NSAI/TC 73 "Defective Concrete Blocks (DCB) Technical matters Steering Group"

National secretary: Mr. David Gall

NSAI Agrément Insulation report – Supplementary Report to N237 on the effects of pumped Cavity Wall Insulation on the moisture content of masonry leaves containing defective concrete blocks.

Document type	Related content	Document date	Expected action
General / Other		2025-12-12	

N369 - Supplementary Report to N237 on the effects of pumped Cavity Wall Insulation on the moisture content of masonry leaves containing defective concrete blocks.

12th December 2025

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Executive Summary

On the 30th of November 2021, a number of enhancements to the Defective Concrete Blocks Scheme were agreed in a Government Decision. Arising from this Government decision, a number of technical issues needed to be considered, and where appropriate, policy advice provided to the Minister. The Government Decision identified several technical items relevant to the National Standards Authority of Ireland (NSAI) which needed to be addressed. It was identified during engagement with the Government Expert Working Group on the enhanced scheme that there may be a potential impact arising for DCB homes from pumped cavity wall insulation and concerns that the deployment of certain materials and processes in the retrofitting of dwellings may be causing unforeseen and unintended problems which may necessitate future remediation. In response to the Government Decision and letter to NSAI dated 15th February 2022 [1], see Appendix B, NSAI Agrément has carried out a review of existing certification of pumped cavity fill insulation products. The results of this review (Committee Document N237 [2]) were made available to relevant technical committees.

The purpose of this supplementary report is to specifically investigate the effects of cavity wall insulation on the moisture content of the external leaves of dwellings constructed with defective concrete blocks. Although Committee Document N237 addressed the original requests in Appendix B and other technical matters, the moisture content of the outer leaves of DCB structures was identified as a parameter requiring further investigation and quantification.

In order to quantify moisture contents and their relationship to defective concrete blocks, NSAI Agrément initially sought to utilize state-of-the-art hygrothermal modelling software to analyse the impact of cavity wall insulation on moisture content in DCB structures; however, this approach was unsuccessful due to data uncertainties that could only be resolved with significant testing and research.

Consequently, as part of the ongoing DCB scheme, available test results from field investigations were accessed and assessed by NSAI Agrément. To ensure the robustness and impartiality of the analysis of this data [3], third-party independent research and testing organizations were also engaged to assess the data and support the overall assessment. The statements and findings contained within this report represent the procedures undertaken and conclusions reached by NSAI Agrément. Appendix A includes an external technical report, which was commissioned to offer independent technical input to this report.

In conclusion, research conducted to date has identified deleterious materials within the blocks themselves as the root cause of deterioration. The findings of this investigation indicate that the retrofitting of dwellings can raise the average moisture content of the outer leaf but that this increase is highly variable and has been shown to be strongly affected by seasonality, exposure, orientation, sampling time, and location. The field data indicates that these structures already possess a baseline moisture level in excess of a dry condition, and any observed rise attributable to retrofitting falls within the range of natural seasonal fluctuations, exposure, and orientation.

1.0 Introduction

Committee Document N237 contains detailed information regarding the review of pumped cavity wall insulation products, their certification, and installation methods, as well as the processes and criteria assessed by NSAI Agrément. It provides a comprehensive overview of the technical requirements governing the selection and installation of cavity wall insulation in Irish dwellings, with particular attention to compliance with national regulations and best practices. This supplementary report, building upon the findings presented in Committee Document N237, offers a focused investigation into cavity wall insulation and its effects on the moisture content of cavity walls containing aggregate concrete masonry blocks.

NSAI Agrément determined that assessing the moisture content of the masonry units was the sole remaining issue that required further investigation from the initial report.

2.0 Investigation Methodologies

The investigation methodologies detailed in this supplementary report were carried out in two principal phases to assess the moisture contents of aggregate concrete masonry cavity walls affected by defective concrete blocks (DCB).

Initially, advanced hygrothermal modelling was employed using WUFI software, a recognized tool for analysing heat and moisture transfer within building envelopes. The aim was to model and predict the impact of pumped cavity wall insulation on the moisture content of external leaves in DCB dwellings under varied environmental scenarios. This approach was initially pursued as real-life test data was not available at the outset of this analysis.

Secondly, as more buildings were tested for admission to the Enhanced Defective Concrete Blocks Grant Scheme, test and building data became available from the National Housing Agency and affected Local Authorities, generating an evidence base for this investigation. This dataset offered an opportunity to analyse specific parameters directly relevant to cavity wall insulation and the associated moisture content in dwellings constructed with defective concrete blocks.

To ensure impartiality and reliability, the assessment of Housing Agency data incorporated input and review from an independent third-party research organization with expertise in masonry blocks and geology as well as an accredited testing organization. These external entities contributed to the analysis of the data, critical review of the results, reinforcing the objectivity of the findings. The combination of field data and independent assessment established a robust empirical foundation for the investigation, allowing for a quantification of moisture levels in both retrofitted and non-retrofitted DCB structures.

The analysis and conclusions presented within this report reflect the assessment and findings of NSAI Agrément based on the available data and methodologies employed. In addition, detailed analysis and conclusions provided by external research and testing organisations, commissioned to ensure independence and impartiality, are documented separately in Appendix A. This distinction ensures that both the primary investigation by NSAI Agrément and the supporting external technical input are transparently reported within the overall assessment framework.

