Dutch Energy Efficient Mortgage Framework

On the application of the Technical Screening Criteria for DNSH in respect of Section 7.7 of the EU Taxonomy

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ENERGY EFFICIENT MORTGAGES
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The Energy Efficient Mortgages NL Hub ("EEM NL Hub") is an association set up with the aim of supporting and promoting the acceleration and adaptation of energy efficient housing in the Netherlands and the financing thereof. The Dutch Energy Efficient Mortgage Framework ("DEEMF") is available to all parties directly or indirectly involved in financing Dutch (residential) properties, be it by granting mortgage loans to consumers or investing therein, or otherwise.

The EEM NL Hub has no formal capacity when it comes to interpreting (EU or other) legislation. The interpretation of the EU Taxonomy as presented in this document is only that: an interpretation, specific to the Dutch residential real estate market. Applying the framework is voluntary, and the framework is intended to work on a 'comply or explain' basis[1] in the future.

DEEMF has been composed based on the input from members and affiliated members of the EEM NL Hub collected as feedback during working group sessions. This document is therefore a summary as composed by the EEM NL Hub but is not necessarily the official position of any of the individual institutions participating in the EEM NL Hub.

Great care has gone into compiling this document. However, it could contain mistakes. We welcome any observations and recommendations for improvement. Please feel free to submit them at: info@eemnl.com.

1 The option for an institution to "not comply and explain" on individual line-items is intended to leave sufficient flexibility to accommodate those institutions that look to apply stricter criteria than included in DEEMF and to those institutions that are still in the process of working towards a full application of DEEMF.

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Executive Summary

This document provides an overview of how Appendix A of the Climate Delegated Act for Climate Change Mitigation under the EU Taxonomy can be practically applied to Dutch residential mortgage loans. Drawing on the work of the EEM NL Hub working group, we present a combination of initial experiences and insights into conducting Climate Risk and Vulnerability Assessments in practice.

The document leverages the expertise of the working group members in assessing and applying relevant hazards affecting buildings in the Netherlands. Additionally, we provide an overview of interpretations, resources, data, limitations, and inferences. The assessment method described here serves as an overview of common denominators on key elements; it is not intended as a minimum or baseline standard. Instead, it offers a foundational approach that institutions can build upon and adapt to their specific needs.

Furthermore, we present risk clusters in which the most significant hazards are grouped based on their relevance and data availability. This method enhances consistency and transparency in the conduct of climate risk and vulnerability assessments.

1 Introduction

The year 2024 has been a significant milestone for Dutch financial institutions in putting the EU Taxonomy into practice. For the first time, most financial institutions included EU Taxonomy reporting in their annual accounts, including the publication of the Green Asset Ratio ("GAR"). This was therefore also the first year that institutions needed to apply the Do No Significant Harm ("DNSH") criteria and describe and evaluate the methods and assumptions used in their assessments.

In 2023, the EEM NL Hub published the *Overview Paper DNSH Appendix A 2023* ("DNSH 2023 Overview Document"). This paper focused on Climate Risk and Vulnerability Assessments ("CRVA") for residential mortgage loans and explored key topics, such as identifying climate risks assessment from a theoretical perspective and an interpretation of the Appendix A text. While this provided an important foundation, the focus was primarily on understanding the regulatory requirements and the (theoretical) context rather than on applying it in practice.

This document ("DEEMF DNSH 2024") builds on last year's publication but shifts towards a more practical approach. Developed through the collective input of the DNSH sub-working group members, this document captures key lessons and experiences gained over the past year. It takes a closer look at the data, assumptions, and shortcomings in current CRVA methodologies, identifying areas where improvements can be made in the future.

Over the past year, it has become clear that institutions have approached the DNSH criteria of Appendix A and CRVA in diverse ways, using different data sources, thresholds, and interpretations. This paper aims to provide a shared basis for understanding and applying these criteria while recognising the need for flexibility to reflect each institution's unique context.

DEEMF DNSH 2024 is not intended to establish a baseline or minimum standard for CRVA, nor should it be regarded as a detailed implementation guide. Instead, it offers a general overview based on shared experiences and lessons learned. The content reflects commonalities and approaches agreed upon by members of the working group, providing a foundation for understanding and application. Institutions are encouraged to view this document as a resource to support their efforts, adapting its insights to their specific contexts rather than treating it as a prescriptive framework.

As further explained in Section 2, DEEMF DNSH 2024 focusses on Section 7.7 (*Acquisition and Ownership of Buildings*) of the Climate Delegated Act. Other activities within Section 7 are not in scope of DEEMF DNSH 2024. The different steps required to be taken in the CRVA are further analysed in Section 3. Section 4 contains the analysis of the different climate risks of Appendix A before we look at ways of how to apply them to Dutch residential mortgage loans in Section 5. Section 6 describes an alternative approach based on the clustering of different climate risks before concluding with Section 7.

2 Scope, design and development of DEEMF DNSH

2.1 Scope

This document is the outcome of the analysis of the EEM NL Hub working group sessions, where we have discussed in detail the different sub-sections of the EU Taxonomy and its application to existing residential mortgage lending practices and related regulations[2].

In this publication, we focus solely on the DNSH criteria outlined in Appendix A for the economic activity "Acquisition and Ownership of Buildings," as described in Section 7.7 of Annex I to the Climate Delegated Act. As will be shown later, we have only been able to partially apply the criteria of Appendix A, primarily due to the general lack of granular data on adaptation solutions for residential buildings.

It is important to note that Section 7.7 addresses both existing and new buildings. The application of Appendix A to economic activity 7.1 is expected to follow a similar approach, though some differences exist. In particular, adaptation solutions for new constructions need to be considered in a different manner than for existing buildings. Another relevant consideration is the applicability of the data (especially the maps as discussed in section 6 below) as by definition, they do not consider the situation where the area under consideration is changed into an urban / built-up area.

2.2 Design

DEEMF is designed to (in due course) work on a 'comply or explain' basis: if applied by an institution, it can indicate whether it applies the common or baseline interpretation of DEEMF, or, if not, the provide an alternative definition or application of the relevant term. At this point in time, no formal disclosure guidelines for the comply or explain feature have been developed, not for the SCC analysis nor for the CRVA as requirement under DNSH.

The assessment method outlined here provides a summary of shared principles on essential elements, without establishing a fixed minimum or baseline standard. It is intended as a flexible framework that institutions can customise to align with their unique circumstances and requirements. By focusing on common denominators, it encourages adaptation and innovation rather than imposing rigid guidelines. This approach empowers organisations to refine and expand upon the methodology in ways that best suit their strategic objectives.

This document does not establish a deterministic baseline interpretation as seen in our publication on the Substantial Contribution Criteria, where a baseline interpretation is outlined, but specific deviations are left to the user's discretion. The evolution of the DEEMF DNSH analysis may, in the future, depend on i) the direction set by the DNSH working group, ii) the development of the EU Taxonomy, and iii) advancements in data availability. These factors will determine whether DEEMF DNSH can adopt a more deterministic approach.

2 Commercial real estate is (currently) not in scope for analysis of the EEM NL Hub, on purpose, any (regulatory) references that are relevant for commercial real estate are omitted in this document.

2.3 Development

DEEMF DNSH 2024 has been compiled by the EEM NL Hub with extreme care and after extensive consultation with i) the participants in the relevant EEM NL Hub working groups, and ii) other stakeholders. The framework document has been presented to the members of the EEM NL Hub for approval taking into account the currently applicable:

1) EU and national regulations, including Commission Notice publications;
2) Availability of energy efficiency, climate and mortgage loan data; and
3) Best practices in the Dutch market.

The EEM NL Hub will be monitoring relevant regulatory developments and improvements in respect of data availability and methodologies with a view to update the DEEMF for any relevant developments after careful analysis, consideration and evaluation. The exact content of future revisions of the DEEMF will be determined by and subject to approval of the members of the EEM NL Hub.

DEEMF DNSH 2024 has been established by the EEM NL Hub working group members building on three key perspectives:

1. Interpretation & application:

Do we understand the Technical Screening Criteria as laid down in Appendix A Generic criteria for DNSH to climate change adaptation and can we apply them to the Dutch housing and mortgage market?

Although this might sound like a basic question to ask, it is important to realise that the process of drafting the EU Taxonomy has taken several years and reflects input from many member states and is thus a document full of (political) compromises and local perspectives. Application of this EU-level wording in a specific jurisdiction is therefore less straightforward than one would expect, particularly given the fact that construction, energy labelling and mortgage lending are highly jurisdiction specific activities. In addition, the applicability of certain climate risks, are highly specific to the local situation.

2. Data availability:

Do we think there is data available to demonstrate compliance with the Technical Screening Criteria?

At this stage, the focus has been on identifying possible data-sources and establishing if the necessary data is likely to be available and what the obstacles are for obtaining this data in the future. As further discussed below, whether or not certain data is or is expected to be available was taken into consideration in setting the definitions as included in DEEMF.

3. Application to mortgage loan level:

Can the mortgage loan or mortgage loanpart that is linked to the relevant economic activity, be identified?

One of the most tangible expressions of EU Taxonomy alignment is the reporting of Taxonomy Alignment and the Green Asset Ratio, as mandated by the Disclosure Delegated Act. Therefore, determining the loan attached to a sustainable activity is an essential component of the analysis and the calculation underlying the determination of the Green Asset Ratio ("GAR").

In the Netherlands we have the somewhat special situation that most residential mortgage loans are composed of multiple loan parts, depending on the redemption profile, interest fixed rate period and loan purpose selected by the borrower. This has also been taken into consideration in determining the definitions as included in the DEEMF.

However, given the fact that DEEMF DNSH 2024 is limited to the application of DNSH in respect of economic activities covered in Section 7.7 of the EU Taxonomy, in this document the full outstanding mortgage loan amount is considered (see also DEEMF SCC 2024).

3 CRVA Context and Overview

In this section, we provide an overview of the context of DEEMF DNSH 2024, particularly in relation to the DNSH 2023 Overview Document. We revisit key concepts, including the high-level decision tree and the conceptual model that formed the basis of our theoretical analysis. Furthermore, we elaborate on the assumptions underpinning our work and provide additional context to highlight the collaborative efforts and progress achieved within the EEM NL Hub DNSH working group.

3.1 EEM NL Hub DNSH Appendix A. Overview paper

DEEMF DNSH 2024 builds upon the DNSH 2023 Overview Document, which served as a comprehensive introduction to climate risk assessment within the framework of the EU Taxonomy's Climate Change Mitigation objective. The DNSH 2023 Overview Document focused on analysing the Do No Significant Harm (DNSH) criteria set out in Appendix A of the Climate Delegated Act, particularly as they apply to economic activity 7.7, "Acquisition and ownership of buildings."

The primary objective of the DNSH 2023 Overview Document was to familiarise readers with the theoretical aspects of the DNSH criteria and to provide a grounding in the conduct of Climate Risk and Vulnerability Assessments (CRVA) as required by the EU Taxonomy. The document delved into the DNSH criteria, offering an interpretation of the requirements in the context of the real estate sector, and explored how these criteria could be applied when assessing the climate-related risks to residential properties.

Key areas covered in the DNSH 2023 Overview Document included:

- Introduction to the DNSH Criteria: The document explained the wording and intent behind the DNSH criteria, ensuring that readers understood the principles governing the EU Taxonomy and its focus on mitigating significant harm to environmental objectives.
- Climate Risk Analysis: A thorough theoretical introduction to climate risk analysis was provided, with a particular emphasis on how these analyses should be conducted from a real estate perspective. The document covered various methods and best practices for assessing physical climate risks, such as flooding and extreme weather events, which are particularly relevant to the Netherlands.
- Interpretation of the DNSH Criteria: The document offered a linguistic and analytical interpretation of the DNSH wording, specifically in relation to economic activity 7.7. This included a detailed examination of how the criteria could be practically applied to residential mortgage portfolios, considering the unique risks and vulnerabilities associated with Dutch properties.
- Data and Resources: The DNSH 2023 Overview Document also identified potential data sources, context and resources that could be utilised in the Netherlands for conducting climate risk assessments. It provided high-level guidance on where to find relevant information and how to apply it effectively within the context of DNSH criteria.
- CRVA Methods: Finally, the document introduced methods and best practices for performing a CRVA specifically for buildings. It outlined different approaches that could be adopted depending on the specific circumstances and needs of financial institutions, while emphasising the importance of thorough and consistent risk assessments.

However, the DNSH 2023 Overview Document was primarily theoretical and exploratory, aimed at laying the groundwork for future developments. It was not intended to serve as a rigid framework or prescriptive method for conducting climate risk assessments in practice. Instead, it provided an essential introduction to the concepts, definitions, and methodologies that underpin the DNSH criteria, offering a platform for further exploration and practical application.

DEEMF DNSH 2024 represents a significant evolution from this initial theoretical work. Drawing on the insights gained from real-world applications and the practices as applied by the majority of Dutch financial institutions over the past year, this analysis shifts from theory to practice. It presents an overview and method that is rooted in the actual experiences, offering a practical and standardised framework that can be directly applied to residential mortgage portfolios.

DEEMF DNSH 2024 addresses the variations in interpretation, data usage, and threshold setting that have emerged, and aims to provide a comprehensive overview of the different approaches to the application of DNSH criteria in respect of Section 7.7. By building on the theoretical insights from 2023, this DEEMF DNSH 2024 publication serves as a practical guide on how to conduct climate risk assessments in a rigorous and standardised manner.

Box 1: Recap DNSH 2023 Overview Document

2023 - Overview Paper - Do No Significant Harm (Appendix A) of the EU Taxonomy – Section 6

Section 6 of our DNSH 2023 Overview Document provides a detailed analysis of the Do No Significant Harm (DNSH) criteria as outlined in Appendix A of the EU Taxonomy, focusing specifically on the acquisition and ownership of buildings (Section 7.7). The chapter begins by breaking down the DNSH criteria, emphasising the importance of understanding key definitions and following a structured, step-by-step approach tailored to the specific economic activity. It also reviews EU guidance and Q&A documents, which offer additional clarification on the application of these criteria. A significant part of the chapter is dedicated to a linguistic analysis, where each phrase of the DNSH criteria is carefully examined. This detailed analysis is crucial because the precise language of the regulation carries important legal and operational implications that must be fully understood to ensure proper compliance and effective application.

