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Transformation services under UWWTD: Calculating compliance, Algorithms used on the UWWTD SIIF toolbox

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1 Overall framework

1.1 Introduction

In the previous contract, the UWWTD SIIF platform included two pages to display information about compliance of stations and agglomerations, similarly to the EEA UWWTD viewer.

While the compliance for stations is not required by the Directive, the agglomerations and urban waste water treatment plants are linked together and it is necessary to calculate what is the situation for the stations first, to then calculate the agglomeration compliance. It is therefore relevant to show as well the status of each station and each agglomeration.

In order to clarify all the rules and implement the necessary calculation in the UWWTD SIIF platform, it was then deemed necessary to develop clear decision trees that present for non IT experts, how the compliance is calculated. These can then more easily be implemented by IT experts in a set of algorithms in a calculation tool, and this was done for the UWWTD SIIF platform.

1.2 Description of the steps and associated decision trees

Directive 91/271/EEC requires agglomerations to be connected most often via a sewer network (but sometimes also via trucks) to treatment plants which discharge the treated waste water via discharge points to receiving areas. The required treatment depends on the type of the receiving area (freshwater, estuary or coastal water) and on its sensitivity to eutrophication parameters, its use for Drinking water production or due to other Directives (sensitive areas) or because it is open marine water (less sensitive areas). The decision trees are organised as follows:

1. To be able to show the compliance of the urban waste water treatment stations, it is first necessary to calculate the treatment required considering the size of the agglomeration and the type of the receiving area. (see Algorithm n°1: Waste Water Treatment plant: treatment required step A and step B)
2. It is then necessary to look at the treatment in place to check if this matches to the required treatment calculated in previous step, and to see if the performance for all the parameters for which a treatment is required is declared to pass. It is only if the treatment in place is correct and the performance is correct, that the treatment plant can be considered compliant. (See Algorithm n°2: Waste Water Treatment plant: treatment compliance and performance compliance, Step A)
3. In the case a country was awarded a delay for implementing the Directive an exception exist for treatment plant not compliant: they are not considered for the rest of the calculation and classified as “pending deadline (PD)” (See Algorithm n°3: Waste Water Treatment plant: treatment compliance and performance compliance, step B)
4. It is then possible to calculate the compliance of the agglomeration to article 3 which covers the wastewater collection. (See Algorithm n°4: Article 3 compliance (agglomeration))

5. Due to the quality of data provided, it is necessary to exclude from the next steps of the calculation some of the agglomerations reported. (See Algorithm n°5: Article 4, 5, 6 compliance, exclusion of some cases (agglomeration))
6. To calculate the compliance of agglomeration to the 3 relevant articles, and, as many agglomerations have more than one treatment plant, a first step is needed, that is to calculate the compliance of each treatment plant to the requirements of these 3 articles. (See Algorithm n°6: Station compliance for Agglomeration Article 4, 5 and 6)
7. Once the compliance of each treatment plant is calculated, it is possible to calculate the compliance of the agglomeration by combining the compliance of the respective treatment plants the agglomeration is connected to for each article individually. This is done in a first step for article 4 only. (See Algorithm n°7: Compliance of agglomeration for Article 4)
8. Then for article 6 only. (See Algorithm n°8: Compliance of agglomeration for Article 6)
9. Then for article 5 only. (See Algorithm n°9: Compliance of agglomeration for Article 5)
10. To calculate the overall compliance, the compliance to each article calculated previously is used, with the general rule that one not compliant situation leads to overall not compliant agglomeration. (See Algorithm n°10: Hierarchical compliance: overall compliance (agglomeration))
11. To calculate the legal compliance for each article, it is necessary to consider the hierarchical compliance rule (See Algorithm n°11: Hierarchical compliance: Legal compliance of individual articles 4, 5 & 6 (agglomeration))

All the above calculations are then used to feed the compliance maps of the UWWTD SIIF platform, but also the compliance graphs and each individual treatment plant fiche and agglomeration fiche.

To facilitate the appropriation by non experts, we chose to show all compliant situations and when a situation is not compliant but the deadline is still pending, it is shown as “Not Relevant” which means not compliant but deadline not passed. However the result of the calculation is stored in the platform as “Pending Deadline” to facilitate checking by administrator of the system.

2 Annexes

Algorithm n°1: Waste Water Treatment plant: treatment required step A and step B

Algorithm n°2: Waste Water Treatment plant: treatment compliance and performance compliance

Algorithm n°3: Waste Water Treatment plant: treatment compliance and performance compliance, correction for transitional period

Algorithm n°4: Article 3 compliance (agglomeration)

Algorithm n°5: Article 4, 5, 6 compliance exclusion of some cases (agglomeration)

Algorithm n°6: Station compliance for Agglomeration Article 4, 5 and 6

Algorithm n°7: Compliance of agglomeration for Article 4 only

Algorithm n°8: Compliance of agglomeration for Article 6 only

Algorithm n°9: Compliance of agglomeration for Article 5 only

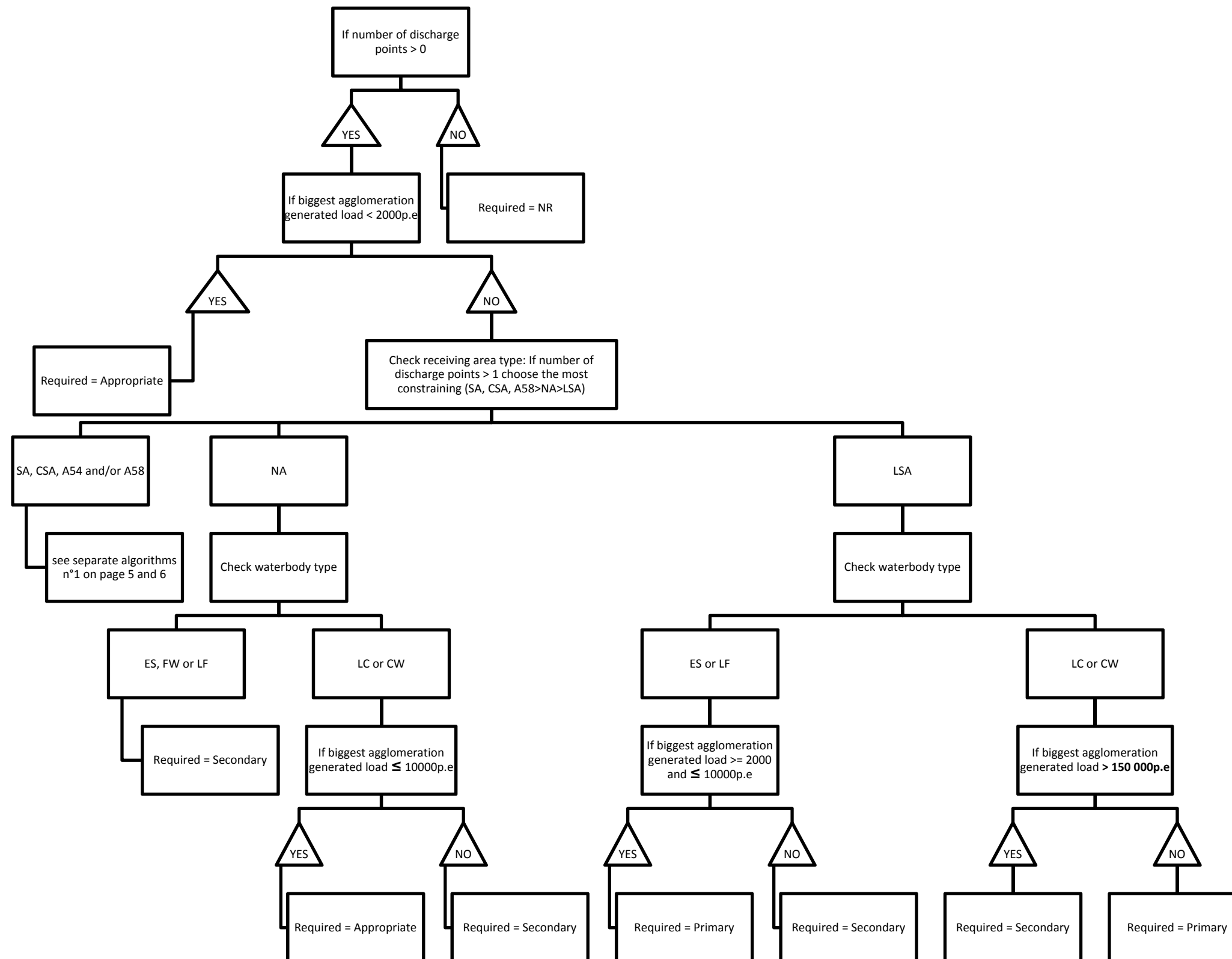
Algorithm n°10: Hierarchical compliance: overall compliance (agglomeration)