3.0 Advanced Hygrothermal Modelling using WUFI software

3.1 Introduction to WUFI Software

WUFI software (Wärme Und Feuchte Instationär) is an advanced hygrothermal modelling tool used to analyse the movement of heat and moisture through building envelopes. In the context of this investigation, WUFI was employed to simulate the effects of pumped cavity wall insulation on aggregate concrete masonry cavity walls, particularly in homes affected by defective concrete blocks (DCB). The software allows the examination of how environmental variables such as seasonality, exposure, and wall orientation influence moisture levels within both the internal and external leaves of the masonry walls. By leveraging WUFI's capabilities, the study aimed to predict and quantify changes in moisture content resulting from retrofitting interventions, providing a scientific basis for understanding the hygrothermal performance of DCB structures.

3.2 Modelling Conducted and Technical Committee Feedback

For the purposes of this investigation, NSAI Agrément appointed an independent third-party organisation with recognised expertise in hygrothermal modelling to conduct the WUFI simulations, ensuring that the modelling benefitted from specialist technical knowledge and impartial analysis.

The modelling phase involved a comprehensive application of WUFI pro (version 6.6) to various DCB dwelling scenarios, simulating moisture behaviour under different environmental conditions and insulation configurations.

Results from these simulations were presented to Technical Committees of experts on masonry, retrofitting and defective concrete blocks for review, where the committees evaluated the robustness of the methodology and the relevance of the input variables. Feedback focused on the accuracy of the boundary conditions, the representation of seasonal variability, and the integration of field data with the model outputs. This feedback was to ensure that the modelling approach remained aligned with industry standards and knowledge. It also helped to refine the study's focus on moisture dynamics in retrofitted masonry cavity walls.

3.3 Resolution of Feedback and Interaction with Modelling Variables

Following the Technical Committee's feedback, NSAI Agrément engaged with the external modelling consultant to adjust the modelling parameters to address queries raised about material data inputs and environmental parameters. As an assessment body for building materials, NSAI Agrément was also able to provide insights on parameters and material variables for the study.

Some of the key variables discussed included moisture content baselines, environmental exposure, wall orientation, and material characteristics. The appointed consultant recalibrated the model to more accurately reflect real-world conditions observed in field surveys. The iterative process of feedback and resolution improved the accuracy of the WUFI model results, however, after several rounds of collaborative discussion addressing the modelling parameters, and careful consideration of recent studies conducted in Ireland, it became evident that further progress could not be achieved without the support of a large-scale study and accurate comprehensive test data to support the model inputs.

3.4 Hygrothermal Modelling Outcome and Next Steps

Building on the collaborative feedback process between NSAI Agrément and the external WUFI modelling consultant, it was mutually recognized that the accuracy of hygrothermal simulations depended heavily on the availability of material specific test data as well as a calibration study to real life conditions. Both parties agreed that further targeted testing and research were essential to calibrate the model and to ensure that its outputs reflected real-world conditions in aggregate concrete masonry cavity walls affected by defective concrete blocks (DCB).

Coinciding with these deliberations, a large-scale study, Fabtrads study [4], was released in Ireland, providing a comprehensive dataset on moisture dynamics and insulation performance of Irish construction materials and environmental conditions. The findings of the Fabtrads study reinforced the position agreed between the external WUFI consultant and NSAI Agrément regarding the necessity of specific test data and environmental model calibration.

Recognizing the significance of the FABTRDS study and its alignment with technical committee feedback, NSAI Agrément initiated an investigation into the availability of additional test data through engagement with the Housing Agency, the body responsible for administering the Enhanced Defective Concrete Blocks Grant Scheme. This agency had access to a growing repository of moisture measurement records and field inspection data from homes affected by DCB. Up to this point, such comprehensive datasets had not been previously accessible, presenting a new opportunity to assess measured moisture contents of cavity walls on the DCB scheme.

4.0 Assessment of Test Data from the Enhanced Defective Concrete Block Scheme

4.1 Availability of Data for DCB Dwellings

The Housing Agency’s data for buildings on the Defective Concrete Blocks (DCB) scheme encompasses a substantial repository of field-gathered measurements and inspection records as well as tests conducted by independent test laboratories. The data is derived from homes that have undergone evaluation as part of the DCB grant process, providing insights into the real-world performance of masonry cavity walls under varying exposure scenarios. Importantly, this collection represents one of the most comprehensive sources of test evidence available for Irish dwellings affected by defective concrete blocks.

In addition to the Housing Agency’s repository, data was also secured through data sharing agreements with two affected local authorities. These agreements enabled access to supplementary information, including photographic evidence and other relevant records, thereby supporting further analysis where required. The inclusion of these additional datasets enhanced the volume of evidence available for the study, ensuring that the assessment could account for a wider range of real-world scenarios encountered in DCB dwellings.

4.2 Data Integrity and External Assessment Support

In the context of research and investigation, NSAI Agrément understands that the integrity and reliability of the data used are especially important for building trust in the findings and conclusions. While many different perspectives and informal accounts have emerged since the beginning of the DCB crisis, it is the consistently measured, well-documented field data that truly supports meaningful analysis and informed decision-making. By grounding this investigation in transparent and verifiable evidence (Housing Agency and Local Authority Data), we have tried to ensure that conclusions and future actions are based on the best available data.

An independent third-party research organization with expertise in masonry blocks and geology, as well as an accredited testing organization, were also contracted to provide an independent analysis of the data. The independent review of the HA data along with its findings and conclusions are appended to this report in Appendix A.