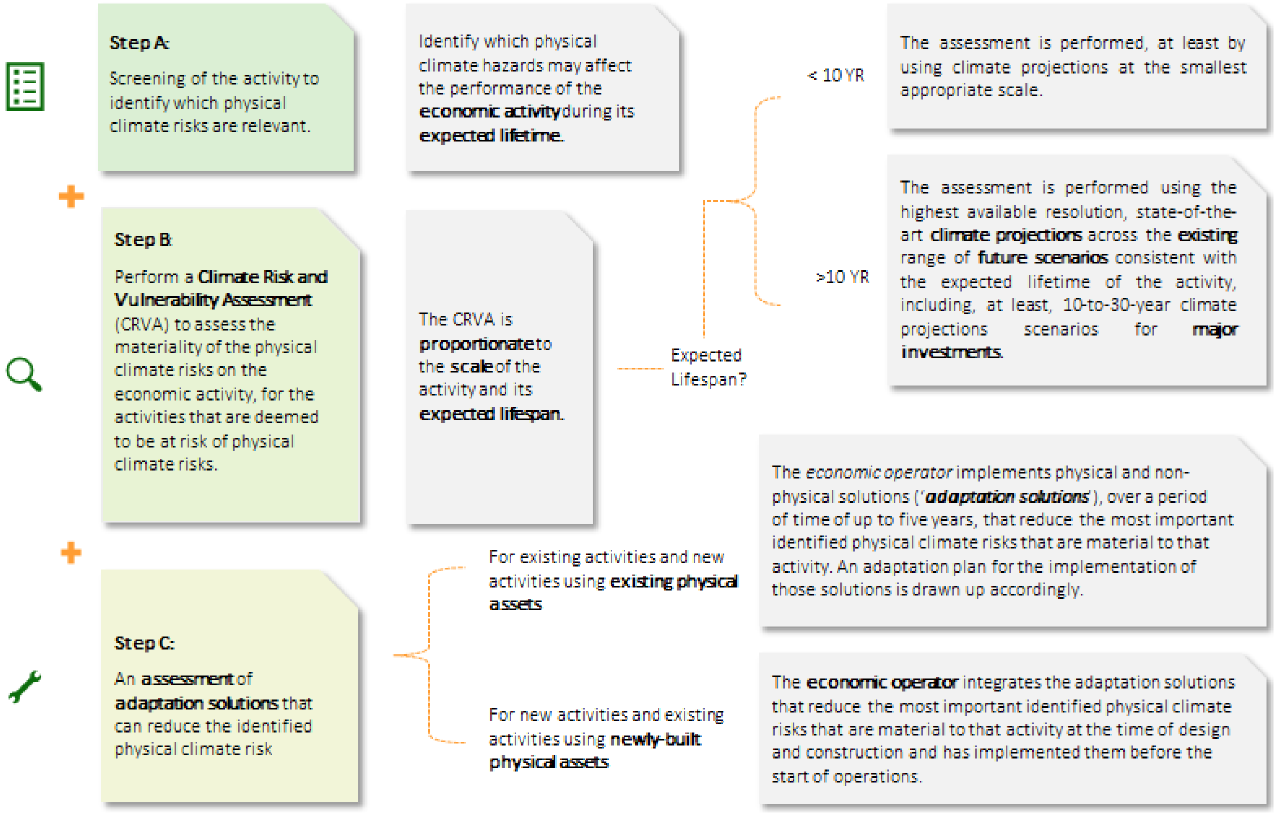
The section concludes with an overview of Appendix A, summarising the key considerations and decision-making processes necessary for conducting a DNSH analysis. This overview serves as a practical guide to ensure that the DNSH criteria are applied accurately and appropriately within the real estate sector. The linguistic analysis is particularly highlighted as a critical tool for ensuring the consistent and correct interpretation of the criteria. Section 6 provides insights and tools needed to align activities with the EU Taxonomy, with a strong focus on the precise application of the DNSH criteria.

Since the publication of our previous DNSH document, several Commission Notice documents have been released, some of which refer to Appendix A in the context of Section 7 of the EU Taxonomy. After a thorough review, the working group concluded that these additional notices do not offer any new insights or changes to the interpretation or application of DNSH Appendix A. Specifically, they do not alter the analysis of the wording outlined in Section 6 of the previous document.

3.2 DNSH Assessment steps

Figure 1 presents a high-level decision tree on some of the key components of Appendix A. We have divided the assessment in several steps (Steps A, B and C) and we will use this terminology throughout this document to clearly indicate the analysis per step.

Figure 1: Overview of three steps under the DNSH Appendix A.



3.3 Applying the conceptual risk model

As mentioned, in one of the Commission Notice answers[3] there is no (single) standard method of conducting a climate risk and vulnerability assessment. The European Commission acknowledges this and adds that these assessments can be based on a variety of methodologies and data sources. With DEEMF DNSH 2024 we aim to create a transparent overview on how the CRVA *is* and *can be* applied in respect of residential properties and mortgage loans in the Netherlands.

3.4 Adaptive capacity in practice

As outlined in the DNSH 2023 Overview Document, we distinguish between adaptive capacity and (existing and planned) adaptation measures at either the building or government level. DG Climate highlights the importance of "considering any steps that have been taken to avoid the impact," which underscores the need to include adaptive capacity when assessing potential impacts and vulnerabilities. Incorporating adaptive capacity can be important because it can significantly influence whether an economic activity is classified as low, medium, or high risk[4].

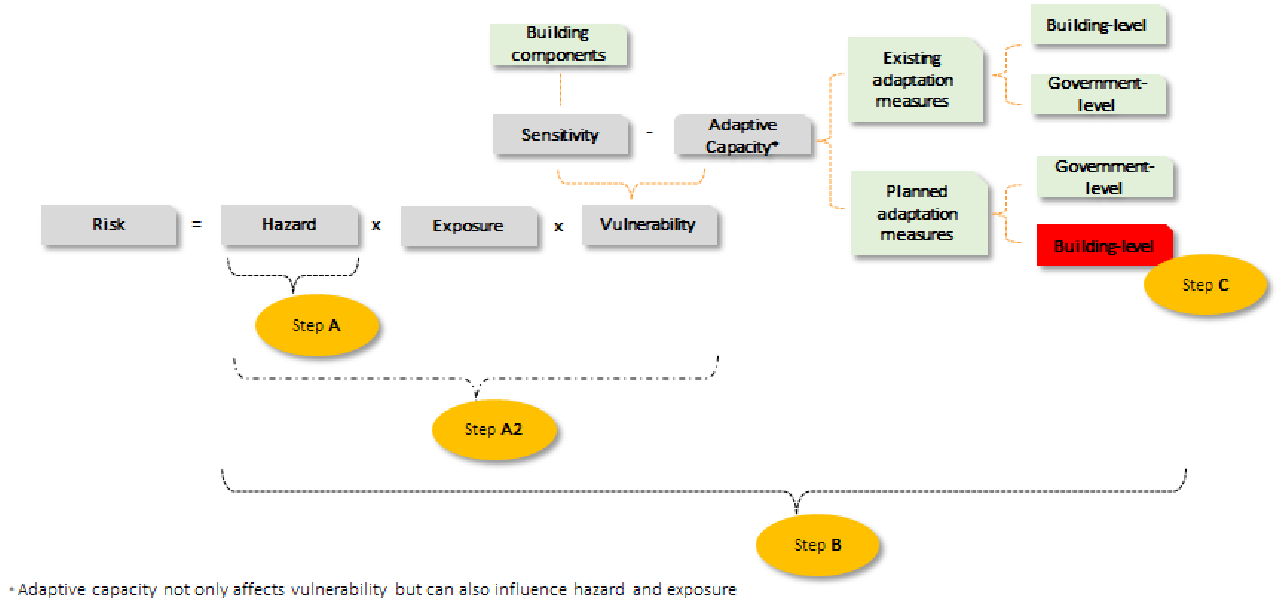
[3] Answer 174 as described in *Commission notice on interpretation and implementation of certain legal provisions of the EU Taxonomy Climate Delegated Act*.

[4] Adaptive capacity not only impacts the vulnerability component of the assessment but can also positively affect hazard and exposure, making it a key factor in determining overall risk levels.

At this stage of the DEEMF DNSH analysis, we have not analysed or incorporated existing or planned building-level adaptation measures. Granular data on such measures, either planned or implemented at the building (unit) level, is not yet widely or readily available in any known data source. However, this does not mean that parties cannot take it into account. In fact, considering information on these building-level adaptation measures, when available, can be highly beneficial—for instance, if such data is accessible from client records. The sources we have investigated so far include commonly known loan application files, mortgage servicing data, and public sources (such *as Kadaster*, *EP-Online*, and *Klimaateffectatlas.nl*). However, we have not found this level of readily available or digitized information in these sources.

Essentially, when performing the steps outlined in Appendix A, we are conducting, in simplified terms, an exercise to identify and potentially flag individual exposures (buildings) based on their climate risk(s). If a building is determined to be at physical risk from one or more hazards, it cannot be considered for EU Taxonomy Alignment—effectively resulting in a "*red flag*" for the building. This can be the case even if the building has successfully passed the Substantial Contribution check. For instance, when assessing an energy efficient building, built before 2021 with an EPC of Class A, that is located in a high-risk flood area.

Figure 2: Risk representation for the three steps of DNSH Appendix A

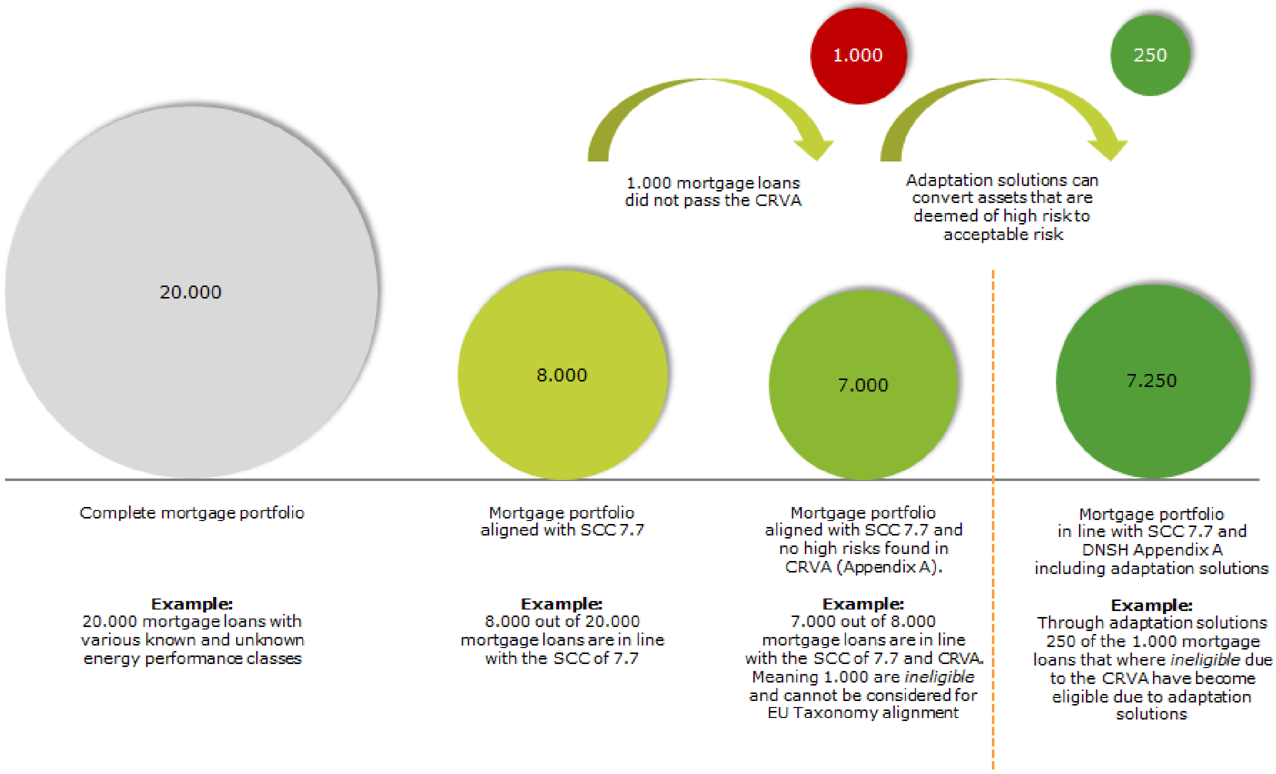


While we do not analyse building-specific adaptation measures, one could consider account government-level adaptive capacity measures. In the Netherlands, these measures include large-scale flood protection systems under the *Waterwet* (Water Act), such as the Delta Works and levee reinforcements. Additionally, regional water boards implement flood risk management plans, ensure the maintenance of dikes, and manage water levels to mitigate climate risks. These government-level measures can influence the overall adaptive capacity of the environment, which may (in)directly reduce the risk to individual buildings. However in practice financial entities may decide to include or exclude these water-related

However, in practice, financial entities may decide to include or exclude these water-related adaptation solutions. We have observed financial parties adopting both approaches.

Adaptation measures implemented at the building or property level can further mitigate risks, potentially reducing the risk classification of a building or property. This dynamic has been illustrated in Figure 3 below with a stylised example. Consequently, additional insights and granular data are highly valuable, as they can improve the EU Taxonomy alignment assessment ratios.

Figure 3: Stylised example of applying DNSH Climate Change Adaptation to a residential mortgage loan portfolio



3.5 Context

When assessing the DNSH criteria for residential mortgage loans in the Netherlands, we evaluate physical hazards such as flooding and heat stress under both current and future climate conditions, including projections for 2050. However, the availability of such data varies. While flood risks are supported by detailed models, comprehensive 2050 climate scenario data for other hazards, such as wind risk, is less developed, which limits the practical scope and application of our analysis. A similar challenge exists for building-level adaptation measures, where granular data on planned or implemented interventions is not consistently available in accessible, digitalised formats.

This reflects a broader circular data challenge: theoretical frameworks and regulatory requirements often identify the types of data needed for robust assessments, while the practical development of such data evolves over time in response to these frameworks (prescribing the requirements). On the positive side, this dynamic provides valuable insights into the data gaps that should be prioritised, serving as a guide for future advancements in climate risk and adaptation measure assessments, ultimately enhancing the completeness of DNSH analyses over time.