Algorithm n°11: Hierarchical compliance: Legal compliance of individual articles 4, 5 & 6 (agglomeration)

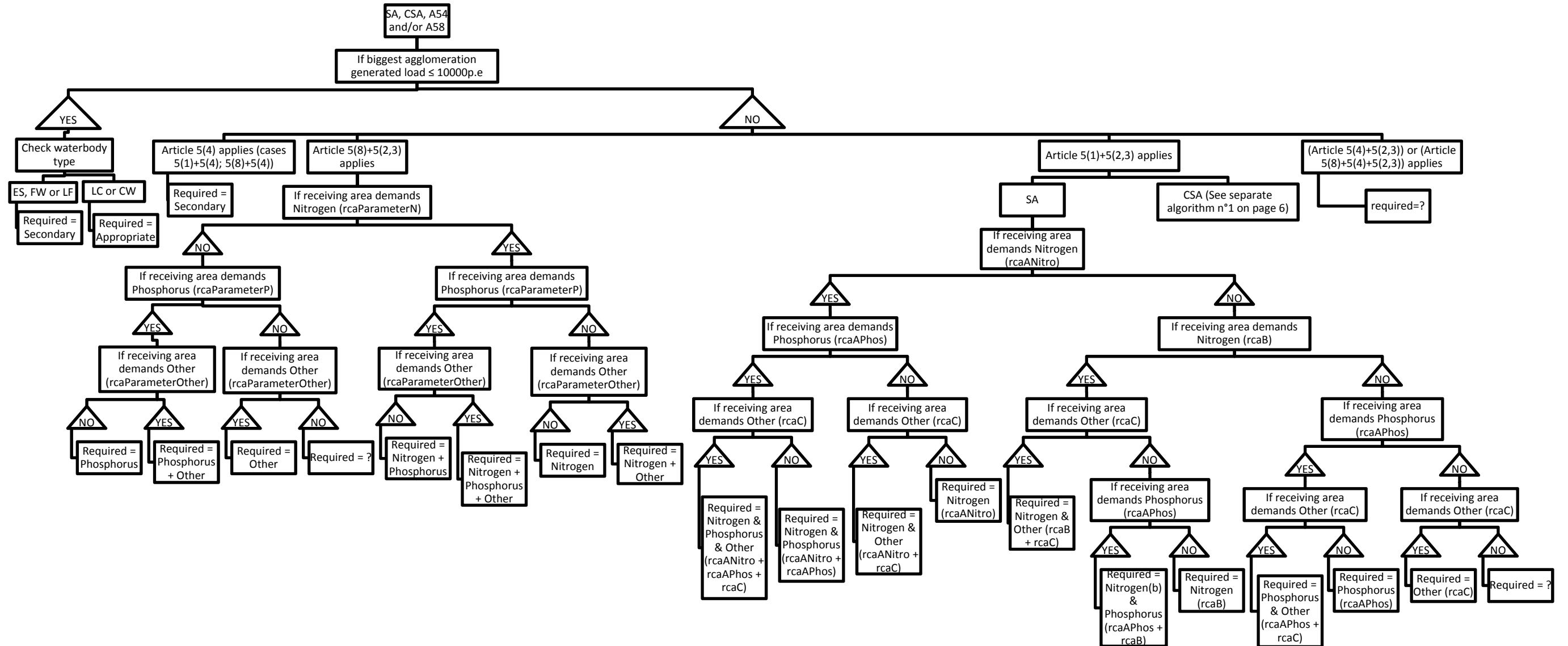
List of acronyms used in the following pages:

p.e.	Population equivalent
BOD5	Biological Oxygen Demand for 5 days
COD	Chemical Oxygen Demand
SA	Sensitive Area
CSA	Catchment of Sensitive Area
A54	Sensitive Area applying article 5(4)
A58	Sensitive Area applying article 5(8)
NA	Normal Area
LSA	Less Sensitive Area
ES	Estuary
FW	Freshwater
LC	on land (catchment of coastal water)
LF	on land (catchment of freshwater and / or estuary)
CW	Coastal Water
C	Compliant
NC	Not Compliant
PD	Pending Deadline (<i>considered Not Relevant - NR in the SIIF platform</i>)
NR	Not Relevant
QC	Questionable Compliance (<i>considered Compliant - C in the SIIF platform</i>)
AddQC	Additional Questionable Compliance (<i>only kept for information in database</i>)
C	Calculated
E	Estimated
M	Measured