4.3 Data Analysis Results

4.3.1 Moisture Content as a Parameter

Moisture content refers to the amount of water contained within a material, typically expressed as a percentage of its total weight. In the context of aggregate concrete masonry materials, moisture content is not a standard parameter, or an essential characteristic, within its product standard (EN 771-3). Therefore, it is not a widely available dataset. All references to moisture content in this report refer to the tested values obtained from concrete cores taken from DCB dwellings. Moisture contents are determined using two cores from affected dwellings:

- Core 1a: An intact core from the elevation with the most advanced deterioration.
- Core 6: A core from the inner leaf inside the elevation with the next most advanced external deterioration.

The reported moisture content values provide a quantifiable basis for assessing the presence and distribution of moisture within wall assemblies, which is essential for understanding the potential influence of factors such as retrofit insulation, seasonality, exposure, and orientation.

One of the important considerations when assessing moisture contents is the level of dryness or wetness of a material. In general, a material protected from external wetting will still absorb moisture from the surrounding ambient air depending on its porosity and affinity for water. Materials will also contain water that has formed as condensation on its external and internal surfaces, dependent on its exposure to temperature differentials and the relative humidity of the surrounding air. For materials, under the above relatively stable conditions, the term “Inherent moisture content” is widely used to describe their moisture content. Inherent moisture content refers to the baseline level of water naturally present in a construction material under relatively stable conditions.

As a material becomes wetter, its moisture content increases up a point when it becomes saturated. A saturated moisture content represents the maximum amount of water the material can hold when exposed to moisture. These two parameters are critical for understanding both the normal and extreme moisture behaviour of building materials in various environmental scenarios.

For aggregate concrete blocks, the level of moisture at saturation point is predominately dependent on the propensity of the constituent aggregates to absorb water, the moisture held by the cement matrix, as well as the porosity and structure of the block. It must also be noted that aggregate concrete blocks are porous and hydrophilic and will generally absorb and hold water when it is available. It is therefore expected that blocks manufactured from different aggregates and made to different compositions will vary in both saturation point and inherent moisture content. As a general observation from the dataset and other investigations on DCB dwellings:

- The saturation point of most concrete blocks lies between 5% and 6%.
- The average moisture content from the inner leaf (core 6) of blocks on the DCB scheme is approximately 0.65%. This could be considered inherent moisture, or the moisture held by a material in stable conditions. It is important to note from plot 5 in appendix A, that while the moisture content of the internal leaf is relatively stable in comparison to the outer leaf, it is still subject to variation which supports the above statements regarding specific composition and environmental considerations.

4.3.2 Moisture Content of blocks contained in the external leaf of cavity walls

Both NSAI Agrément, and the aforementioned external parties, have assessed the Housing Agency data to ensure the accuracy of the findings presented below. It should be acknowledged that these findings are specific to dwellings included in the DCB scheme and, while they require careful interpretation, they nonetheless represent the most reliable and comprehensive moisture content data currently available. The following relationships between environmental parameters and moisture contents could be identified from this study:

- The data shows that the outer leaves of masonry in all areas, and exposure classes, are exposed to liquid water throughout the year, with moisture content averages varying from 2.40% to 3.94%. These moisture contents are representative of all properties on the scheme, i.e. they represent CWI retrofitted and non-retrofitted properties. (Ref. Plot 5, Appendix A).
- 56% of properties do not contain retrofit insulation. Retrofit insulation is present in 44% of the properties on the scheme and is predominantly cavity wall insulation. (Ref. Plots 10 and 11, Appendix A)
- When retrofitted and non-retrofitted properties are analysed independently, the average moisture content is marginally higher for retrofitted properties depending on their location. Note: The relationship between retrofitting and moisture contents is not an absolute relationship i.e. there are instances where moisture contents of retrofitted properties are lower than the average for non-retrofitted properties (approximately 30% of the dataset), but the only consistent relationship that could be deduced was using average values.

Location	**Clare**	**Donegal**	**Limerick**	**Mayo**
No. of Properties	97	97	28	5
Average Moisture Content without CWI Retrofitted Insulation	2.92%	2.93%	2.26%	1.44%
Average Moisture Content with CWI Retrofitted Insulation	3.54%	3.21%	3.66%	1.84%
Difference	0.62%	0.28%	1.4%	0.37%

Table 1 – Summary of Average Moisture Contents. (Ref. Plots 1 & 13, Appendix A)

- The data shows a very strong correlation between the most damaged elevation in properties and the prevailing wind. The worst damage occurs in the West, Southwest and Southern elevations of affected properties. (Ref. Plot 2, Appendix A)
- There is a significant seasonal effect on moisture contents, with a seasonal reduction/increase in moisture contents evident from plot 5, Appendix A.

4.3.4 Role of Moisture in the reaction of deleterious materials

To meaningfully evaluate the impact of any additional moisture in masonry walls, it is essential first to identify a root cause of deterioration and then to quantify the effect of any additional moisture on that mechanism.

In the context of affected properties, extensive research conducted over many years has established that iron sulphide minerals act as the primary deleterious materials responsible for the degradation of masonry walls.

The chemical reactions responsible for this damage require the presence of oxygen, moisture, and the minerals themselves. With the data demonstrating that liquid water remains available in the outer leaves throughout the year—regardless of whether cavity wall insulation is present — these reaction conditions are persistently met, allowing the deterioration process to continue unabated in susceptible structures.

