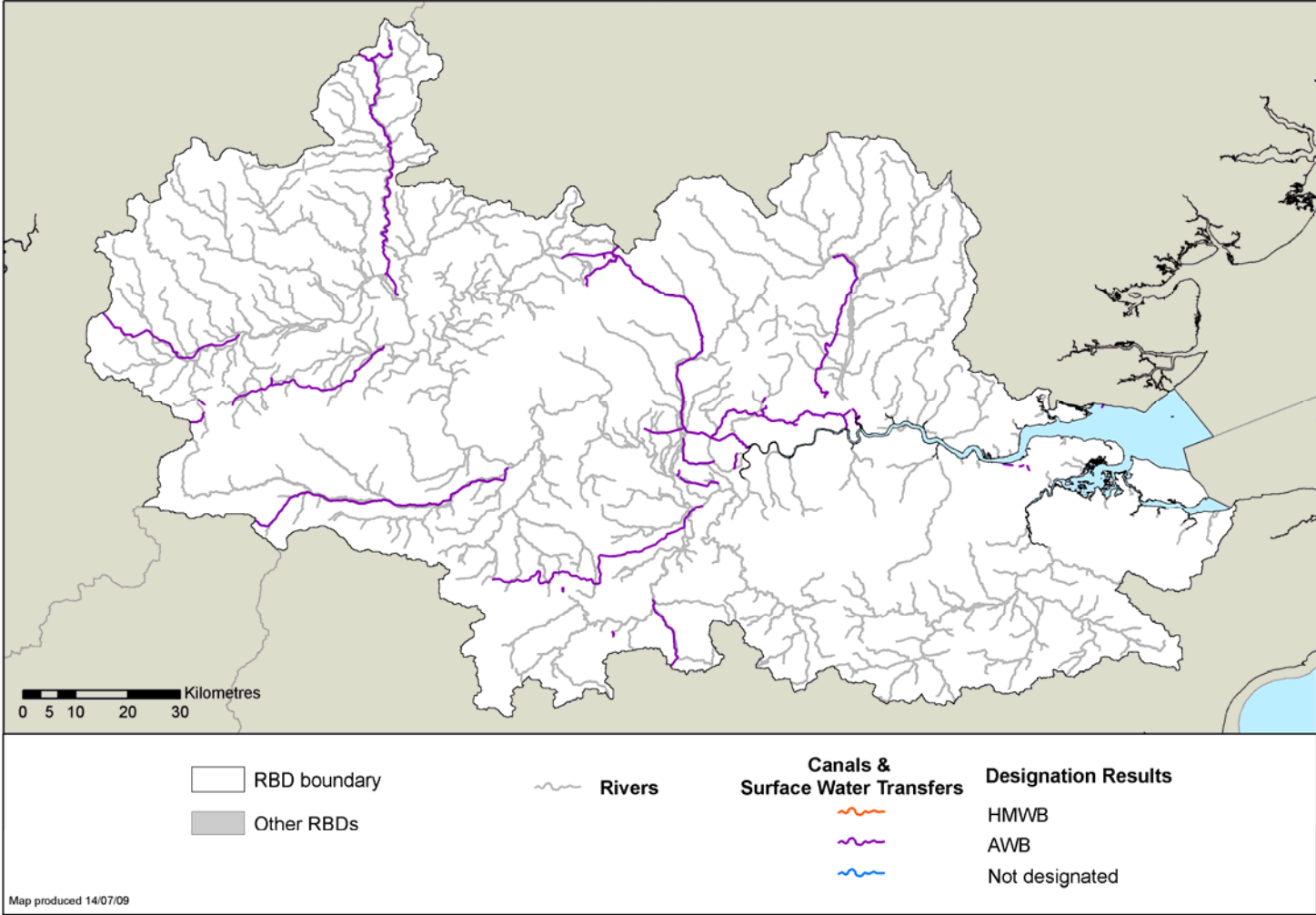
Figure I.8 The designation status for lake water bodies, coasts, estuaries and SSSI ditches



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Figure I.9 The designation status for canals & surface water transfer water bodies



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