The learnings from the first GAR reporting cycle in 2024 are invaluable. They do not only highlight areas for improvement, such as data collection and risk modelling but also underscore the importance of collaboration (within the financial sector). As institutions refine their approaches, the foundation is being laid for more detailed and comprehensive DNSH analyses in subsequent reporting years fostering greater transparency in sustainable finance.

In this document, we build upon the collective expertise of the EEM NL Hub working group in performing climate risk assessments for residential buildings. The approaches to these assessments vary across institutions, reflecting diverse strategies and resources. Some organisations perform the analysis entirely in-house, leveraging internal teams and capabilities to integrate climate risk considerations into their operations. Others rely on external expertise, such as the services provided by the Dutch Green Building Council (DGBC), which applies the Climate Adaptive Building Framework to assess risks and recommend adaptive measures. This document takes into account the experiences and perspectives from both approaches.

3.6 Guidance on DNSH in recent EC publications

Since the publication of the EU Taxonomy Regulation in 2020, the European Commission has issued several Commission Notice documents to provide guidance on the interpretation and implementation of the Climate Delegated Act ("CDA"), the Disclosure Delegated Act ("DDA"), the Environmental Delegated Act ("EDA")[5] and other related frameworks such as the SFDR[6] and the CSRD[7]. These documents mainly pertain the Delegated Acts and to a less extend the level 1 text of the regulation. In this section 3.6 we present the (most) relevant questions that have been addressed in these Commission Notice documents on the topic of DNSH.

For the purposes of this DEEMF DNSH 2024, we will primarily reference the following documents, for which we have assigned shortened names (these are not official titles but are used here for clarity and ease of reference):

- The DDA Q&A (draft version published on 21 December 2023 and final version on 8 November 2024)[8]
- The ADA Q&A (draft published on 29 November 2024)[9]

A note on Commissions Notice documents

No formal public consultation or notification was provided for submitting questions on Commissions Notice publications. However, the EEM NL Hub proactively submitted several questions, some of which have been addressed in various Commission Notice documents.

These documents should not be read in isolation but considered as part of a broader context, given their overlaps and cross-references, which can sometimes create ambiguities or conflicting interpretations. Additionally, new Commission notices occasionally reinterpret or clarify earlier guidance, requiring a reassessment of prior positions to align with updated regulatory insights. Together, these notices form a significant body of work that must be evaluated alongside the original Taxonomy Regulation (Level 1) and Delegated Acts (Level 2). Please note that the ADA Q&A also contains a number of questions in relation to the 'other' DNSH criteria applicable to Section 7 (Pollution Prevention and Control & Protection and Restoration of Biodiversity and Ecosystems). As the scope of DEEMF DNSH 2024 is limited to Climate Change Adaptation, only the questions relevant to this DNSH criterion have been included.

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5 The Environmental Delegated Act (Commission Delegated Regulation (EU) 2023) establishes technical screening criteria for four environmental objectives of the EU Taxonomy: sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems.

6 Sustainable Finance Disclosure Regulation (SFDR): The SFDR (Regulation (EU) 2019/2088) requires financial market participants and advisers in the EU to disclose sustainability-related information. It aims to increase transparency on how financial products consider ESG factors and to combat greenwashing by providing standardised disclosure requirements for sustainability risks and impacts.

7 The CSRD (Directive 2022/2464/EU) expands on the NFRD by requiring more companies to report on sustainability, standardising reporting frameworks, and aligning with EU taxonomy. It introduces mandatory assurance of reported data and detailed requirements on sustainability information, starting from financial year 2024 for certain companies.

8 *COMMISSION NOTICE on the interpretation and implementation of certain legal provisions of the Disclosures Delegated Act under Article 8 of the EU taxonomy Regulation on the reporting of taxonomy-eligible and Taxonomy-aligned economic activities and assets (approved in principle).*

9 *DRAFT COMMISSION NOTICE on the interpretation and implementation of certain legal provisions of the EU Taxonomy Environmental Delegated Act, the EU Taxonomy Climate Delegated Act and the EU Taxonomy Disclosures Delegated Act.*

Reference	Excerpt
Q33 of the DDA Q&A	33. **In cases of financing where the use of proceeds is known, should a financial undertaking be expected to review all the documents attesting compliance with the TSC or should it accept the assessment of that compliance, including verification or assurance, submitted by the counterparty?** Financial undertakings rely on the accuracy of data and evidence provided by their counterparties. However, financial undertakings are also required to conduct adequate due diligence provided for in Directives 2009/65/EC ([41]), 2009/138/EC ([42]), and 2011/61/EU ([43]), CRD, MiFID, and ensure their own compliance with the applicable law. Disclosures provided by financial undertakings in accordance with the Disclosures Delegated Act remain part of the sustainability reporting referred to in Articles 19a and 29a of the Accounting Directive, and therefore must, among other things, be reliable, comparable and relevant. For instance, point (i) of Section 1.2.1.1. of Annex V DDA, in relation to loans and advances where the use of proceeds is known states that *'For the purposes of point (1)(c)(1), credit institutions shall consider the gross carrying amount of the exposures where the use of proceeds is known, including specialised lending exposures, to the non-financial undertaking to the extent and proportion that they finance a taxonomy-aligned economic activity. The assessment of whether that requirement has been met shall be based on information provided by the counterparty on the project or activities to which the proceeds will be applied.'* Therefore, financial undertakings should check whether the information concerning Taxonomy-alignment of economic activities provided by their counterparties includes adequate documentary evidence that respective individual TSC are met. For example, if the exposure of a financial undertaking finances an activity set out in Section 7.7. of Annex I to the Climate Delegated Act, the credit institution should check whether the real estate has an EPC class A, on the basis of the (copy) of the EPC certificate provided by the client, and should receive the adequate documentary evidence that all DNSH criteria are met. A mere declaration by the client, without any supporting evidence, that the real estate in question meets the TSC set out in Section 7.7. of Annex I to the Climate Delegated Act would not suffice to conclude that the respective real estate and the underlying exposure are Taxonomy-aligned. Similarly, where the TSC require verification by an independent third party, the credit institution should receive a (copy of) the verification report issued by the independent third party. A mere declaration by the client to the financial undertaking that the verification was performed would not suffice to infer Taxonomy-alignment of the economic activity. In the case of use of proceeds from environmentally sustainable bonds where the Taxonomy-alignment of the use of proceeds is verified by an independent third party, the credit institution should receive a copy of such a verification report to ascertain for itself the extent to which its exposure is financing Taxonomy-aligned economic activities or assets. The same evidence can be used to demonstrate compliance with the TSC for several exposures to which it pertains.
Comment on answer	Confirmation that verification of DNSH criteria (by the financial institution) is to take place based on documentary evidence and not on declaration by a client.

Reference	Excerpt
Q34 of the DDA Q&A	34. **Do financial undertakings need to annually review the Taxonomy-alignment of their exposures?** it is necessary that data on Taxonomy-alignment of exposures are reviewed, and, where necessary, revised annually to ensure that the sustainability statement includes a fair view of the development and performance of the undertaking's business, including its compliance with the TSC. By virtue of the grandfathering clause in Article 7(5) of the Disclosures Delegated Act applicable to special purpose loans and certain environmentally sustainable bonds or debt securities, if the TSC are amended, financial undertakings could report the Taxonomy-alignment of such loans and instruments with the amended TSC up to five years after the date of application of the amended TSC. It is therefore not necessary to check compliance with the amended TSC during the 5-year grandfathering period. Nevertheless, financial institutions are encouraged to engage with their counterparties in view of aligning their economic activities with the amended TSC during that transitional period.
Comment on answer	Compliance with the TSC (so including those in relation to DNSH) is to be checked annually.

Reference	Excerpt
Q36 of the DDA Q&A	36. **In the case of retail clients, can credit institutions verify compliance with the TSC, in particular DNSH for adaptation, using specific evidence, e.g. domestic certifications or information in EPC)?** Section 1.2.1.3. of Annex V DDA prescribes two categories of disclosures on retail exposures, namely: — residential real estate lending where compliance with the TSC as laid down in Sections 7.1., 7.2., 7.3., 7.4., 7.5., 7.6. and 7.7. of Annex I or Annex II to the Climate Delegated Act or Sections 3.1. and 3.2. of Annex II to the Environmental Delegated Act is required; and — retail – credits/consumptions loans for cars, where compliance with the TSC as laid down in Section 6.5. of Annex I to the Climate Delegated Act is required. With respect to such retail exposures, credit institutions should obtain adequate documentary evidence showing that all TSC specified under the corresponding economic activity in the respective Delegated Acts are met (see also responses to question 33 of this Notice). This applies equally to the assessment of DNSH criteria for the CCA objective. The evidence can be obtained directly from the client or can take the form of third-party independent and reliable verifications or external reviews, which could include domestic certifications by public authorities or information in EPCs. Evidence provided by third parties and public authorities could be relied upon to ascertain compliance with the TSC as long as it is specific and directly related to the underlying exposures of credit institutions. The same evidence can be used to demonstrate compliance with the TSC for several exposures to which it pertains. However, in the absence of exposure-specific evidence, estimates of Taxonomy-alignment may be disclosed on a voluntary basis separately from the mandatory KPIs together with the methodology used to calculate such estimates.
Comment on answer	In respect of retail exposures, financial institutions are to obtain documentary evidence supporting that the TSC are met. If specific information is not available, voluntary reporting is encouraged.

Reference	Excerpt
Q129 of the ADA Q&A	**129. The generic DNSH criteria for climate change adaptation state that the economic operator should implement physical and non-physical solutions ('adaptation solutions') for existing activities and new activities using existing physical assets, over a period of up to five years. Does the period of five years start when the assessment is completedor when the adaptation solution is identified?** Adaptation solutions are changes in processes, practices, and structures of the economic activity in question to moderate potential damages associated with climate change. Adaptation solutions can be physical (e.g. building flood defences), or non-physical (e.g. switching to drought-resistant crops, or redesigning communication systems). Assessing adaptation solutions is a step in the climate risk and vulnerability assessment. The five year period starts from the day when the operator has finalized the climate risk and vulnerability assessment of the activity and identified the adaptation solution for the activity.
Comment on answer	It is confirmed that the five-year period starts from the day the CRVA has been finalised the adaptation solution has been identified.

Reference	Excerpt
Q130 of the ADA Q&A	**130. How is 'expected lifespan' defined? Should it be understood as the expected lifetime of the underlying economic activity or of the financing of the activity?** The generic DNSH criteria for the objective of climate change adaptation state that physical climate risks that are material to the activity are to be identified through a climate risk and vulnerability assessment. This assessment involves identifying what physical climate risks may affect the performance of the economic activity during its expected lifetime. The physical risks are related to the location and type of the activity, so the expected lifetime is understood as the entire period during which the economic activity is carried out. In the construction sector, for example, the lifespan covers the planning, design, use and demolition of a building. For long-term or indefinite activities, it may be appropriate to take into account a lifespan of at least 30 years in the future.
Comment on answer	To determine the expected lifespan, the economic activity should be considered and not the financing.

Reference	Excerpt
Q131 of the ADA Q&A	**131. The DNSH criteria for climate change adaptation included in Appendix A refer to '(...) physical and non-physical solutions ('adaptation solutions') (...) that reduce the most important identified physical climate risks that are material to that activity'. How should the term 'reduce' be understood? Is anything that can reduce physical climate risks acceptable? Or is it only possible to consider solutions that reduce the effect to such an extent that it leads to a different risk assessment (risk bucket) of the climate risk and vulnerability assessment (CRVA) be considered?** The generic DNSH criteria to climate change adaptation mention 'adaptation solutions that can reduce the identified physical climate risk' in the list of steps involved in the performance of a robust CRVA. The term 'reduce' here means that physical climate risks material to the economic activity are reduced to the level that the activity may be continued without major avoidable[81] climate-related disruptions in the present and for the lifetime of the activity. [81] The term 'avoidable' in this context means (i) there are solutions/technologies available that can eliminate or reduce the specific identified climate change related risk to the required level to avoid disruption; and (ii) the cost of eliminating or reducing the risk to the required level to avoid disruptions is not exceeding the benefit (e.g., the value of the avoided damage and loss taking into account their severity and likelihood and applying the precautionary principle). In cases where the risk is deemed 'not avoidable' based on these factors, attempt should be given to (i) reduce the risk and impact on the operation of the activity to the highest attainable level and (ii) shorten the recovery time; and the residual risk should be accounted for.
Comment on answer	Adaptation solutions are to be considered if they result in a reduction of the physical climate risk to such extent that they reduce the exposure of the economic activity to a level that the activity can be continued without major avoidable climate-related disruptions in the present and for the lifetime of the activity.

Reference	Excerpt
Q132 of the ADA Q&A	**132. The generic DNSH criteria for climate change adaptation in Appendix A state that 'the economic operator implements physical and non-physical solutions'. Should both conditions always be satisfied before an adaptation solution is eligible (given that the word 'and' is used)?** Appendix A requires economic operators to identify adaptation solutions that reduce the most important identified physical climate risks that are material to that activity. These adaptation solutions can be either physical or non-physical solutions depending on the physical climate risk the operator is facing. As an example of a physical adaptation solution[82], an operator located in a region prone to heat waves may decide to install green roofs or green facades on its buildings in order to keep indoor temperatures low during hot periods and to improve water retention around the buildings by minimizing rainwater run-off. In contrast, a company operating in landfill gas capture and use that is located in a zone at risk of being affected by wildfires may, as a non-physical solution, implement awareness campaigns to reduce wildfire-generating behavior[83]. [82] The main categories of physical solutions are physical infrastructure and technological solutions, as well as nature-based and ecosystem-based approaches. [83] The main categories of non-physical solutions are governance and institutional solutions (including initiation or changes of practices, processes and process management, planning, monitoring and cooperation systems and similar) economics and financial solutions (including insurance), as well as knowledge and behavioral change related approaches.
Comment on answer	Either physical or non-physical adaptation solutions can be considered. Please note the specific mention of insurance as a possible non-physical adaptation solution.