5.0 Conclusions

This study has used the best available data to quantify the moisture content of the external leaves of masonry in properties participating in the DCB scheme, providing data that enhances the understanding of material moisture contents in the context of cavity wall insulation. It is important to emphasize that all analyses, interpretations, and conclusions drawn herein pertain exclusively to properties on the DCB scheme. While retrofitting cavity wall insulation results in a marginal increase in the average moisture content of masonry units, the data shows that these external leaves are exposed to liquid water throughout the year regardless of retrofit status. It also shows that their moisture contents are strongly affected by several variables besides retrofit insulation.

It should also be noted that further research is ongoing in the field of concrete blocks and the use of hygrothermal modelling, with several studies currently underway to enhance understanding and inform best practices. These continued efforts reflect a commitment to improving the resilience of masonry construction in Ireland. NSAI Agrément remains committed to sharing its knowledge and insights with relevant stakeholders, thereby supporting current and future studies focused on enhancing our understanding of these materials.

Finally, this study would not have been possible without the valuable support and contributions of several organizations and individuals. Special acknowledgment is extended to the team within the NSAI Sustainability & Built Environment Department, the Housing Agency, Dr. Robbie Goodhue, Wain Morehead Architects, Testall Laboratory, and the professional geologists whose research and expertise have informed NSAI's committees over recent years.

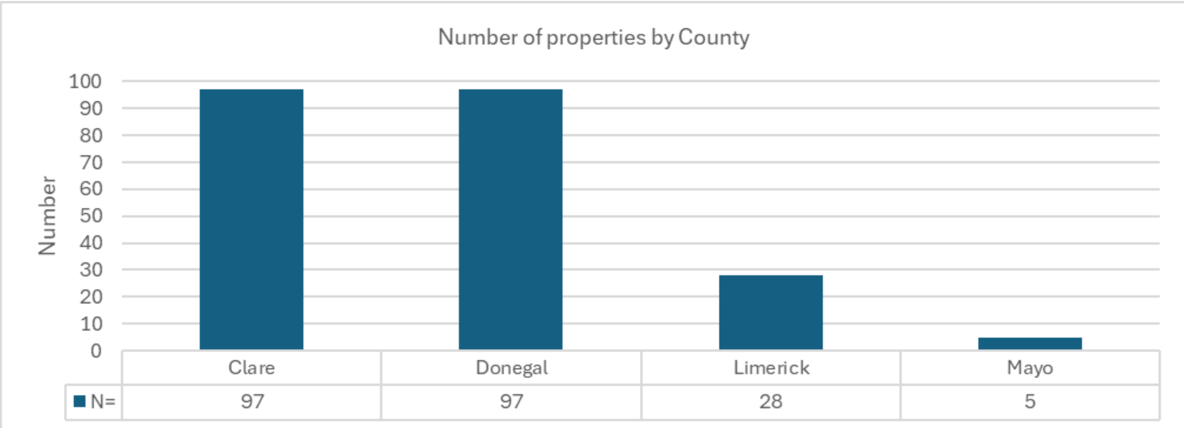
Appendix A – External Assessment Report on HA Data with respect to Moisture Contents and Cavity Wall Insulation

A.1 Background

The NSAI provided a selection of data fields from 227 properties assessed as per the Housing Agency protocols. The remit was to assess potential influence of retrofit insulation on the moisture content (MC) of the outer leaf masonry samples. MC's are routinely determined in core 1a (an intact core from the elevation with the most advanced deterioration) and core 6 (a core from the inner leaf inside the elevation with the next most advanced external deterioration). The dwelling inspection records details on the insulation at construction and the type of retrofit insulation, if present. Other data fields which were considered were location (County) of properties, the direction of worst elevation, the exposure class, the core sampling date, and the render type and thickness.

A.2 Location of properties

Properties in Counties Clare, Donegal, Limerick, and Mayo are included in the data as per plot 1. Most of the properties (64%) were built between 1990 and 2007. The building condition assessment[1] records the properties as being either Group 3 (damaged, 25%) or Group 4 (significantly damaged,75%).



Plot 1: The number of properties included in the data by County

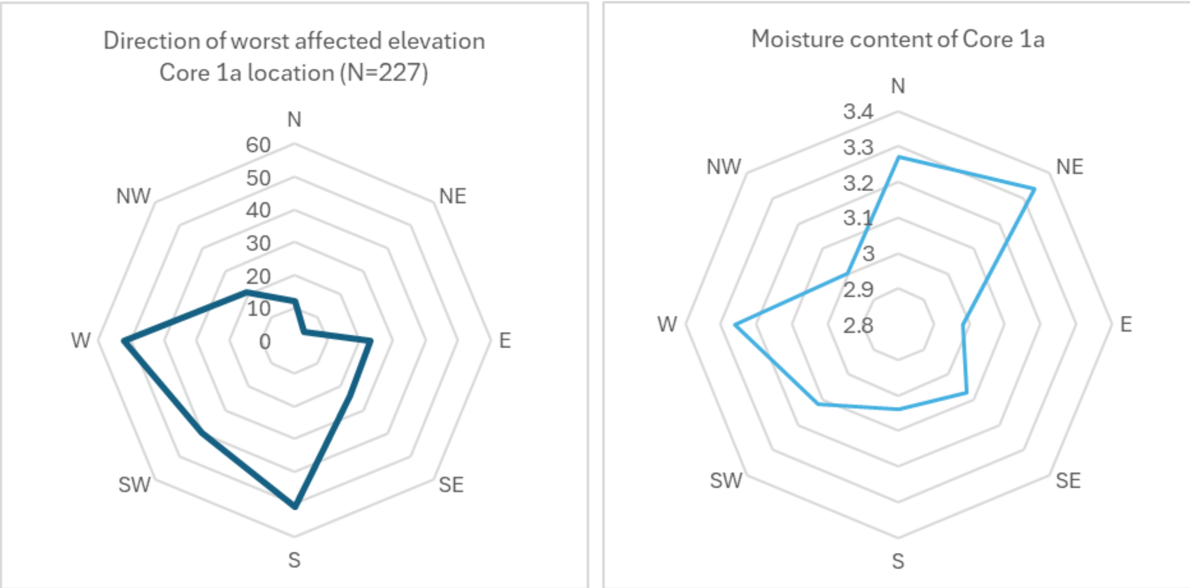
A.3 Direction of worst affected elevation