Algorithm n°1: Waste Water Treatment plant: treatment required

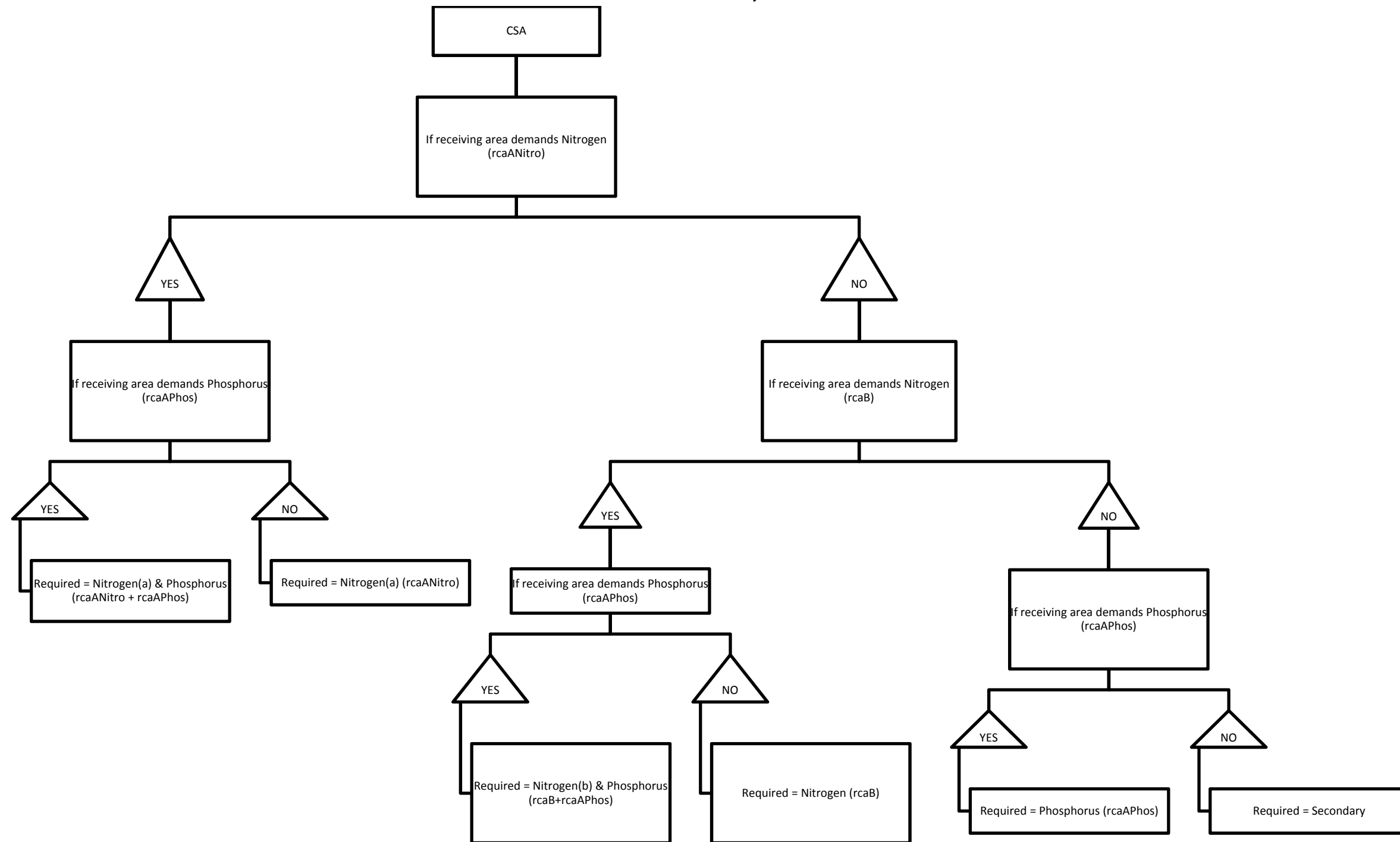


Algorithm n°1: Waste Water Treatment plant: treatment required (sensitive areas)



In bracket the name of the field in the data dictionary

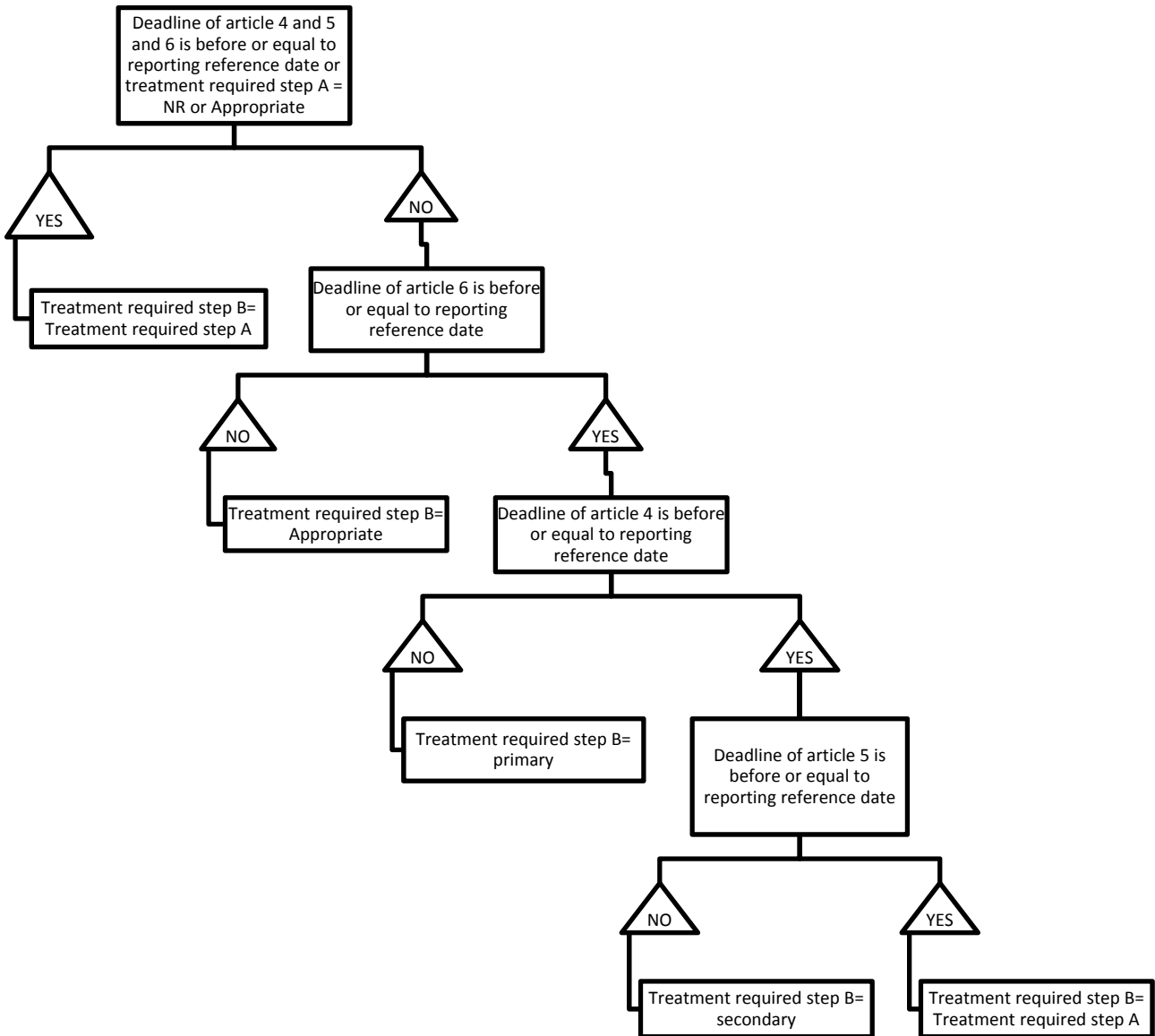
Algorithm n°1: Waste Water Treatment plant: treatment required (Catchment of sensitive areas)



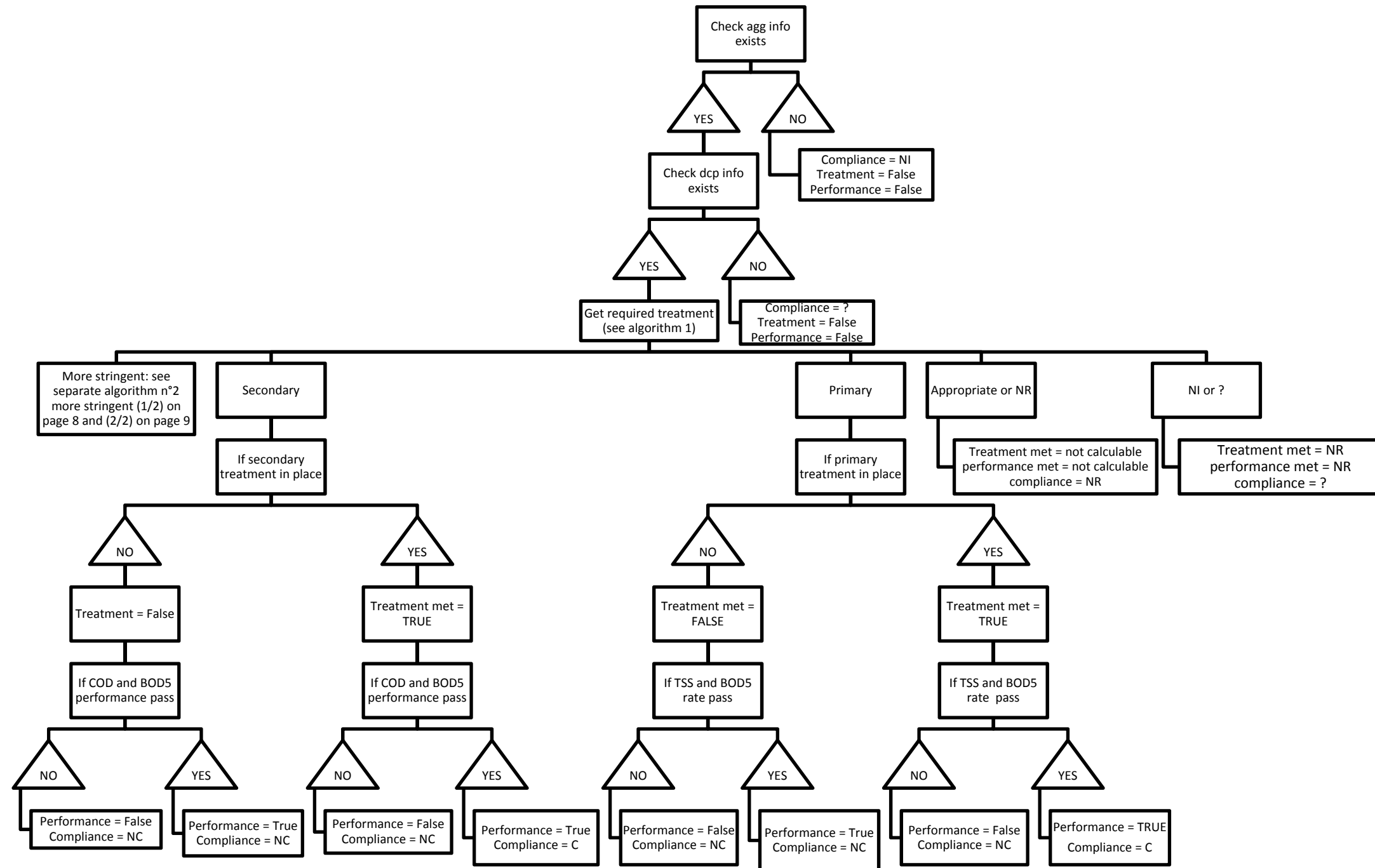
- Nota: The case where receiving area demands criterion c (other treatment) is not considered/listed here, because according to the document "UWWTD legal compliance assessment methodology document - Final version from 20 June 2014" (page 10) compliance with Article 5 under criterion c is only assessed for SA, but not for CSA. Hence if CSA demands criterion c only, the required treatment is only secondary.