4 Step A: Hazards and Risks that *may* affect

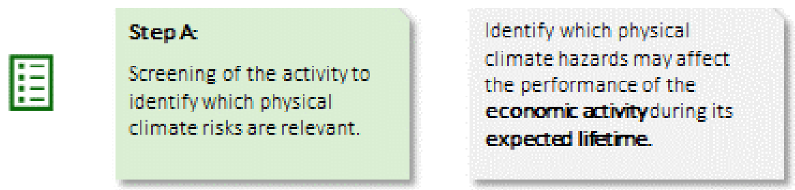
The hazards listed in Appendix A of the Climate Delegated Act form the foundation of our analysis for assessing climate risk to buildings. These hazards[10], broadly referred to as physical hazards in the climate literature, encompass natural events or environmental conditions driven by climate change that can adversely impact buildings, infrastructure, and ecosystems (see Figure 4 below). Examples include acute events like floods, heatwaves, storms, and wildfires, as well as chronic conditions such as rising sea levels and temperature shifts. The DNSH criterion, as clarified in the footnote of the regulation, emphasises that the table of hazards in Appendix A is non-exhaustive: "*the list of climate-related hazards in this table is non-exhaustive and constitutes only an indicative list of most widespread hazards that are to be taken into account as a minimum in the climate risk and vulnerability assessment*." This guidance highlights the importance of flexibility in the analysis, encouraging the incorporation of additional hazards beyond those explicitly mentioned, depending on regional and local contexts. In the Netherlands, for instance, the specific geography and built environment necessitate a tailored approach to climate risk assessment. While flooding remains one of the most prominent physical hazards due to the country's low-lying topography, other hazards such as heat stress in urban areas, pole rote, and the impact of storms also demand attention.

Figure 4: Overview risks to be considered as listed in Appendix A

	Temperature-related	Wind-related	Water-related	Solid-mass-related
Chronic	Changing temperature (air, freshwater, marine water)	Changing wind patterns	Changing precipitation patterns and types (rain, hail, snow/ice)	Coastal erosion
	Heat stress		Precipitation or hydrological variability	Soil degradation
	Temperature variability		Ocean acidification	Soil erosion
	Permafrost thawing		Saline intrusion	Solifluction
			Sea level rise	
			Waterstress	
Acute	Heat wave	Cyclone, hurricane, typhoon	Drought	Avalanche
	Cold wave/frost	Storm (including blizzards, dust & sandstorms)	Heavy precipitation (rain, hail, snow/ice)	Landslide
	Wildfire	Tornado	Flood (coastal, fluvial, pluvial, ground water)	Subsidence
			Glacial lake outburst	

Step A of Appendix A requires determining if a physical climate risk may affect the performance the economic activity, in our case 'Acquisition and Ownership of buildings' (see Figure 5 below).

Figure 5: Step A: which hazards 'may affect'



[10] See section 4 of the DNSH 2023 Overview Document for a (theoretical) analysis on climate hazards.

4.1 Hazards and risks – definitions

To determine whether a specific risk may impact the economic activity of acquiring or owning a building (or in our analysis "acquiring or owning a residential property"), it is essential to first define what that climate risk entails. This step is foundational, as clarity in definition directly informs the relevance and applicability of the subsequent analysis.

Climate risks can be approached in multiple ways, often drawing on extensive scientific (climate) literature that provides detailed, nuanced definitions of hazards and their impacts. An analysis of this literature is indispensable for understanding the broader context of climate risks, as it offers a solid theoretical and empirical foundation. However, given the abundance of such publications, our focus here is on presenting a more practical approach to definitions.

The definitions we propose are actionable and tailored to the specific needs of assessing climate risk in the context of residential properties in The Netherlands. They serve as a natural extension of the more traditional scientific definitions but emphasise applicability and ease of use in hands-on analyses.

Table 1 below contains an overview of the definitions that the EEM NL working group has jointly developed in respect of the risks included in Appendix A, Section II.

Table 1: Definitions of climate risks in Appendix A, Section II.

Climate risk	Definition
Changing temperature (air, freshwater, marine water)	Change in average and minimum/maximum temperatures.
Heat stress	The adverse effect of extreme heat or hot environments on a person's health.
Temperature variability	The increase in the temperature range occurring within a short timespan at a given location.
Permafrost thawing	The thawing of the ice inside permafrost which could lead to an instable surface area. In turn, this could damage buildings and infrastructure.
Heat wave	Period of abnormally hot weather, often defined with reference to a relative temperature threshold, at a certain location, lasting for a specific minimum number of days.
Cold wave/frost	A weather event involving a cooling of the air resulting in a rapid fall in temperature.
Wildfire	An unplanned, uncontrolled and unpredictable fire in or near an area of combustible vegetation, affecting natural, cultural industrial and residential landscape.
Changing wind patterns	The change in wind speeds or direction at a given location caused by climate change.
Cyclone, hurricane, typhoon	Large air mass that rotates around a strong centre of low atmospheric pressure resulting in very strong (destructive) winds.
Storm (including blizzards, dust & sandstorms)	A violent disturbance of the atmosphere with strong winds and usually rain, thunder, lightning, or snow.
Tornado	A mobile destructive vortex of violently rotating winds having the appearance of a funnel-shaped cloud and advancing beneath a large storm system.
Changing precipitation patterns and types (rain, hail, snow/ice)	Refers to how precipitation has increased or decreased from a specific reference period. Change in precipitation patterns could cause floods and droughts due to differences in rain patterns such as more rain in winter instead of snow. Increases or decreases of precipitation could disrupt the water balance of the area, possibly resulting in water stress.
Precipitation or hydrological variability	Refers to the differences in annual rainfall and seasonal variability from one year to the next.
Ocean acidification	The reduction in the pH of the ocean.
Saline intrusion	The movement of saline water into an area that is not normally exposure to high salinity levels. This can cause loss of drinking water resources a.o. as a result of deterioration of ground water quality.

Sea level rise	The average increase in the water level of the earth's oceans primarily caused by the melting ice sheets and the increase in volume of seawater as it warms.
Waterstress	When the demand for water exceeds the available amount during a certain period or when poor quality restricts its use.
Drought	A prolonged period of abnormally low rainfall and higher evapotranspiration due to higher temperatures leading to a shortage of water and low groundwater levels affecting sensitive foundation of real estate.
Heavy precipitation (rain, hail, snow/ice)	Instances during which the amount of rain or snow experienced in a location substantially exceeds what is normal causing a disruption of normal use.
Flood (coastal, fluvial, pluvial, ground water)	An overflow of a large amount of water beyond its normal limits, especially over what is normally dry land resulting in a disruption in the normal land use.
Glacial lake outburst	A flood caused by the failure of a dam containing a glacial lake.
Coastal erosion	Loss of land or the long-term removal of sediment and rocks along the coastline due to the action of waves, current, tides, wind-driven water or other impacts of storms.
Soil degradation	The physical, chemical and biological decline in soil quality.
Soil erosion	The gradual process that occurs when the impact of wind or water or human activities detaches and removes soil particles, causing the soil to deteriorate.
Solifluction	The process of slow downslope movement of waterlogged soils on gentle to moderate slopes in periglacial environments.
Avalanche	A rapid flow of snow and/or mud down a slope.
Landslide	A movement of ground such as rockfalls. Mudflows, slope failures and debris flows. This typically occurs in areas with steep or gentle slope gradients.
Subsidence	The process by which land or buildings move or sink to a lower level than the land surrounding it, often caused by changes in groundwater levels and by degradation of peat due to higher temperatures.
Foundation deterioration	The process of the foundation of a property deteriorating, either as a result of the rotting of wooden foundation poles as a result of low groundwater levels or other events.

4.2 Rationale for considering a specific risk to be relevant or not

Now that all risks have been defined, it is possible to determine whether or not a specific risk is—or may become—relevant for the acquisition or ownership of Dutch residential properties, as outlined in Table 2 and Table 3 below. This evaluation is informed by insights from EEM NL Hub working group discussions and considers factors such as the availability of research, data, relevance to the Dutch context, potential impact on buildings, and practical experience with these risks.

The tables below provide an overview of the rationale for considering or excluding specific climate risks. By incorporating these guiding factors, the framework ensures that the analysis is comprehensive, practical, and grounded in the realities of the Dutch housing market.

Table 2: Rationale for considering the specific climate risks to be relevant

Climate risk	Rationale for considering the specific climate risk to be (not) relevant
Changing temperature (air, freshwater, marine water)	Research by a.o. KNMI indicates that due to climate change also in the Netherlands, the average and minimum/maximum temperatures will change. Direct impacts include structural damage that may debilitate concrete or cause expansion and contraction of the building materials. Indirectly, changing temperatures are expected to result in more frequent and severe floods, droughts, and faster subsidence. We conclude that (the structural stability of) buildings can be impacted by changing temperatures, either directly or indirectly.
Heat stress	Research by a.o. KNMI indicates that due to climate change the Netherlands will experience drier summers and therefore the risk of heat stress is expected to increase, particularly in built-up environments as a result of the so-called heat-island effect. Liveability and usability of buildings may be impacted by heat. In some cases, being inside a hot building may be too uncomfortable to allow for normal use of the building. We conclude that heat stress can have an impact on the liveability and usability of buildings.

Temperature variability	Although currently there is no research available that demonstrates that temperature variability has or will have a significant impact on residential properties in the Netherlands, the consensus view is that as a result of climate change this could become relevant, and buildings can be impacted by significant changes in temperature. Direct impacts include structural damage that may debilitate concrete or cause expansion and contraction of the building materials. Indirectly, changing temperatures are expected to result in more frequent and severe floods, droughts, and faster subsidence. We conclude that (the structural stability of) buildings can be impacted by increased temperature variability, either directly or indirectly.
Heat wave	Research by a.o. KNMI indicates that due to climate change the Netherlands will experience drier summers and therefore the risk of heatwaves occurring to increase, particularly in built-up environments as a result of the so-called heat-island effect. Liveability and usability of buildings may be impacted by heat. In some cases, being inside a hot building may be too uncomfortable to allow for normal use of the building. We conclude that heat waves can have an impact on the liveability and usability of buildings.
Wildfire	Several wildfires have occurred in the Netherlands and the number of fire-sensitive days has doubled in the period 1950-2020 according to the PBL in the Klimaatrisico's in Nederland. Climate change is expected to impact the conditions that could facilitate wildfires to occur (more frequently). We conclude that buildings can be impacted by wildfire by either burning the structure itself or the relevant areas surrounding them.
Changing precipitation patterns and types (rain, hail, snow/ice)	Research by a.o. KNMI indicates that due to climate change the Netherlands will experience drier summers and wetter winters and that the amount of precipitation is likely to increase (more intense) and decrease (more droughts) and therefore precipitation patterns are expected to change in the Netherlands. Changes in precipitation patterns and intensity could affect buildings by, for example, causing more precipitation related wear and tear than previously accounted for, and it could also put extra strain on sewage systems. Indirectly, changing precipitation patterns are expected to result in more frequent and severe floods, droughts, and faster subsidence. We conclude that (the structural stability of) buildings can be impacted by changing precipitation patterns, either directly or indirectly.
Precipitation or hydrological variability	Research by a.o. KNMI indicates that due to climate change the Netherlands will experience drier summers and wetter winters and therefore that the amount of precipitation is likely to increase (more intense) in winter and decrease (more droughts) in summer. Changes in precipitation could affect buildings by, for example, causing more precipitation related wear and tear than previously accounted for, and it could also put extra strain on sewage systems. Indirectly, increased precipitation is expected to result in more frequent and severe floods, whereas droughts are likely to result in faster subsidence. We conclude that (the structural stability of) buildings can directly or indirectly be impacted by precipitation variability.
Sea level rise	Research indicates that climate change causes sea levels to rise. As a country the Netherlands is heavily exposed to the sea and sea level rise could have a very significant impact on the habitability of certain regions of the Netherlands if no or insufficient adaptation measures are implemented. We conclude that (the liveability and usability of) buildings can be impacted by sea level rise.
Waterstress	Research by a.o. KNMI indicates that due to climate change the Netherlands will experience drier summers and therefore the risk of drought to increase, potentially leading to shortages of (drinking) water. Water stress could have a very significant impact on the habitability of certain regions of the Netherlands since access to drinking water may be constrained. We conclude that (the liveability and usability of) buildings can be impacted by water stress.
Drought	Research by a.o. KNMI indicates that due to climate change the Netherlands will experience drier summers and therefore the risk of drought is expected to increase. We conclude that (the foundation of) buildings and hence the structural stability of the building can be impacted by drought.
Heavy precipitation (rain, hail, snow/ice)	Research by a.o. KNMI indicates that due to climate change the Netherlands will experience wetter winters and that the amount of precipitation is likely to increase (more intense). In addition, more heavy showers are expected in summer as warmer atmosphere can contain more water vapor. Buildings can directly and indirectly be impacted by precipitation. Hailstorms may break structures and accumulation of snow or ice could debilitate structures. In addition, extra strain on sewerage systems will result in more frequent pluvial floods affecting the structural stability of buildings. We conclude that (the structural stability of) buildings can directly or indirectly be impacted by precipitation variability.
Flood (coastal, fluvial, pluvial, ground water)	Research by a.o. KNMI indicates that due to climate change the Netherlands will experience wetter winters and that the amount of precipitation is likely to increase (more intense) and therefore the risk of flooding to increase. We conclude that buildings and hence the structural stability of the building can be impacted by flood.
Subsidence	There is ample research demonstrating that subsidence can have an impact on (the foundation of) buildings. Drier summers and hotter temperatures due to climate change will likely increase the rate of subsidence. We conclude that (the foundation of) buildings and hence the structural stability of the building can be impacted by subsidence.