The direction of worst affected elevation is recorded as a cardinal or intermediate cardinal compass directions (i.e. N, NE, E, SE, S, SW, W, NW, N). A radar plot of the direction of worst affected elevation which incorporates the number of properties (plot 2) clearly shows that the worst damage occurs in the W, SW, and S elevations. This is the direction of the prevailing wind in W Ireland (See Met Eireann Windrose date for Malin Head and Belmullet, 1956 to 2014[2]).

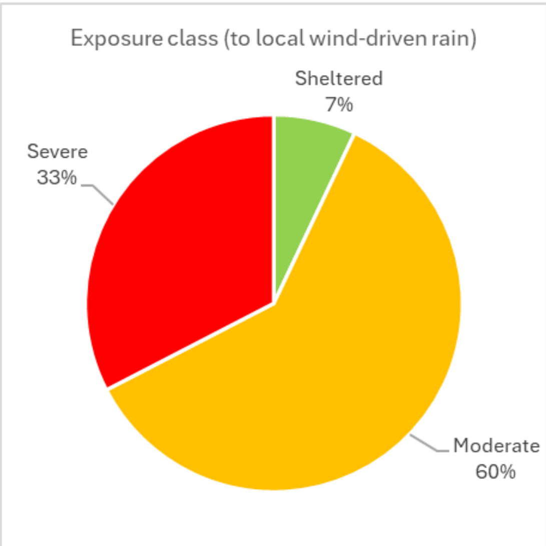
The average MC of cores 1a is marginally higher in the N and NE than the S, SE, and SW. This may be due to more rapid drying of S-facing elevations compared to N-facing elevations in spells of dry

[1] Table 1 – Building Grouping of I.S. 465:2018+A1:2020
[2] https://www.met.ie/climate/what-we-measure/wind

weather. The recorded exposure classes for most of the properties in the data is moderate or severe[3], with just 7% recorded as sheltered.



Plot 2: Radar plot showing direction of worst affected elevation and the average MC's of core 1a.

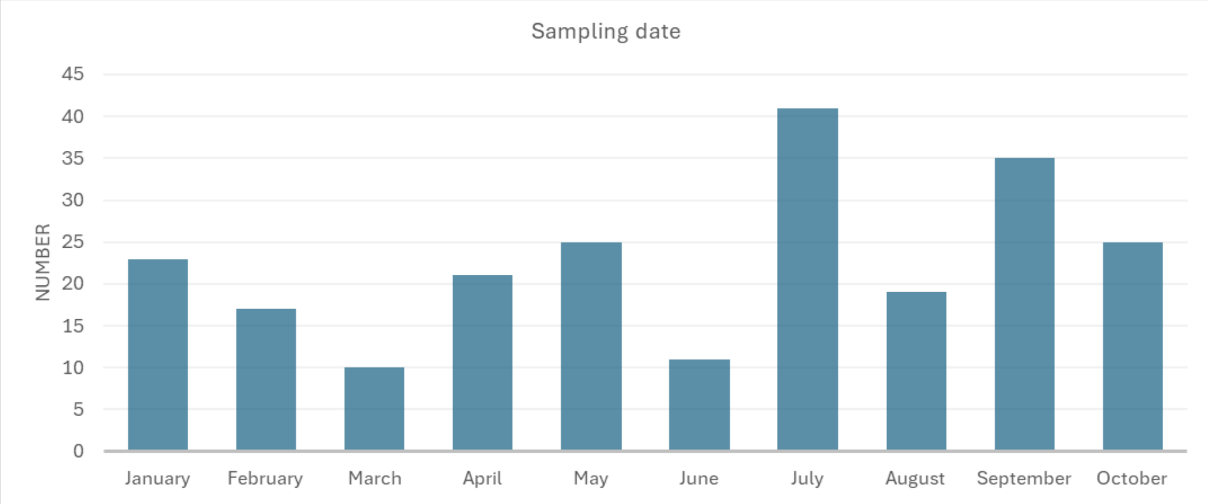


Plot 3: Pie chart showing exposure class (local wind-driven rain).