Algorithm n°1: Waste Water Treatment plant: treatment required step B

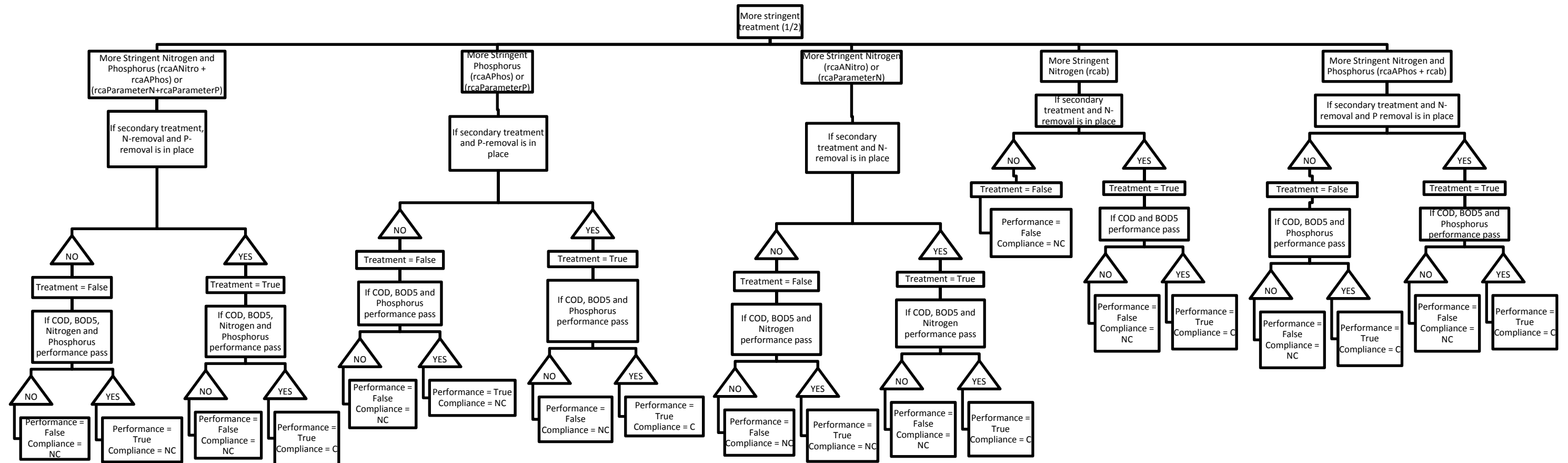
Nota: only apply test on deadline of article 4, 5 or 6 if deadline of article <> (null or NR or NI or ?) else test next article in tree



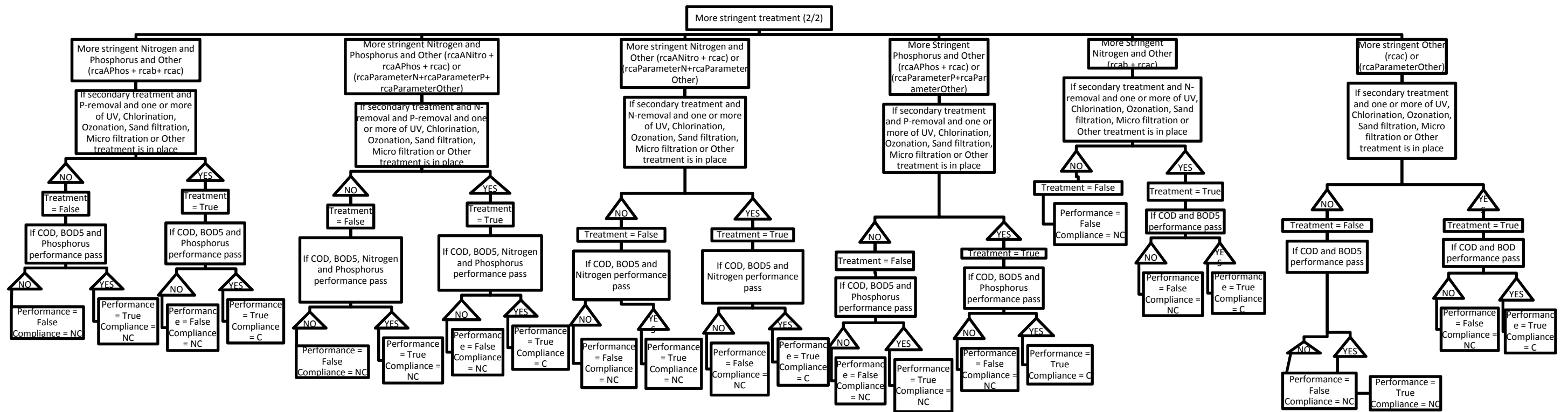
Algorithm n°2: Waste Water Treatment plant: treatment compliance and performance compliance (except more stringent treatment)