Table 3: Rationale for considering the specific climate risks ***not*** *to be relevant.*

Climate risk	Rationale for considering the specific climate risk to be (not) relevant
Permafrost thawing	There is no permafrost in the Netherlands.
Cold wave/frost	There is no research available that demonstrates that cold waves have or will have a significant impact on residential properties in the Netherlands, also given the current moderate climate in the Netherlands.
Changing wind patterns	There is no research available that demonstrates that the wind patterns in the Netherlands will change as a result of climate change to such extent that it is expected to have a significant impact on residential properties in the Netherlands. Research by a.o. KNMI indicates that little or no changes on wind patterns are expected.
Cyclone, hurricane, typhoon	There is no research available that demonstrates that the atmospheric conditions in the Netherlands will change as a result of climate change to such extent that it is expected that cyclones, hurricanes or typhoons will occur. Due to climate change some remnants of tropical cyclones from the Atlantic could reach the North Sea but not conclusive research has proven the extent according to PBL.
Storm (including blizzards, dust & sandstorms)	There is no research available that demonstrates that the more or stronger storms will occur in the Netherlands as a result of climate change to such extent that it is expected to have a significant impact on residential properties in the Netherlands.
Tornado	The atmospheric conditions in the Netherlands make it unlikely that significantly destructive tornados can frequently occur and there is no research available that demonstrates that this will change as a result of climate change.
Ocean acidification	There is no research available that demonstrates that ocean acidification has a significant impact on residential properties in the Netherlands.
Saline intrusion	There is no research available that demonstrates that as a result of saline intrusion certain areas of the Netherlands can no longer be inhabited and that there is a significant impact on residential properties.
Glacial lake outburst	There are no glacial lakes in the Netherlands and there is no research available that demonstrates that they will form as a result of climate change.
Coastal erosion	The Dutch coast is well protected and under the waterwet, the Dutch government is obliged to maintain the water defences. There is no research available that demonstrates that coastal erosion will have a significant impact on residential properties.
Soil degradation	There is no research available that demonstrates that in the Netherlands soil degradation has a significant impact on residential properties.
Soil erosion	There is no research available that demonstrates that as a result of soil erosion certain areas of the Netherlands can no longer be inhabited and that there is a significant impact on residential properties.
Solifluction	In the Netherlands the conditions required for solifluction do not exist.
Avalanche	There are no hills or mountains in the Netherlands that are sufficiently high for avalanches to be sufficiently destructive and frequent to have a significant impact on residential properties.
Landslide	In the Netherlands landslides are extremely rare and therefore considered not to occur sufficiently frequent to have a significant impact on residential properties.

Applying these considerations to the 28 risks that Appendix A, Section II recommends considering, results in Figure 6 where the 15 risks that are deemed *not* to be relevant have been highlighted in red.

Figure 6: Overview of classification into relevant and not-relevant risks (from the perspective of Dutch residential properties

	Temperature-related	Wind-related	Water-related	Solid-mass-related
Chronic	Changing temperature (air, freshwater, marine water)	**Changing wind patterns**	Changing precipitation patterns and types (rain, hail, snow/ice)	**Coastal erosion**
	Heat stress		Precipitation or hydrological variability	**Soil degradation**
	Temperature variability		**Ocean acidification**	**Soil erosion**
	Permafrost thawing		**Saline intrusion**	**Solifluction**
			Sea level rise	
			Waterstress	
Acute	Heat wave	**Cyclone, hurricane, typhoon**	Drought	**Avalanche**
	Cold wave/frost	**Storm (including blizzards, dust & sandstorms)**	Heavy precipitation (rain, hail, snow/ice)	**Landslide**
	Wildfire	**Tornado**	Flood (coastal, fluvial, pluvial, ground water)	Subsidence
			Glacial lake outburst	

4.3 Addition of the risk of foundation deterioration

The EEM NL Hub working group has identified the deterioration of wooden foundation piles as a significant risk for Dutch residential properties. Approximately 750,000 homes in the Netherlands are constructed on such foundations, primarily in low-lying regions, or on shallow foundations. Prolonged low groundwater levels can cause these piles to dry out, making them susceptible to fungal decay and compromising structural integrity. A 2024 study by Deltares and TNO, commissioned by the Council for the Environment and Infrastructure[11], estimates that 425,000 buildings may have a remaining technical lifespan of less than 15 years, with nearly a quarter founded on wooden piles. Climate change, with increasing droughts and fluctuating groundwater levels, exacerbates this issue[12].

Regions at heightened risk include areas with unstable peat and clay soils, such as Zuid-Holland, Friesland, and Groningen. Cities facing significant foundation issues include Amsterdam, Rotterdam, Gouda, Dordrecht, and Schiedam. These urban centres, many built on wooden pile foundations in low-lying areas, have been grappling with foundation challenges for decades[13] .

Addressing this risk presents considerable financial challenges. Repair or replacement of foundations typically costs between €50,000 and €100,000 per home, with nationwide expenses potentially reaching tens of billions of euros. Public funding, subsidies, and coordinated efforts will be essential to support large-scale remediation, while indirect costs, such as reduced property values and increased municipal obligations, further strain resources[14].

For homeowners, the financial burden can be severe. Many insurance policies do not cover groundwater-related foundation damage, leaving homeowners to shoulder the costs while repairs may consume a substantial portion of a property's value.

11 https://en.rli.nl/publications/2024/advice/firm-foundations
12 https://www.deltares.nl/nieuws/funderingsschade-nederland-kaart-nationale-aanpak
13 https://www.atlasleefomgeving.nl/indicatieve-aandachtsgebieden-funderingsproblematiek
14 https://www.kcaf.nl/https-www-kcaf-nl-de-nationale-funderingsramp-deel-1/

In Table 4 below we provide a practical hands-on definition and in Table 5 we establish the rationale to include this additional risk.

Table 4: Definition of foundation deterioration risk.

Climate risk	Definition
Foundation deterioration	The process of the foundation of a property deteriorating, either as a result of the rotting of wooden foundation poles as a result of low groundwater levels or other events.

Table 5: Rationale for considering foundation deterioration to be relevant.

Climate risk	Rationale for considering the specific climate risk to be (not) relevant
Foundation deterioration	There is ample research demonstrating that lower groundwater levels and subsidence can impact the foundation of buildings under certain circumstances. Additionally, changes in ground composition and ground level can negatively impact the (effectiveness of) foundations of buildings to such extent that they become uninhabitable if not addressed or repaired. We conclude that (the structural stability of) buildings can be impacted by the deterioration of the foundations.

Foundation deterioration is a risk for buildings in the Netherlands and it combines water-related and solid-mass factors. Prolonged droughts can cause soil subsidence and the shrinkage of clay or peat soils, exposing wooden foundation piles to air, which accelerates rot and settlement[15]. Conversely, heavy rainfall and elevated groundwater levels can compromise foundation stability by saturating the soil, leading to erosion or differential settlement (*verschilzetting*). Solid-mass factors, such as shifting soil layers and changes in ground pressure, further exacerbate these risks, particularly in areas with low soil-bearing capacity[16].

Figure 7: Overview of all climate risks considered to be relevant for Dutch residential properties, including foundation deterioration.

	Temperature-related	Wind-related	Water-related	Solid-mass-related
Chronic	Changing temperature (air, freshwater, marine water)		Changing precipitation patterns and types (rain, hail, snow/ice)	
Chronic	Heat stress		Precipitation or hydrological variability	
Chronic	Temperature variability		Sea level rise	
Chronic			Waterstress	
			Foundation deterioration	Foundation deterioration
Acute	Heat wave		Drought	Subsidence
Acute	Wildfire		Heavy precipitation (rain, hail, snow/ice)	
Acute			Flood (coastal, fluvial, pluvial, ground water)	

[15] Deltares (2023). *Funderingsproblemen door droogte en wateroverlast.*

[16] KNMI (2023). *Klimaatsignaal'23: Verandering van extreem weer in Nederland.*

4.4 Snapshot of Hazards w.r.t annual report 2024

While the EEM NL Hub working group reached consensus that the 14 identified risks could be relevant for inclusion in DNSH (Do No Significant Harm) analyses, not all members of the DNSH working group incorporated all 14 risks in their 2024 GAR (Green Asset Ratio) reporting. The variability in approaches stems primarily from differences in data availability, the expected impact of specific risks, and institutional readiness to address these risks comprehensively.

The year 2024 marks a pivotal moment for financial institutions, as it was the first time they were required to publish the GAR, which necessitates conducting a DNSH analysis on their mortgage portfolios.

This inaugural reporting cycle has been characterised by significant learning, as institutions grappled with the practicalities of implementing the EU Taxonomy's technical screening criteria in their operations. The process has provided valuable insights into data gaps, risk prioritisation, and the challenges of aligning reporting practices with regulatory expectations.

Among the 14 identified risks, a substantial majority of working group members included four key risks in their DNSH analyses and GAR reporting for 2024:

- Wildfire
- Drought[17]
- Flood
- Subsidence

These risks were prioritised based on their immediate relevance, availability of supporting data, and the tangible impact they pose to mortgage portfolios in the Netherlands. For example, flood risks have long been a critical concern in the Dutch context, given the country's geographical vulnerability to water-related threats, while subsidence and drought increasingly threaten the structural integrity of residential properties.

The remaining ten risks, although deemed relevant by the working group, have been included by some members or are under active consideration for future inclusion. This phased approach reflects the need to balance ambition with pragmatism, as institutions progressively enhance their capabilities to integrate more risks into DNSH analyses and align with the evolving requirements of the EU Taxonomy (see Figure 8 below).

Figure 8: Overview and classification of all climate risks, including foundation deterioration and the inclusion in the 2024 GAR calculations by Dutch financial institutions

INCLUDED IN 2024 GAR REPORTING BY MAJORITY	INCLUDED BY SOME / UNDER CONSIDERATION BY OTHERS		CONSIDERED NOT TO BE RELEVANT BY MAJORITY	
Wildfire	Changing temperature (air, freshwater, marine water)	Precipitation or hydrological variability	Permafrost thawing	Glacial lake outburst
Drought	Heat stress	Sea level rise	Cold wave/frost	Coastal erosion
Flood (coastal, fluvial, pluvial, ground	Temperature variability	Waterstress	Changing wind patterns	Soil degradation
Subsidence	Heat wave	Heavy precipitation (rain, hail, snow/ice)	Cyclone, hurricane, typhoon	Soil erosion
	Changing precipitation patterns and types (rain, hail, snow/ice)	Foundation deterioration	Storm (including blizzards, dust &	Solifluction
			Tornado	Avalanche
			Ocean acidification	Landslide
			Saline intrusion	

17 Some institutions report certain risks under a different name or as a combination.

5 Step B: Perform a Climate Risk and Vulnerability Assessment

In this step we will build upon the previous step where we identified risks that may affect the performance of the activity. The goal of the CRVA is to estimate for each building (location) the risk that arises from each climate-related hazard found in the previous step (A). Following the EU Taxonomy wording: the assessment must be conducted for the current situation and for different future scenarios. The Climate Delegated Act distinguishes between two time periods: an expected lifetime <10 years and > 10 years. For buildings we will specifically be looking at the latter timeframe[18].

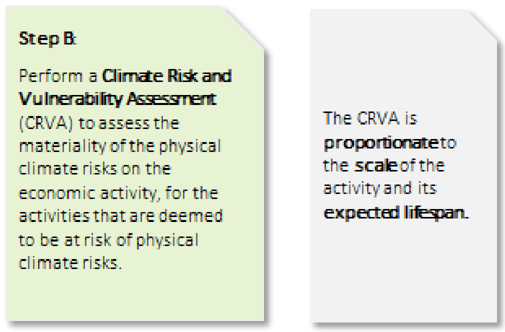
Practically, detailed climate projections are often available that detail the projections in the year 2050[19]. Therefore, we assume that where 30 years projections are not available the projections for the year 2050 are suitable.

In the CRVA we will assess the overall materiality of the physical climate risks to the economic activity by:

- Understanding potential (impact) relationships between the climate-related hazards and buildings.
- Gather information on current and future climate-related hazards. This can be done by employing data on climate projections.
- Gather information on the sensitivity, impact and adaptive capacity of the possibly affected building.

In this step we will build not only on the outcome of Step A, but we will also re-use most of the tools and concepts. The (most) important difference being that we will '*deepen*' our analysis., by looking into future scenarios of certain physical climate risks. Specifically in the vulnerability assessment where we will investigate the exposure and sensitivity to explore the potential impact.

Figure 9: Step B – perform a Climate Risk and Vulnerability Assessment



5.1 Risk and vulnerability assessment & data availability

To assess if an economic activity is materially impacted by one of the climate risks that may possibly affect the economic activity, one needs to determine:

a) the location where the specific activity takes place;

b) if at that location a specific climate risk is expected to occur;

c) if the property is exposed to or able to withstand the specific climate risk.

[18] As described in Section 6 of EEM NL Hub - Overview Paper - DNSH Appendix A - 2023

[19] The year 2050 is a pivotal milestone for the European Union, marking its commitment to achieving carbon neutrality as outlined in the European Green Deal. This target aligns with the objectives of the Paris Agreement, which seeks to limit global temperature increases to well below 2°C, with aspirations to remain within 1.5°C. Through the Green Deal's regulatory framework, the EU aims to lead the global transition towards a sustainable and climate-resilient economy, ensuring the long-term well-being of its citizens and the environment.

5.2 Practical Approaches to Climate Risk Assessment

Assessing the impact of physical climate risks on the economic activity under section 7.7 of the EU Taxonomy requires integrating three key components of climate risk frameworks:

1. **Hazard**: The physical climate event or trend, such as flooding, extreme heat, or windstorms, characterised by how likely it is to occur and its potential severity (e.g., flood depth, peak temperature).
2. **Exposure**: The degree to which residential properties are located in areas susceptible to these hazards, considering spatial (location) and temporal (timeframe) factors.
3. **Vulnerability**: The likelihood that properties will be harmed, determined by their sensitivity to hazards (e.g., structural condition) and their capacity to adapt or mitigate harm (e.g., retrofitting or resilience measures).

Ideally, an assessment would address all these elements with detailed, high-quality data. However, practical constraints, such as inconsistent data availability and coverage, require focusing on what is feasible using the best resources currently available.

5.2.1 Practical Approach: Hazard Assessment

Understanding the likelihood and intensity of climate hazards is the foundation of climate risk assessment. However, the availability and quality of data vary significantly. Hazards like flooding benefit from detailed and reliable datasets in the Netherlands, but others, such as temperature variability, lack detailed information especially forward-looking projections for the next 30 years. These gaps make it difficult to perform consistent and detailed evaluations for all hazards individually.

Additionally, the level of detail (*resolution*) in the data varies. Some datasets are very detailed, offering precise local insights, while others generalise conditions over larger areas, which can miss important details at property level. For some hazards, geographic coverage across the Netherlands is incomplete, leaving gaps in assessments for specific regions.

To address these challenges and the fact that some of the events are correlated, this analysis uses a *risk-cluster approach*. Instead of evaluating hazards individually, related risks are grouped to provide a more focused and practical evaluation. This approach makes the best use of available data while providing actionable insights. Future improvements in data resolution, coverage, and consistency will enhance these assessments further.

5.2.2 Practical Approach: Exposure Assessment

Exposure assessment identifies how properties are geographically situated in relation to climate hazards, focusing on potential direct physical impacts on buildings.