A.4 Sampling date and seasonality

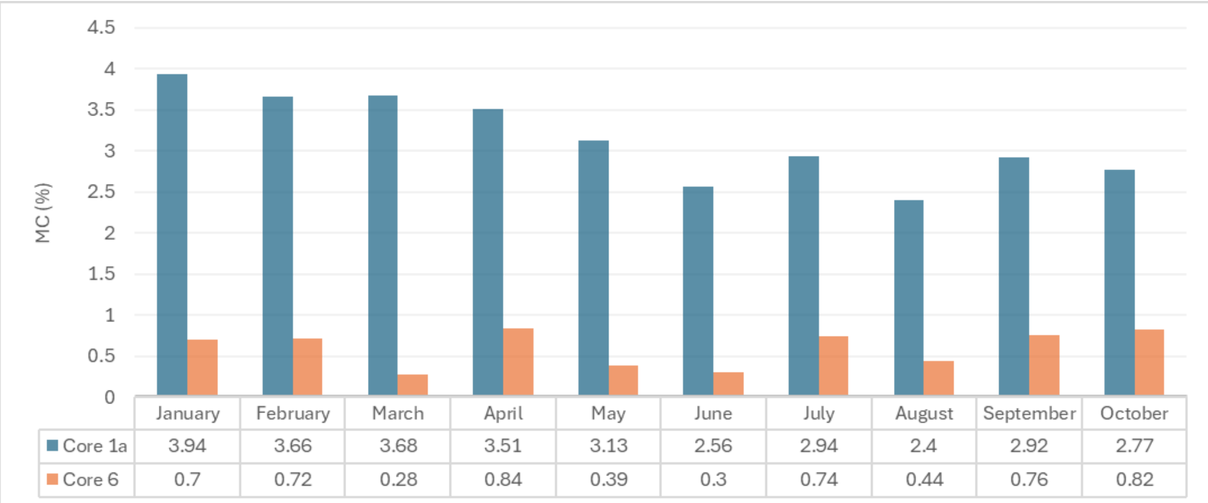
The data records the core sampling date which was between 10th January and 16th October 2024 with slightly fewer cores extracted in the Winter / Spring than the Summer / Autumn (shown in plot 4).

[3] See table 10 – Classification of exposure to local wind-driven rain in S.R. 325:2013+A2:2018.



Plot 4: Histogram showing the month the cores were extracted in and the number of cores.

The average MC for cores 1a and 6 by month were calculated and shown in plot 5. The average MC of core 1a (N=224) is 3.12% and of core 6 (N=227) is 0.65%. Plot 5 shows a significant seasonal effect, with Core 1a moisture contents generally reducing from April to August and generally increasing from September to March.



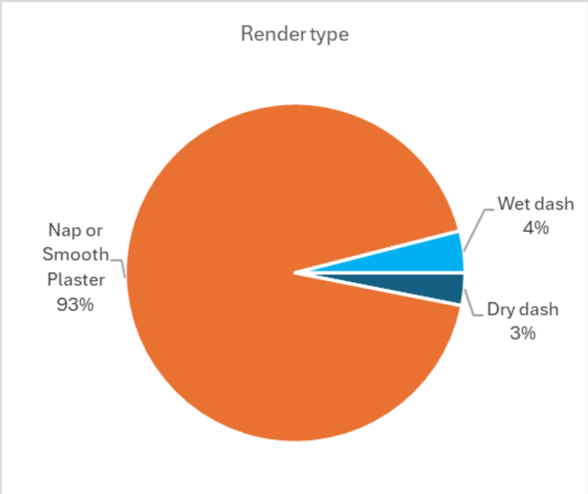
	January	February	March	April	May	June	July	August	September	October
Core 1a	3.94	3.66	3.68	3.51	3.13	2.56	2.94	2.4	2.92	2.77
Core 6	0.7	0.72	0.28	0.84	0.39	0.3	0.74	0.44	0.76	0.82

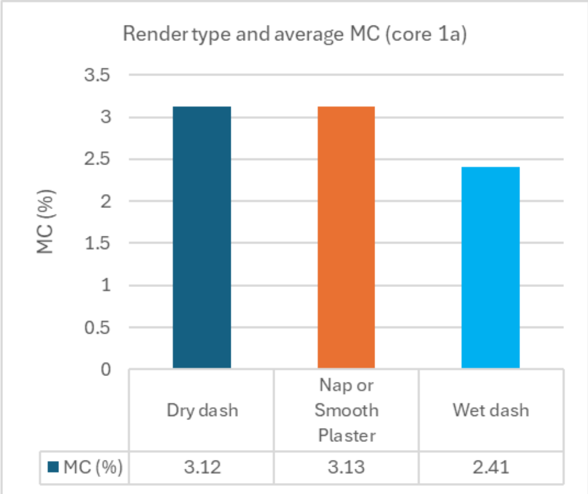
Plot 5: Histogram showing the average MC by month for the cores from the outer leaf (1a) and inner leaf (6).

The effect of annual cyclical wetting and partial drying of the outer leaf may also be present in shorter durations or higher frequency events (e.g. short spells of wet and dry weather) but are not detectable in the data.