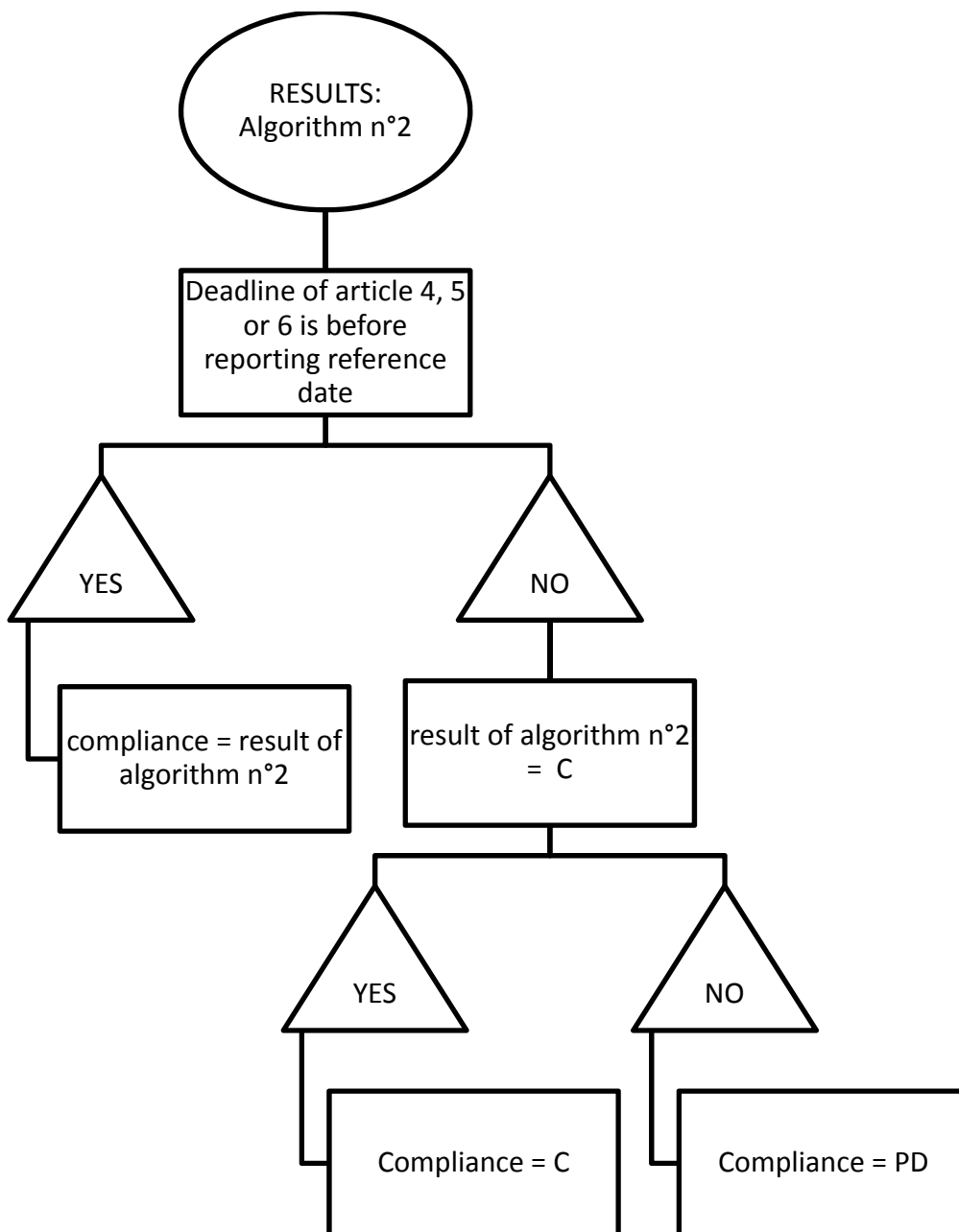
Algorithm n°2: Waste Water Treatment plant: treatment compliance and performance compliance (more stringent treatment 1/2)



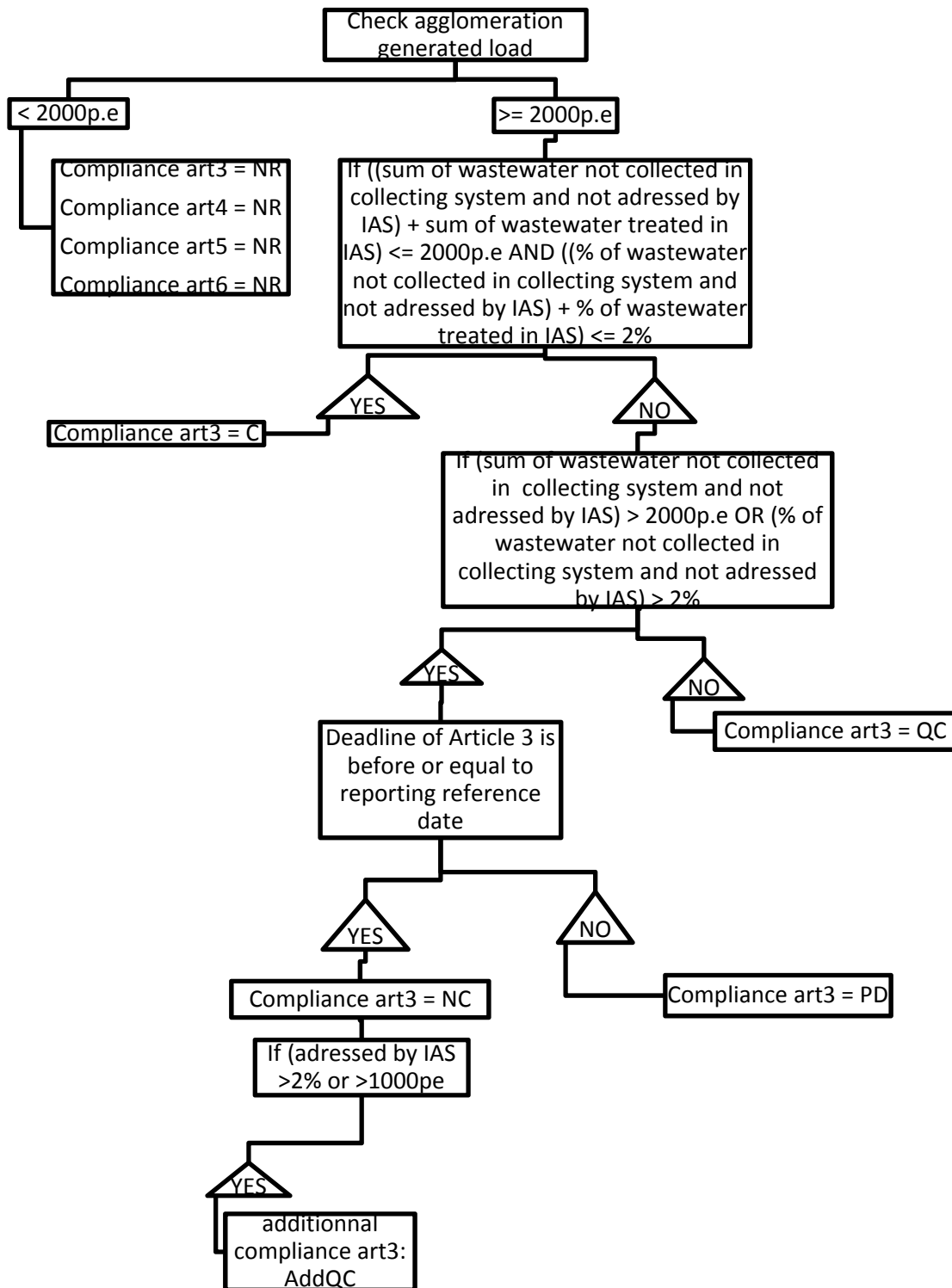
Algorithm n°2: Waste Water Treatment plant: treatment compliance and performance compliance (more stringent treatment 2/2)