Steps in Exposure Assessment:

1. **Property Identification**: Compile a list of residential property addresses for evaluation.
2. **Geographic Mapping**: Plot these properties on a map of the Netherlands to provide a visual representation of their locations.
3. **Overlay with Hazard Data**: Combine the property map with data on climate hazards, such as flood zones, drought-prone areas, or wind damage regions, to identify which properties are most exposed.
4. **Simplified Focus**: The analysis uses two-dimensional (2D) spatial factors, such as proximity to hazard zones. Factors like building elevation, height, floor-level withing a building or construction type are not included at this stage but are flagged for inclusion in future refinements.

This streamlined approach ensures the analysis remains feasible and practical while creating a foundation for more detailed assessments as additional data becomes available.

5.2.3 Practical Approach: Vulnerability Assessment

Vulnerability assessment evaluates a property's susceptibility to harm, which depends on its sensitivity to climate hazards and its capacity to adapt. Ideally, this would require detailed information on individual building characteristics, such as structural integrity, construction year, and maintenance status.

Due to the lack of such granular data, this analysis relies on generalised insights from tools like the Klimaat-schadeschatter.nl[20] and klimaateffectatlas.nl[21]. While this method does not account for property-specific details, such as unique materials or implemented adaptive measures, it offers a practical starting point. Future analyses incorporating more detailed building-level data will significantly enhance the depth and precision of vulnerability assessments.

Risk-cluster approach

This section has outlined a practical methodology for assessing climate risks through the lenses of hazards, exposure, and vulnerability. Recognising the limitations of data granularity and availability, the analysis adopts, grouping related risks instead of assessing each hazard individually.

By using available data effectively, this method ensures a streamlined and actionable framework while supporting alignment with the EU Taxonomy. Section 6 of DNSH 2023 Overview Document provides further details and guidance on implementing this risk-cluster approach and outlines pathways for refinement as data availability improves.

[20] Which provide proxies for how typical buildings respond to climate hazards. These tools use factors like location and hazard intensity to estimate vulnerability.

[21] Which provides "kaartverhalen" useful narratives for physical climate risks.

6 Alternative approach: clustering of risks based on available datasources

The 14 physical climate risks identified by the working group as potentially impacting the acquisition and ownership of residential properties in the Netherlands can be grouped into three overarching clusters:

- Heat
- Water
- Foundation

This clustering reflects a high degree of overlap in how these risks are defined and their potential impacts on properties. Even before examining the available data for these clusters, it becomes clear that many of the risks are interconnected, both in definition and effect. While each risk is individually defined, distinguishing their specific impacts on property level often proves challenging. For example, “changing temperature,” “heat stress,” “temperature variability,” and “heat wave” are distinct in their terminology, yet their practical effects on residential properties—such as increased cooling demands, material degradation, or energy inefficiency—are difficult to separate. This overlap highlights the necessity of clustering related risks to enable a more streamlined and actionable analysis.

The clustering approach not only simplifies the assessment process but also allows for a more coherent application of the available data. Each cluster represents a set of risks with shared characteristics, enabling the use of common data sources to evaluate exposure. For instance, the Heat cluster can leverage temperature models, heat maps, and urban heat island studies, while the Water cluster benefits from flood risk assessments and precipitation data.

Figure 10 below illustrates the three clusters identified by the EEM NL Hub working group and lists the eight key data sources within the three clusters that can be used to assess the exposure of residential properties to risks within each cluster. By focusing on these clusters and aligning them with relevant data sources, this methodology strikes a balance between comprehensiveness and practicality.

Figure 10: Overview three risk clusters and related datasources.

Risk clusters

Heat	Water	Foundation
Wildfire	Flood (coastal, fluvial, pluvial, ground water)	Drought
Changing temperature (air, freshwater, marine water)	Changing precipitation patterns and types (rain, hail, snow/ice)	Subsidence
Heat stress	Precipitation or hydrological variability	Foundation deterioration
Temperature variability	Sea level rise	
Heat wave	Waterstress	
	Heavy precipitation (rain, hail, snow/ice)	

Datasources

Heat	Water	Foundation
Hittestress door warme nachten	Plaatsgebonden overstromingskans	KCAF Fundermaps
Natuurbrandgevoeligheid	Maximale overstromingsdiepte	Risico Paalrot
	Waterdiepte bij hevige bui	Risico Verschilzetting

The following sections (6.1 – 6.3) provide an overview of the three risk clusters and the data sources available within each cluster.

6.1 Heat

The heat-related risks for residential buildings—wildfires, rising temperatures, heat stress, temperature variability, and heatwaves—are closely linked through their connection to higher temperatures and their shared impact on building structures. Wildfires, though still uncommon in the Netherlands, increasingly threaten buildings near wooded or heathland areas during prolonged dry and hot periods, as highlighted by the Climate Impact Atlas. Rising temperatures contribute to more frequent and intense heatwaves, which can damage building materials, strain cooling systems, and raise maintenance costs.

Heat stress, particularly during warm nights, poses additional challenges, especially in urban areas where the urban heat island effect keeps buildings warmer for longer. This sustained heat can strain ventilation and cooling systems and accelerate wear on materials like roofs and walls. Rapid temperature changes, along with prolonged heat, can weaken materials such as concrete or metal, reducing their durability over time.

Heatwaves amplify these challenges, increasing risks such as thermal expansion in building components. Clustering these risks under the category "heat" helps capture their shared causes and overlapping impacts.

6.2 Water

The "Water" risk cluster includes several physical hazards that significantly affect residential buildings in the Netherlands, such as floods, changing precipitation patterns, precipitation or hydrological variability, sea-level rise, water stress, and heavy precipitation events. Flood risks are highly localised, as shown in the *Plaatsgebonden Overstromingskans* map, which identifies the probability of flooding in specific areas. This information helps assess how different types of flooding may affect buildings, whether from rivers, heavy rainfall, or rising groundwater.

The severity of potential flooding is illustrated in the *Maximale Overstromingsdiepte* map, which provides estimates of flood depth under various scenarios. This is critical for understanding the structural impact on buildings and planning flood resilience measures. Additionally, the *Waterdiepte bij Hevige Bui* map highlights water depth during intense rainfall events, reflecting the growing challenge of urban pluvial flooding due to heavier and more frequent precipitation.

Sea-level rise adds to these challenges, particularly in coastal areas, where higher water levels pose potential risks to buildings and surrounding infrastructure. This is further influenced by changing precipitation patterns, including more frequent heavy rain and hail, which contribute to greater hydrological variability. Such variability can lead to alternating periods of water stress and flooding, placing additional demands on building materials and drainage systems.

Clustering these hazards under the "Water" category makes sense from both an impact assessment and data perspective. These risks share common drivers—such as changing hydrological patterns—and overlapping effects on buildings. Grouping them allows for a cohesive analysis of their combined impacts and simplifies the use of data sources.

6.3 Foundation

The risk cluster "Foundation" includes physical hazards such as drought and subsidence, which can significantly impact residential buildings in the Netherlands. Drought, as highlighted by the Climate Impact Atlas and KCAF fundermaps, can cause soil shrinkage in clay or peat soils, exposing wooden foundation piles to air, increasing the risk of pile rot (*paalrot*). This degradation weakens the structural integrity of buildings, particularly in areas where older wooden foundations are prevalent.

Subsidence (*bodemdaling*) is another key concern, often resulting from a combination of soil dehydration during dry periods and the compaction of weak subsoils like peat. The *Risico Verschilzetting* map illustrates how differential settlement can lead to uneven ground levels, placing stress on foundations and causing visible damage to walls or floors.

This type of damage not only affects the safety of buildings but also increases repair costs over time. Regions with a reliance on high groundwater levels are especially vulnerable to compounded risks when these levels drop significantly.

Clustering these risks under the category "Foundation" helps capture their shared causes and overlapping impacts on buildings, particularly the challenges posed by soil conditions and structural stability.

6.4 Available Datasources

For each data source, we have outlined the following details:

#	Detail	Description
1	The name or classification of the indicator/data source	General information about the data source.
2	The source of the data	
3	The year of publication	
4	The resolution of the available data	
5	Map detail / scenario	Most of the data sources allow for further selection or refinement of specific indicators or scenarios. In the respective paragraphs, we highlight the map details or scenarios most commonly used by the EEM NL Hub working group members.
6	Threshold	And as a final step, the threshold is determined above/below which a certain property is considered to be affected. We present the map threshold that is most commonly applied by the EEM NL Hub WG members.

Please note that following this ‘cluster approach’ is very much based on “what is available” and not “what data is required to model each individual climate hazard”. In an ideal world, for each of the 14 hazards, hazard specific data on property level would be available. However, given the fact that this data is not available and the interconnectedness of the hazards within the three clusters, the EEM NL Hub working group members see this approach as the most practical application of the CRVA.

We recommend regularly consulting *klimaateffectatlas.nl*, as new maps and updates are periodically introduced. These updates will increasingly incorporate the new KNMI 2023 climate scenarios, providing more refined and up-to-date insights into climate risks.

In this section we will also indicate where possible the corresponding reference described in the Framework for Climate Adaptive Buildings (“FCAB”), issued by the Dutch Green Building Council (“DGBC”)[22].

[22] The first part of the publication, released in November 2022, outlines a methodology for understanding the impact of climate change on a building's surroundings, using open data from the Climate Impact Atlas (*Klimaateffectatlas*). The publication is available here: https://www.dgbc.nl/publicaties/framework-climate-adaptive-buildings-63

6.4.1 Hittestress door warme nachten

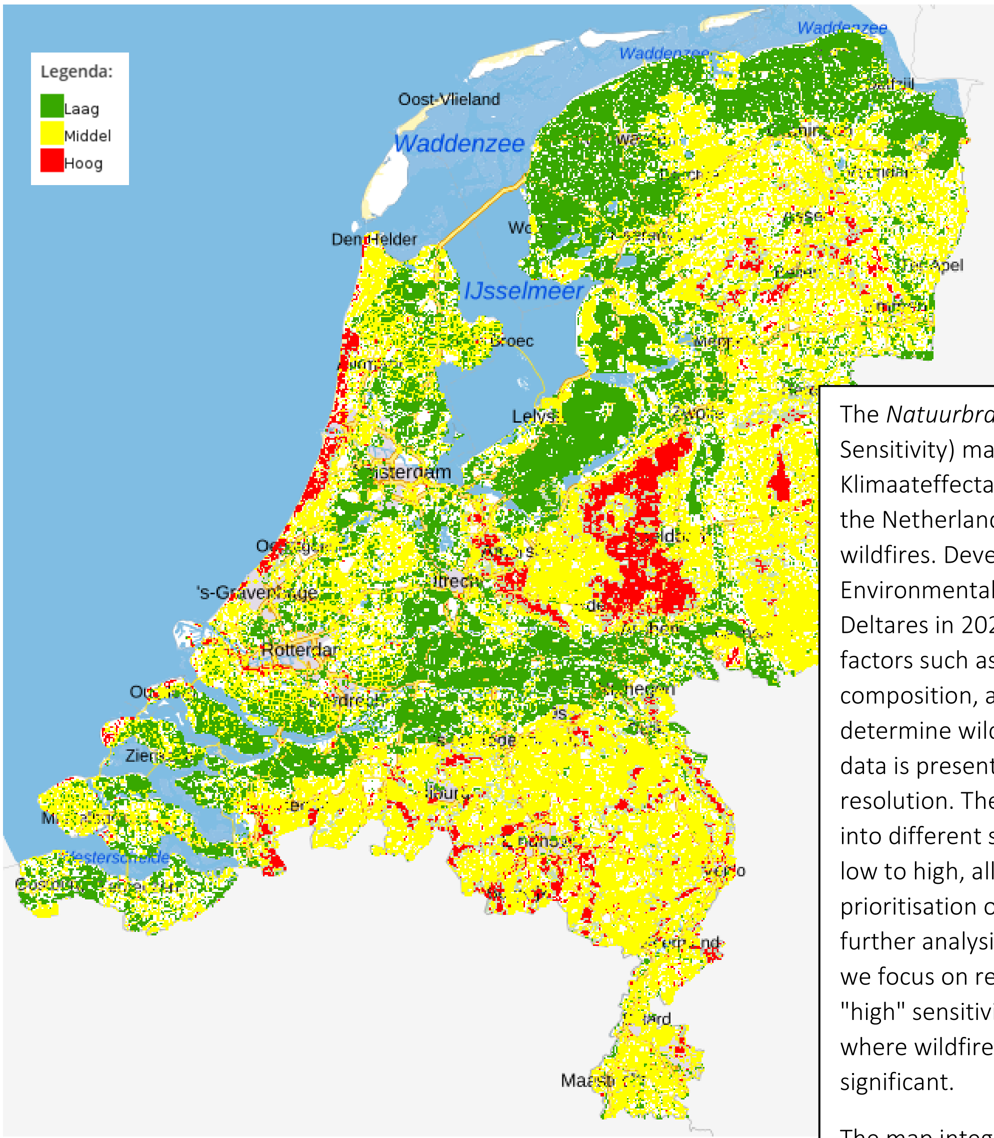
		Heat
		Indicator/datasource
1	**Name**	Hittestress door warme nachten
2	**Source**	Wageningen Environmental Research (WEnR)
3	**Year of publication**	2016
4	**Resolution**	100m x 100m
5	**Map detail / scenario**	2050 Hoog
6	**Threshold**	> 3 weken

The *Hittestress door warme nachten* (Heat Stress from Warm Nights) map identifies areas in the Netherlands where nighttime temperatures exceed 20°C for extended periods, focusing on regions vulnerable to tropical nights. Developed by Wageningen Environmental Research (WEnR) in 2016 using KNMI'14 climate scenarios, the map highlights the impact of urban heat islands, particularly in densely built areas where heat retention is higher.

The EEM NL Hub working group selected a threshold of more than three weeks of tropical nights as appropriate, based on the cumulative effects such conditions have on buildings and occupants. This duration represents a critical point where buildings struggle to cool sufficiently, leading to increased indoor heat levels and added strain on ventilation and cooling systems.

FCAB applies the same threshold of more than three weeks for these nights, aligning with our assessment of this as a significant risk indicator.