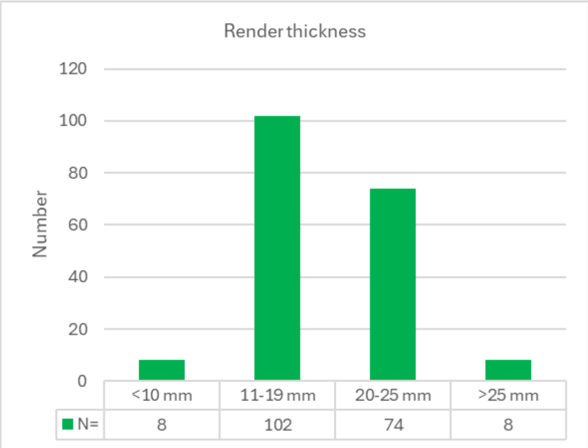
A.5 Render

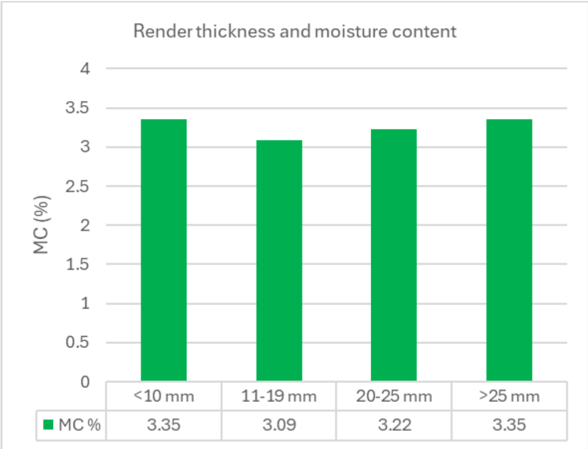
Render thickness was recorded on 226 properties with the majority having nap or smooth plaster (plot 6). The average MC (of core 1a) is lower where wet dash is present than the other render types, although there is limited data on dash renders. There appears to be no correlation between render thickness and MC (plots 8 and 9).





Plot 6: Pie chart showing render type. Plot 7: Bar chart showing render type and MC of core 1a.



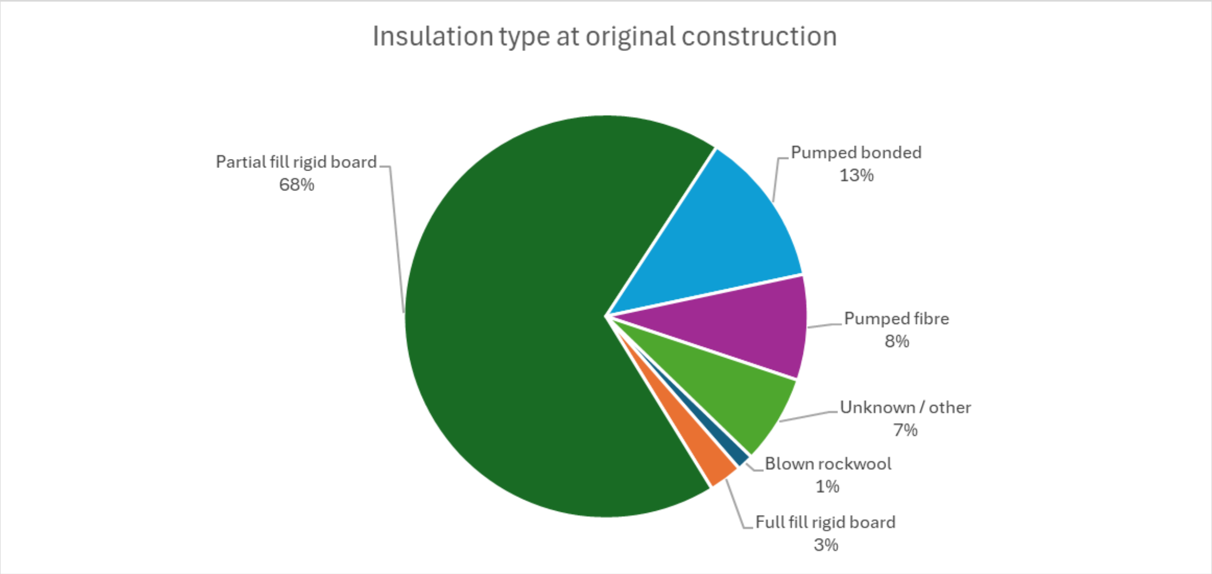


Plot 8: Bar chart showing recorded render thickness. Plot 9: Bar chart showing render thickness and average MC (core 1a).

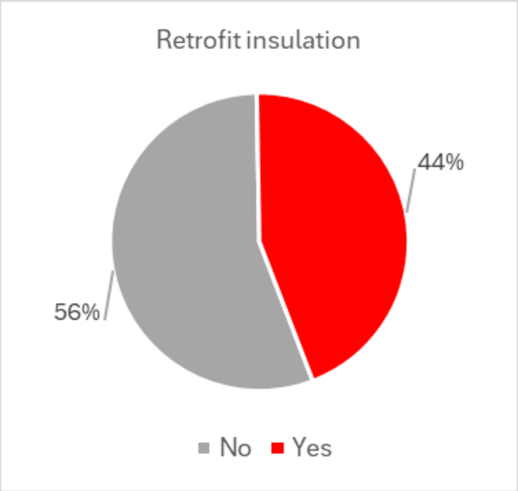
The data shows that the outer leaves in nearly all areas and exposure classes is predominantly wet throughout the year.

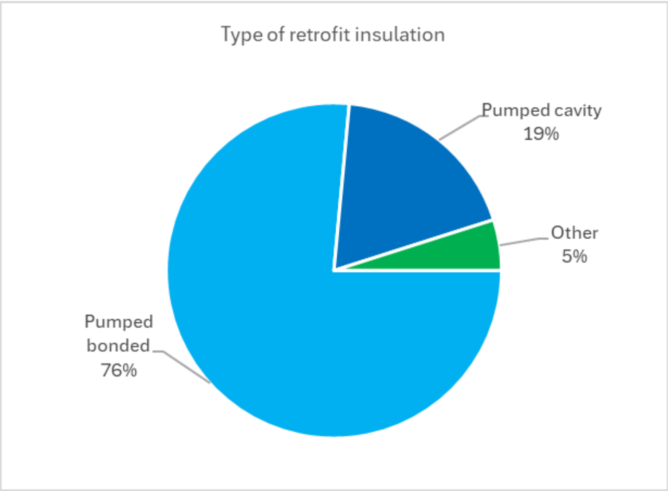
A.6 Insulation

The predominant insulation type at original construction is partial fill rigid board (plot 10). Retrofit insulation is present in 44% of the properties and is predominantly pumped bonded / pumped cavity. Note: pumped bonded and pumped cavity both describe pumped cavity wall insulation in the HA dataset.