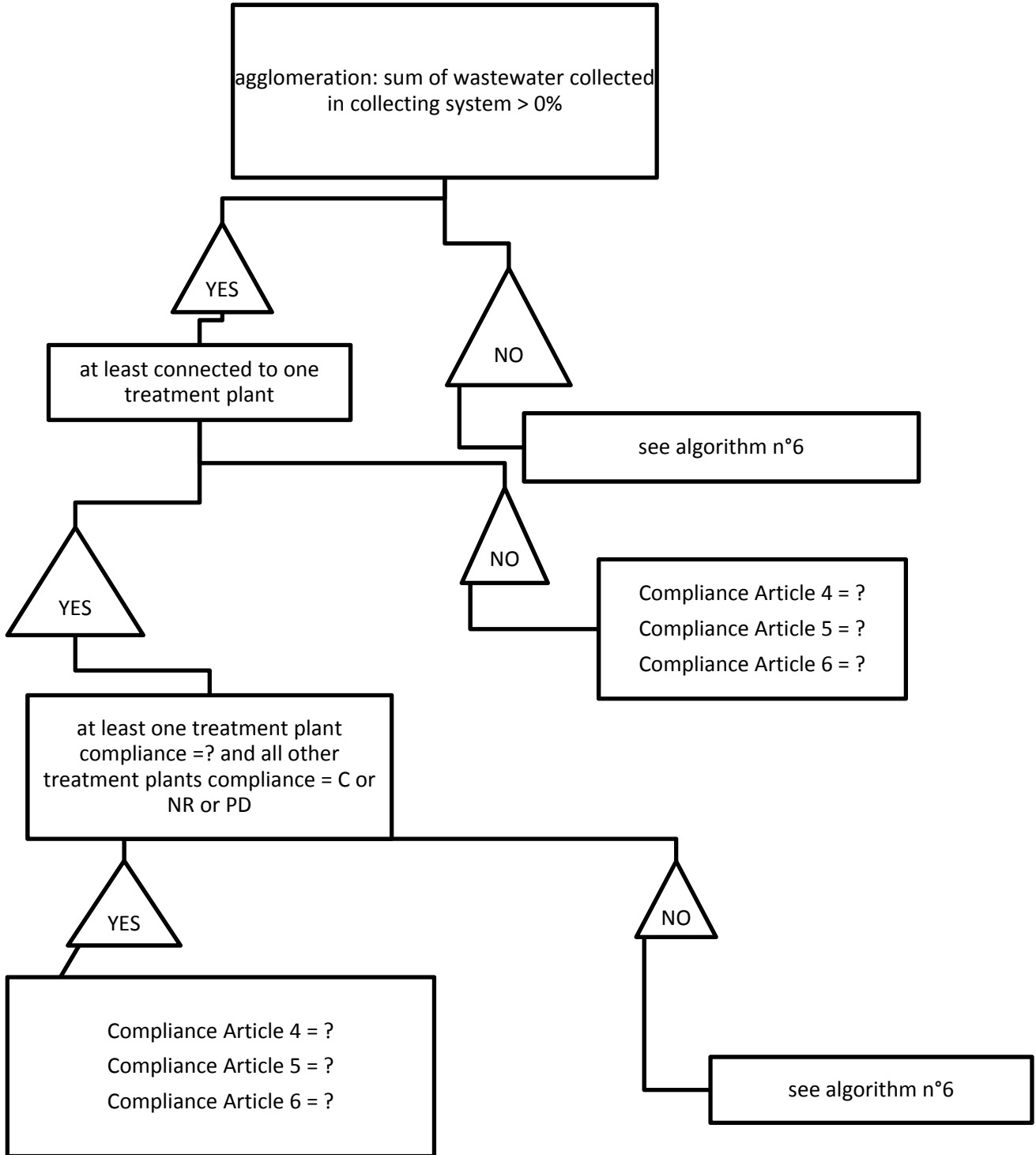
Algorithm n°3: Waste Water Treatment plant: treatment compliance and performance compliance, correction for transitional period



Algorithm n°4: Article 3 compliance (agglomeration)

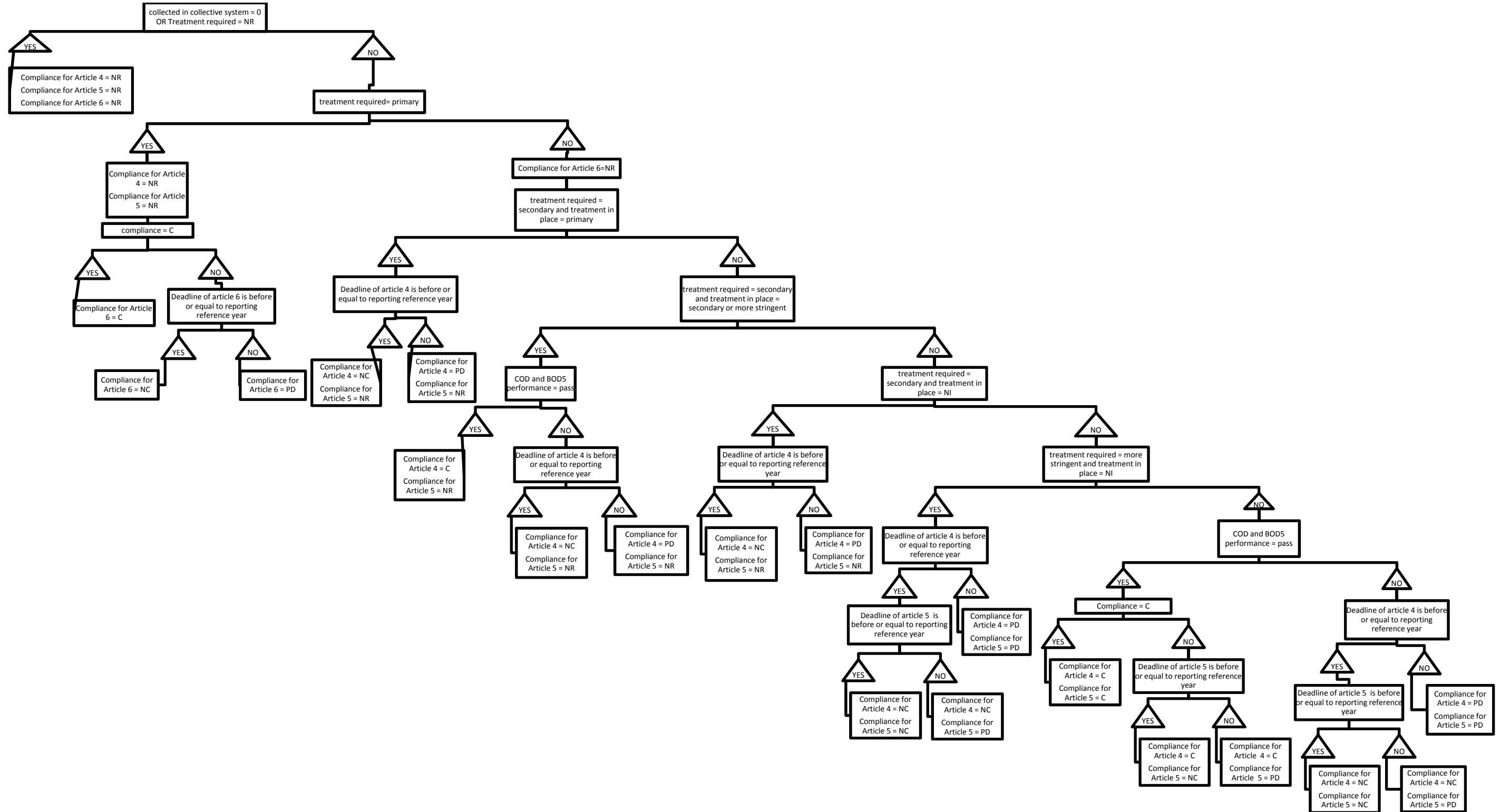


Algorithm n°5: Article 4, 5, 6 compliance exclusion of some cases (agglomeration)