6.4.2 Natuurbrandgevoeligheid



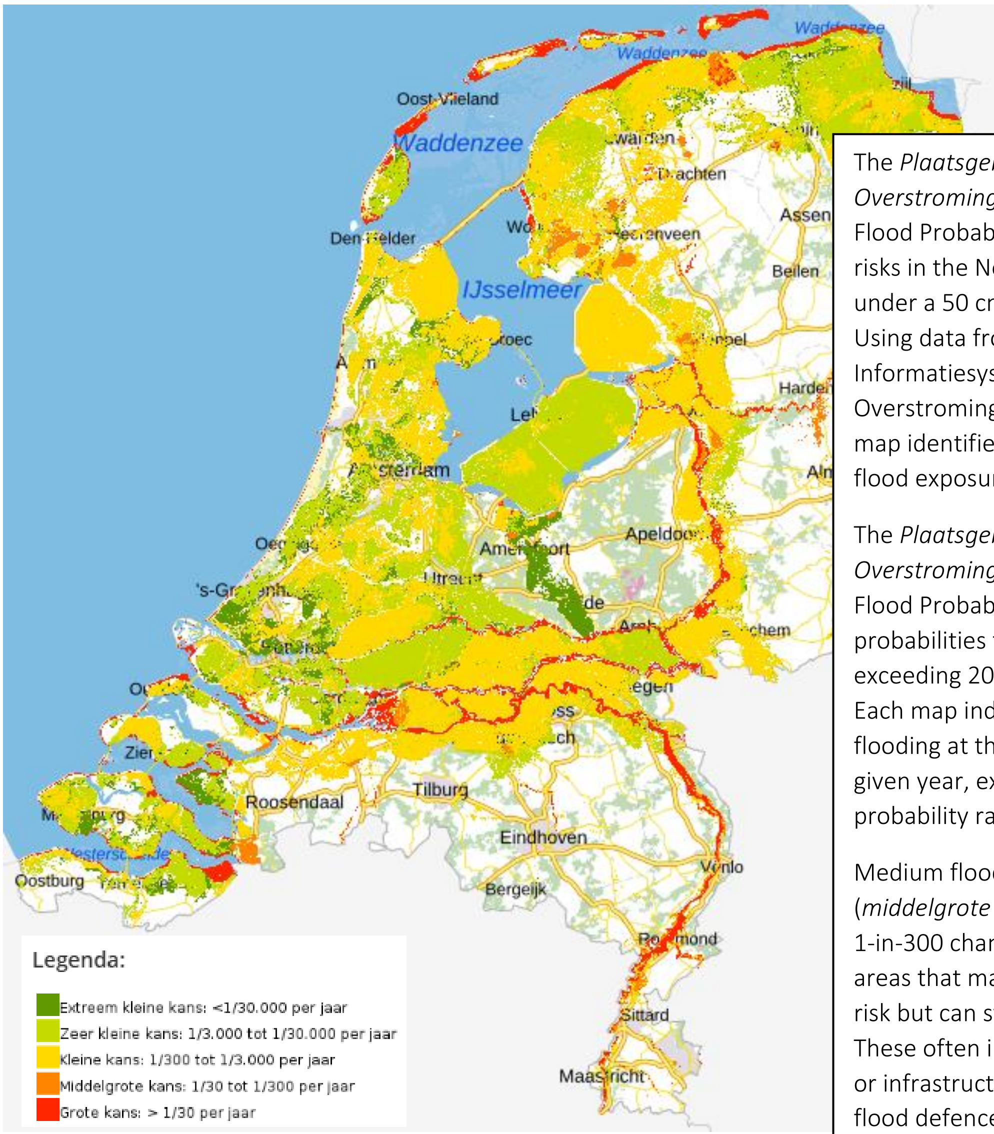
		Heat
		Indicator/datasource
1	**Name**	Natuurbrandgevoeligheid
2	**Source**	WEnR & Deltares
3	**Year of publication**	2021
4	**Resolution**	250m x 250m
5	**Map detail / scenario**	2050 Hoog
6	**Threshold**	Hoog

The *Natuurbrandgevoeligheid*(Wildfire Sensitivity) map in the Klimaateffectatlas assesses areas in the Netherlands susceptible to wildfires. Developed by Wageningen Environmental Research (WEnR) and Deltares in 2021, this map evaluates factors such as vegetation type, soil composition, and land use to determine wildfire sensitivity. The data is presented at a 250m x 250m resolution. The map categorises areas into different sensitivity levels, from low to high, allowing for clear prioritisation of areas requiring further analysis. For our assessment, we focus on regions classified as "high" sensitivity, reflecting zones where wildfire risk is deemed significant.

The map integrates key factors like prolonged dryness, wind conditions, and fuel availability (e.g., dense vegetation), which together increase the likelihood of wildfire occurrence and spread. It highlights particularly vulnerable regions, such as sandy soil areas or zones with large stretches of forest or heathland, where wildfires can pose substantial risks to nearby buildings.

FCAB applies the same threshold and data source.

6.4.3 Plaatsgebonden overstromingskans



		Water
		Indicator/datasource
1	**Name**	Plaatsgebonden overstr.kans|50cm|2050 Norm
2	**Source**	LIWO
3	**Year of publication**	2024
4	**Resolution**	100m x 100m
5	**Map detail / scenario**	2050 Hoog
6	**Threshold**	Middelgrote kans: 1/30 tot 1/300 per jaar

The *Plaatsgebonden Overstromingskans* (Location-Specific Flood Probability) map analyses flood risks in the Netherlands for 2050 under a 50 cm sea level rise scenario. Using data from the Landelijke Informatiesysteem Water en Overstromingen (LIWO), this 2024 map identifies areas with varying flood exposure.

The *Plaatsgebonden Overstromingskans* (Location-Specific Flood Probability) maps show flood probabilities for 2050 at depths exceeding 20 cm, 50 cm, and 200 cm. Each map indicates the likelihood of flooding at these depths within a given year, expressed as annual probability ranges.

Medium flood probabilities (*middelgrote kans*), with a 1-in-30 to 1-in-300 chance per year, highlight areas that may not face the highest risk but can still be heavily impacted. These often include residential areas or infrastructure with less effective flood defences.

The map includes both primary (*primaire keringen*) and secondary (*secundaire keringen*) flood defences, as defined under the Dutch Water Act (*Waterwet*). Primary defences protect against flooding from major water bodies such as seas and rivers, while secondary defences are designed to manage risks from smaller water systems, such as canals and streams.

FCAB applies a threshold of 20cm (which is a different map).

6.4.4 Overstromingsdiepte | Grote kans

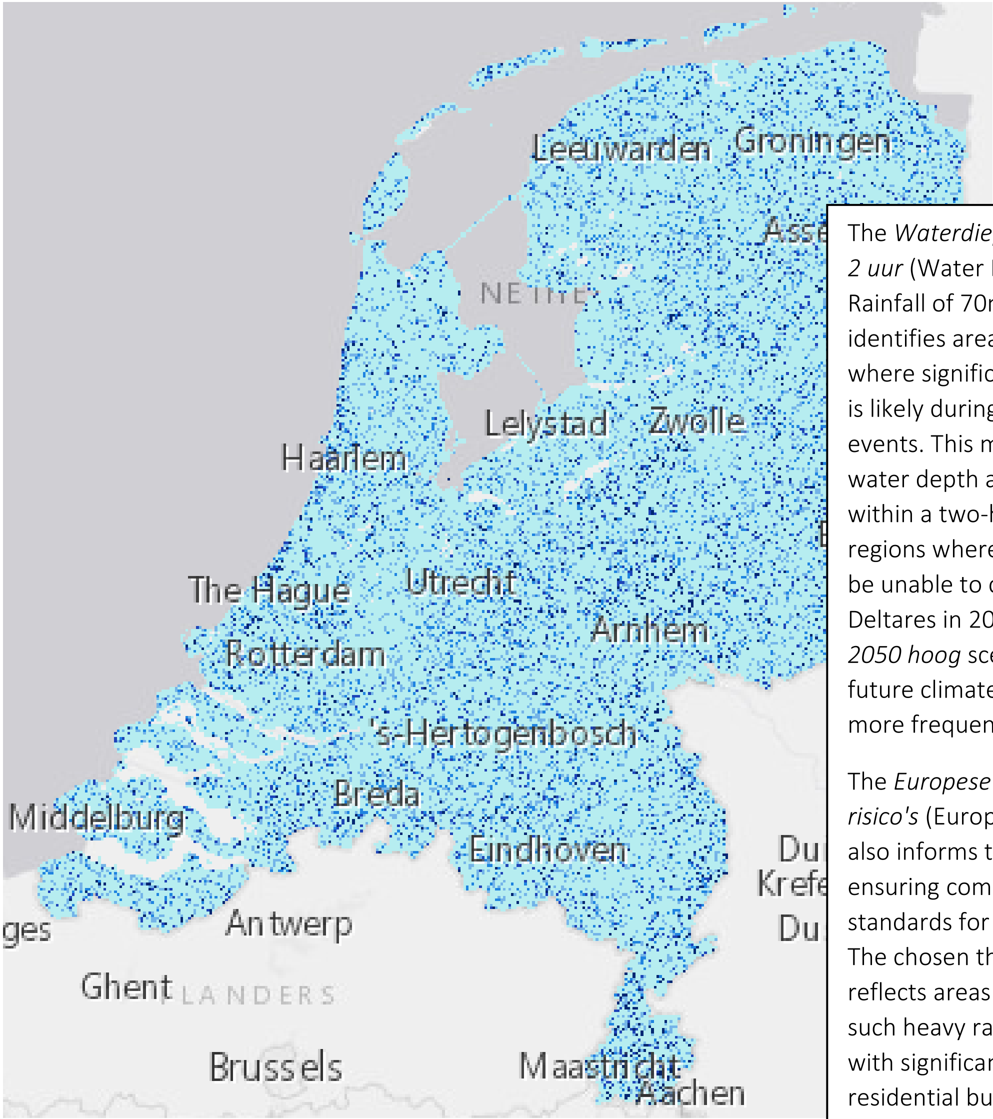
		Water
		Indicator/datasource
1	**Name**	Overstromingsdiepte | Grote Kans
2	**Source**	LIWO
3	**Year of publication**	2022
4	**Resolution**	100m x 100m
5	**Map detail / scenario**	2050 Hoog
6	**Threshold**	> 1m

The *Overstromingsdiepte | Grote kans* (Flood Depth | High Probability) map provides an in-depth data set of flood depths in areas with a high probability of flooding in the Netherlands. This map is useful for assessing areas where flooding exceeds depths of 1 metre, offering insights into potential damage to buildings and infrastructure. Developed by the Landelijke Informatiesysteem Water en Overstromingen (LIWO) in 2022, it uses detailed spatial data to highlight regions most vulnerable to significant flood events.

It focuses on high-probability flooding scenarios (*grote kans*), which represent flood events that are more likely to occur. By using a threshold of >1 metre, the map ensures that it captures events with substantial physical impacts, as flooding at this depth can severely damage building structures and disrupt essential systems such as electrical and plumbing networks.

The 2050 high scenario (*2050 hoog*) is appropriate because it accounts for the projected effects of climate change, including increased sea levels and more intense rainfall, which exacerbate flooding risks.

6.4.5 Waterdiepte bij hevige bui



		Water
		Indicator/datasource
1	Name	Waterdiepte bij hevige bui|70mm|2uur
2	Source	Deltares/Europese Richtlijn Overstromingsrisico's
3	Year of publication	2018
4	Resolution	2m x 2m
5	Map detail / scenario	Huidig - 2050 Hoog
6	Threshold	> 30cm

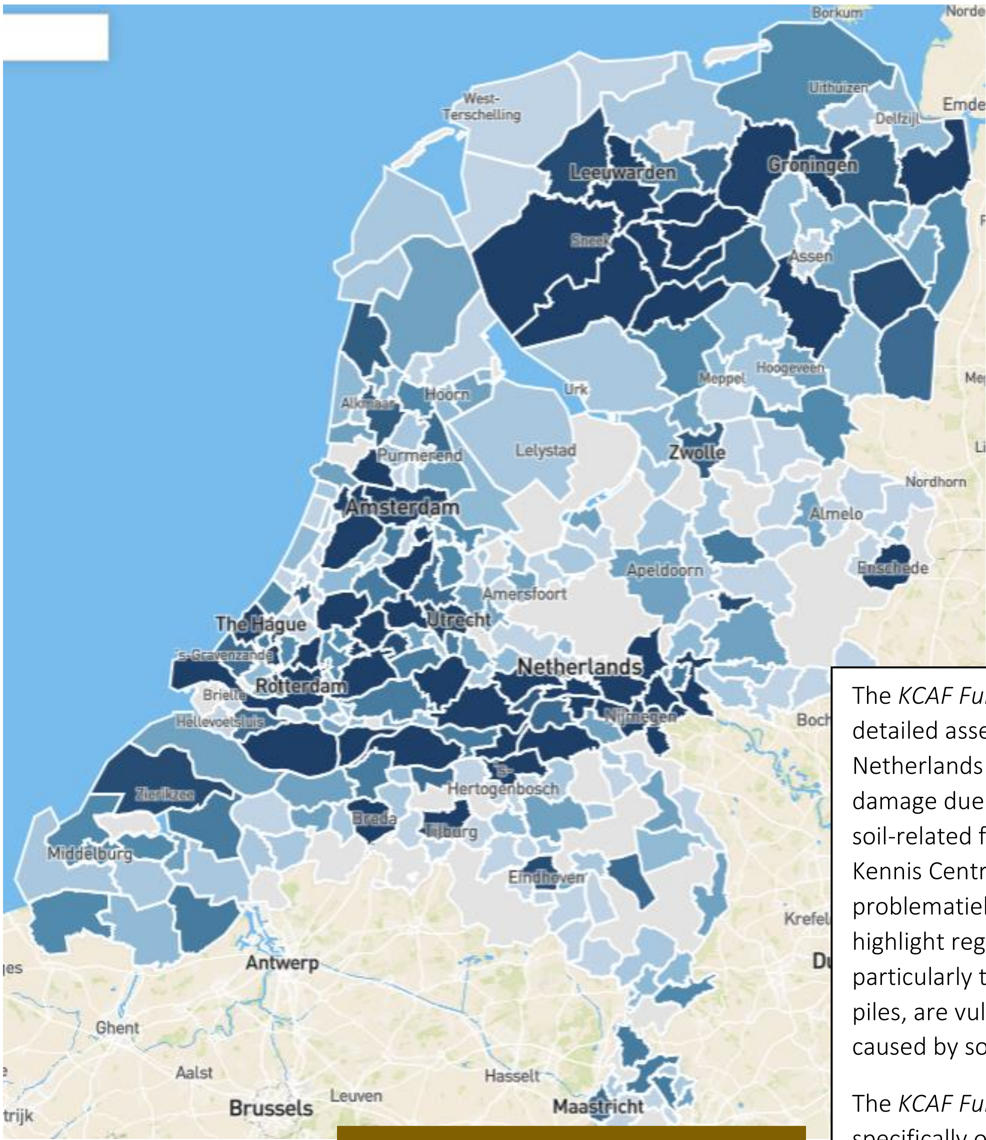
The *Waterdiepte bij hevige bui 70mm 2 uur* (Water Depth During Heavy Rainfall of 70mm in 2 Hours) map identifies areas in the Netherlands where significant water accumulation is likely during short, intense rainfall events. This map models the potential water depth after 70mm of rainfall within a two-hour period, highlighting regions where drainage systems might be unable to cope. Developed by Deltares in 2018, it incorporates the *2050 hoog* scenario, which considers future climate projections such as more frequent extreme rainfall.

The *Europese Richtlijn Overstromings-risico's* (European Flood Risk Directive) also informs the methodology, ensuring compliance with EU standards for flood risk identification. The chosen threshold of >30 cm reflects areas severely affected when such heavy rain occurs in a short time, with significant implications for residential buildings.

Water at this depth can seep into basements, damage foundations, and compromise walls, flooring, and insulation. Homes in areas with poor drainage systems are particularly vulnerable, as the inability to drain water quickly exacerbates the impact.

By focusing on these risks, the map provides insights for understanding the physical impacts of short-duration heavy rainfall on residential properties.

6.4.6 KCAF Fundermaps

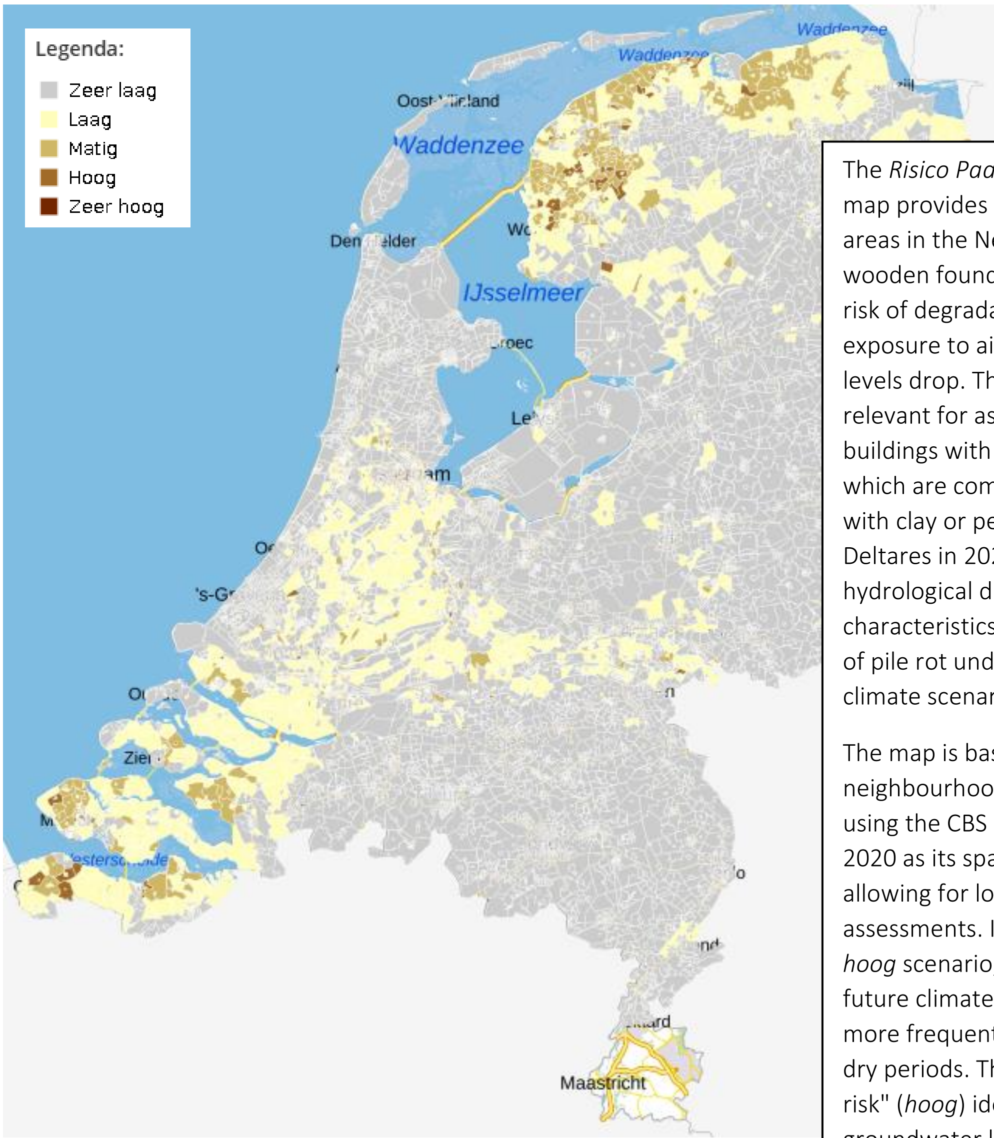


The *KCAF Fundermaps* provide a detailed assessment of areas in the Netherlands at risk of foundation damage due to drought and other soil-related factors. Developed by the Kennis Centrum Aanpak Funderings-problematiek (KCAF), these maps highlight regions where foundations, particularly those relying on wooden piles, are vulnerable to damage caused by soil shrinkage and drying.

The *KCAF Fundermaps* focus specifically on risks related to drought, which can lower groundwater levels, exposing wooden foundation piles to air and triggering decay. A threshold is established for areas where prolonged drought conditions create a high likelihood of damage, identifying zones where buildings are particularly at risk. This is especially relevant for older buildings constructed on clay or peat soils, as these materials are highly susceptible to drying out and shrinkage.

		Foundation
		Indicator/datasource
1	Name	KCAF Fundermaps
2	Source	KCAF
3	Year of publication	Updated quarterly
4	Resolution	Property address level
5	Map detail / scenario	XX
6	Threshold	> 25%

6.4.7 Risico Paalrot



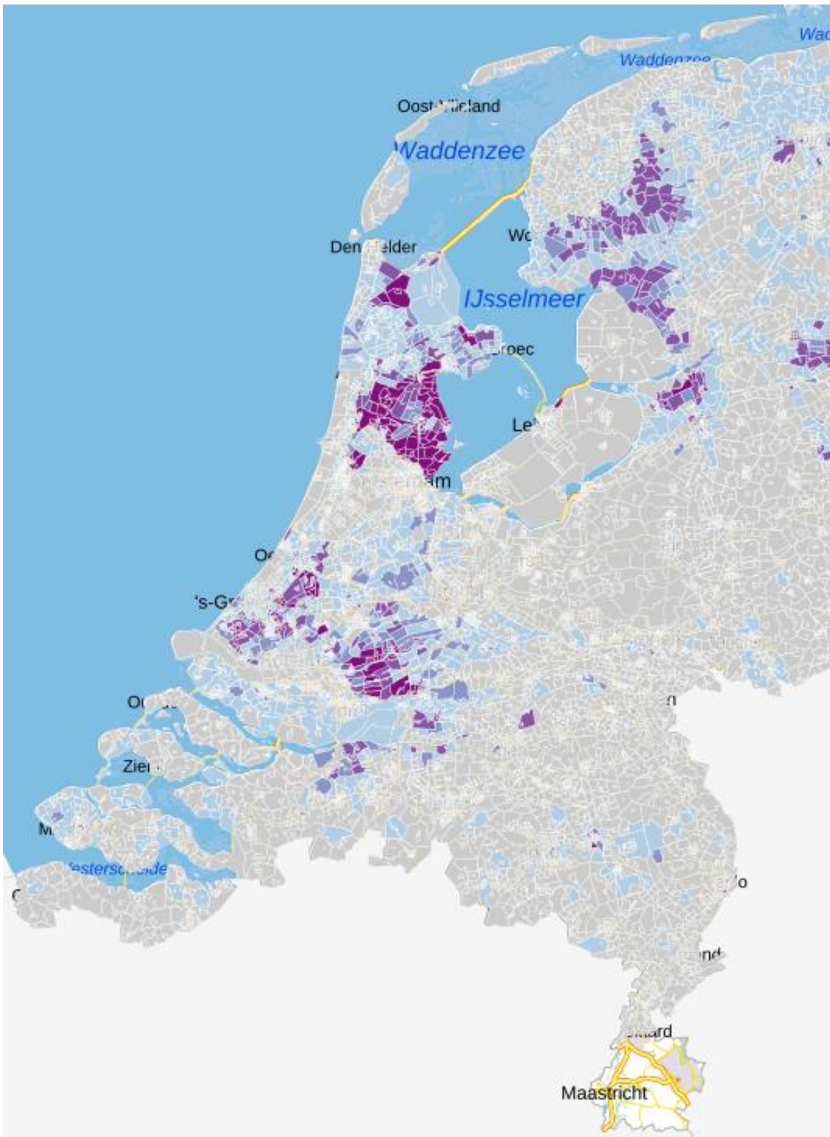
		Foundation
		Indicator/datasource
1	Name	Risico Paalrot
2	Source	Deltares
3	Year of publication	2021
4	Resolution	Buurtniveau (CBS Wijk- en buurtenkaart (2020)
5	Map detail / scenario	2050 Hoog
6	Threshold	Hoog

The *Risico Paalrot* (Risk of Pile Rot) map provides a detailed analysis of areas in the Netherlands where wooden foundation piles are at high risk of degradation due to prolonged exposure to air when groundwater levels drop. This map is particularly relevant for assessing risks to older buildings with wooden foundations, which are commonly found in regions with clay or peat soils. Developed by Deltares in 2021, it combines hydrological data and soil characteristics to model the likelihood of pile rot under current and future climate scenarios.

The map is based on data at the neighbourhood level (*buurtniveau*), using the CBS Wijken en Buurtenkaart 2020 as its spatial framework, allowing for localised and practical risk assessments. It incorporates the *2050 hoog* scenario, which accounts for future climate conditions such as more frequent droughts and extended dry periods. The threshold of "high risk" (*hoog*) identifies areas where groundwater levels are expected to fall significantly, increasing the exposure of wooden piles to air and triggering rot.

The risks highlighted on this map are critical for residential buildings, as pile rot can lead to structural instability, uneven settlement, and costly repairs. The map's focus on neighbourhood-scale data makes it an effective tool for pinpointing vulnerable zones and understanding the geographical distribution of pile rot risks.

6.4.8 Risico Verschilzetting



		Foundation
		Indicator/datasource
1	Name	Risico Verschilzetting
2	Source	Deltares
3	Year of publication	2021
4	Resolution	Buurtniveau (CBS Wijk- en buurtenkaart (2020)
5	Map detail / scenario	2050 Hoog
6	Threshold	Hoog

The *Risico Verschilzetting* (Risk of Differential Settlement) map identifies areas in the Netherlands where uneven ground settlement poses a significant risk to buildings. This issue is most common in regions with clay or peat soils, where variations in soil shrinkage and compaction can cause foundations to settle unevenly. Created by Deltares in 2021, the map combines data on soil, groundwater, and climate to model settlement risks now and in the future.

The map is based on neighbourhood-level data (*buurtniveau*), using the CBS Wijken en Buurtenkaart 2020, which provides a detailed local view of risk areas.[2] It incorporates the *2050 hoog* scenario, accounting for future challenges like prolonged droughts and fluctuating groundwater levels, which can worsen soil instability. Areas marked as "high risk" (*hoog*) are those where settlement is expected to significantly impact buildings and infrastructure.

Differential settlement can cause cracks in walls and floors, structural misalignments, and expensive repairs, particularly in older buildings with less robust foundations. By offering detailed insights at the neighbourhood scale, the map helps identify where buildings are most vulnerable to soil movement, making it a valuable resource for understanding and addressing long-term risks to building stability.

6.5 Conclusion

In this section, we have outlined the 14 physical climate risks identified by the working group as potentially impacting the acquisition and ownership of residential properties in the Netherlands. These risks can be categorised into three overarching clusters: heat, water and foundation.

It is important to acknowledge that this analysis is inherently dynamic and evolving. As data availability improves over time, there is potential for the development of more precise and comprehensive maps addressing existing physical climate hazards. This progress may apply not only to the risks currently recognised but also to phenomena not presently classified as risks due to insufficient data. Consequently, ongoing updates and refinements to the analysis will likely be necessary.

7 Conclusion

The year 2024 was an important milestone as the first reporting period for Taxonomy alignment. In this initial phase, many stakeholders prioritised conducting their analyses, which represented a significant undertaking, over alignment of methodologies or extensively sharing best practices on data and inference. However, 2024 also offered a first opportunity for stakeholders to exchange insights and approaches regarding these methodologies.

This publication aims to provide an overview of common denominators in key elements of the analysis. It is not intended to serve as a definitive minimum or baseline standard. Rather, it offers a foundational framework that institutions can adapt and expand upon to address their requirements.

Moreover, we emphasise the critical role of considering the EU Taxonomy's Level 1 and Level 2 texts, alongside the growing body of Commission notice documents. These should be reviewed holistically, as they collectively shape the interpretation and application of the Taxonomy framework. It is possible that future Commission notices could provide new insights or reinterpretations that alter previously understood conclusions. This underscores the necessity of maintaining flexibility and openness to new information within the analysis.

The year 2025 will provide further opportunities to share best practices, discuss suitable data sources, and refine approaches to inference. Additionally, the Level 1 and Level 2 texts of the EU Taxonomy are scheduled for revision in the coming year. We aim to extend our analysis to include the "Do No Significant Harm" (DNSH) criteria for other economic activities and expand our focus to the DNSH criteria of other environmental objectives related to residential real estate.

We hold the firm hope that this opportunity will allow us to advocate for the practical feasibility of the EU Taxonomy criteria, particularly the DNSH criteria for residential (mortgage) loans. This effort is of paramount importance for strengthening a sustainable framework that supports and accelerates the EU Renovation Wave.

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