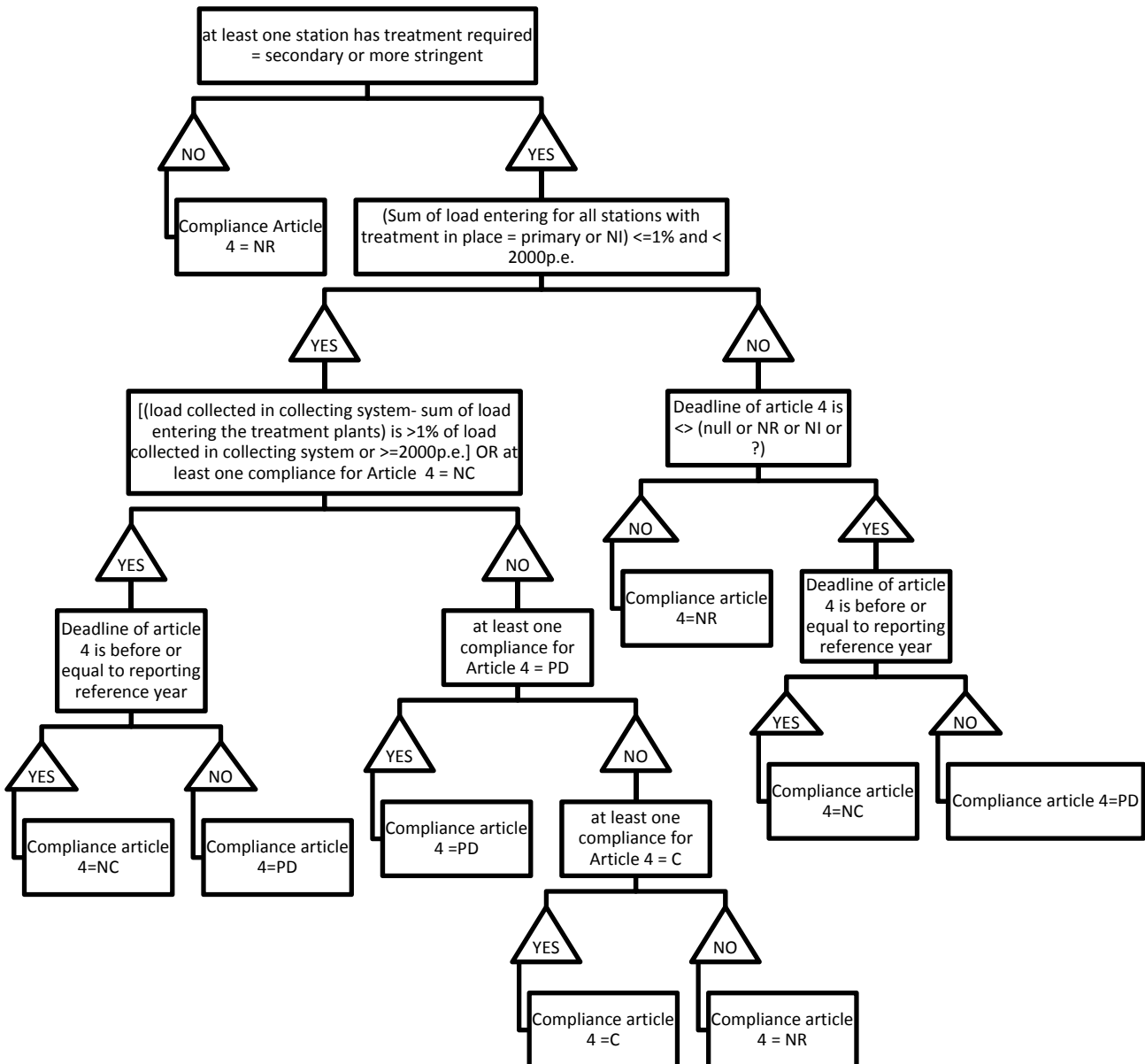


Algorithm n°6: Station compliance for Agglomeration Article 4, 5 and 6

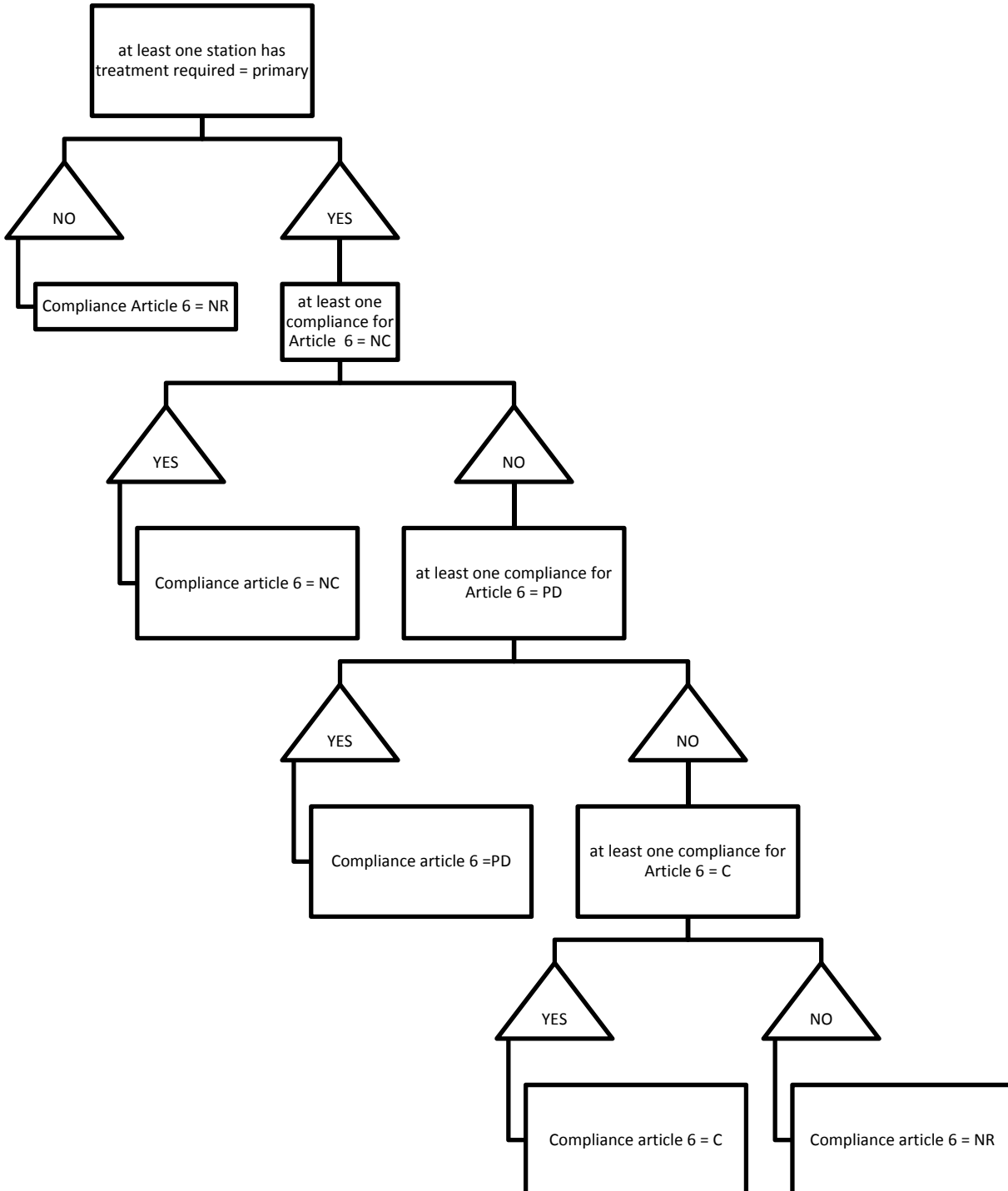
Nota: only apply test on deadline of article 4, 5 or 6 if deadline of article <> (null or NR or NI or ?) else Compliance for article 4, 5 or 6 = NR



Algorithm n°7: Compliance of agglomeration for Article 4 only



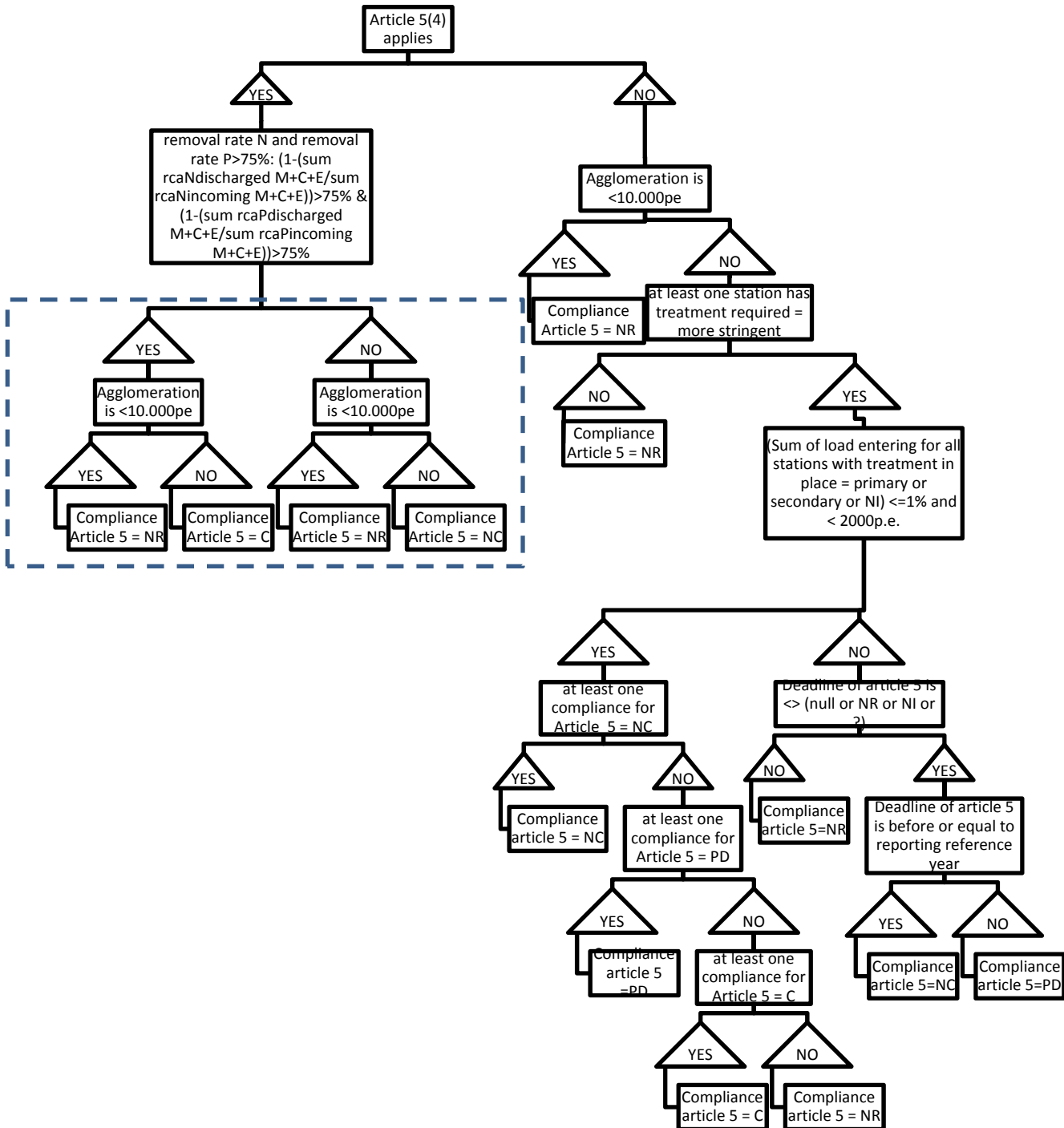
Algorithm n°8: Compliance of agglomeration for Article 6 only



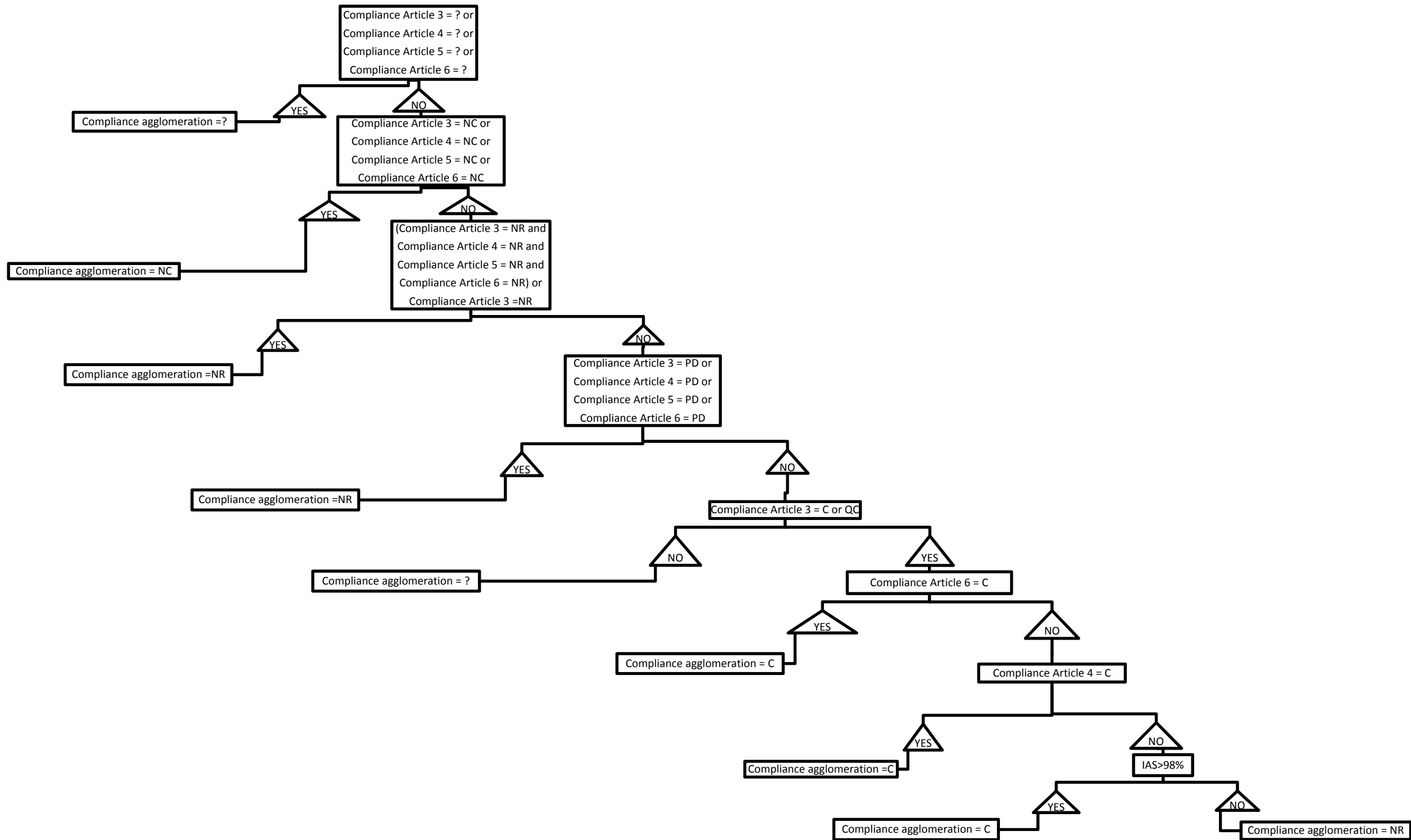
Algorithm n°9: Compliance of agglomeration for Article 5 only

M+C+E stands for Measured, Calculated or Estimated

 Interpretation made in 8th reporting assessment



Algorithm n°10: Hierarchical compliance: overall compliance (agglomeration)



Algorithm n°11: Hierarchical compliance: Legal compliance of individual articles 4, 5 & 6 (agglomeration)