Plot 10: Pie chart showing percentages of insulation type at original construction (N=225).

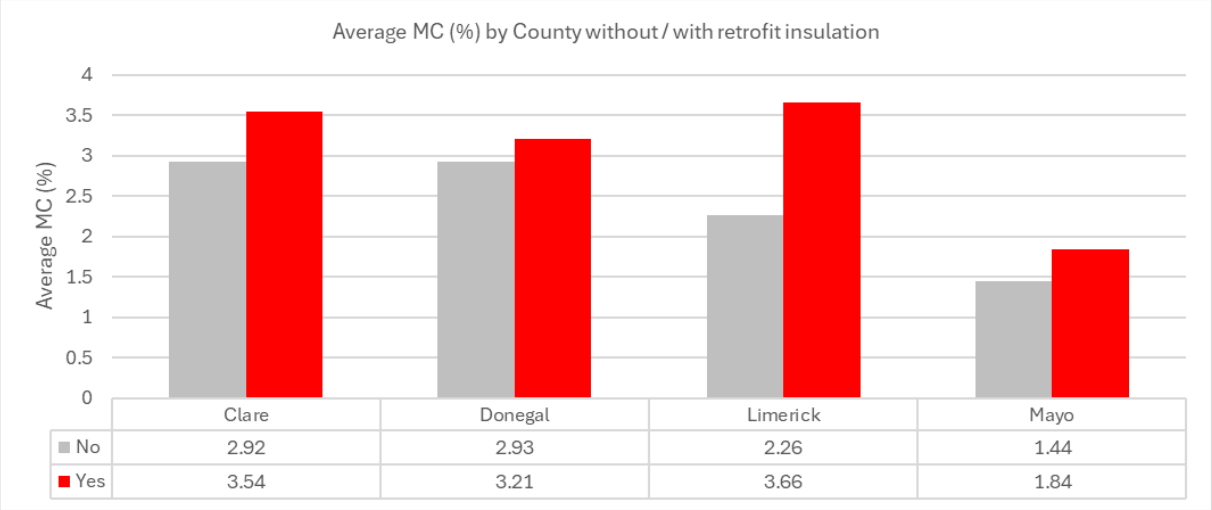




Plot 11: Pie chart showing percentage of properties with retrofit insulation. Plot 12: Pie chart showing type of retrofit insulation.

A.7 Impact of retrofit insulation on MC

The average MC of the outer leaf (core 1a) is marginally higher in properties with retrofit insulation. The full data gives an average of 2.80% MC (N=125) for properties without retrofit insulation and 3.52% MC (N=100) for properties with retrofit insulation (i.e. 0.72% increase in the average MC where retrofit insulation is present). The trend is also recorded by County, although the values and numbers of data vary.



Plot 13: Bar chart showing average MC (%) for properties without and with retrofit insulation, by County. Data numbers (N) recorded within bars.

The impact of the marginally elevated average MC in properties with retrofit insulation is not known. Further analysis assessing possible correlation between MC and sulphide oxidation resulting in sulfate production is underway.

A.8 Comments and conclusions

The analysis of metadata provides insight on influences which are not observable in individual properties. Many additional data fields are available but were not considered within this focused research. The data shows the very strong correlation between the most damaged elevation in properties and the prevailing wind. This observation is well known on sites but may be insufficiently considered in the scientific literature which emphasis the role of deleterious materials but gives little consideration to exposure and the role of moisture in degradation.

Seasonal variability in the moisture content of the outer leaf is shown by the data, and this corroborates previous (unpublished) data.

The outer leaf masonry is in contact with liquid water throughout the year (with some seasonal drying in the summer months).

The impact of the movement of moisture in and out of the porous masonry may cause dimensional changes and may result in the removal or precipitation of soluble compounds (e.g. sulfates).

The impact of the marginally elevated average MC (c. 0.7%) in properties with retrofit insulation is not known. Further analysis assessing possible correlation between MC and sulfide oxidation resulting in sulfate production is underway. This report will be updated if this testing yields additional insights.

Appendix B - Request to NSAI regarding Cavity Wall Insulation

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

15 February 2022

Geraldine Larkin
Chief Executive Officer
NSAI
1 Swift Square
Northwood
Santry
Dublin 95

Dear Ms Larkin,

I refer to your letter of 05 November 2021, which was forwarded to me by my colleague Paul Lemass.

As you are aware, in a Government Decision of 30 November, 2021 on the Defective Concrete Blocks (DCB) grant scheme, a number of enhancements to the scheme were agreed.

Arising from the Government decision a number of technical issues need to be considered and policy advice provided to the Minister so as to enable the enhanced scheme to be legislated for and implemented. Some of these items can and must be resolved in the short term as they are critical to the drafting of legislation. Other issues require significant reviews and research, will therefore take longer to complete and are not required for the legislation now being drafted or the roll out of the enhanced scheme.

An Expert Group on the enhanced scheme, which is chaired by Mr. Paul Forde, Consultant Engineer, has been established by the Department to advise on the issues. A copy of the terms of reference for the Expert Group is attached.

The Government Decision identified a number of technical items relevant to NSAI which need to be addressed. These fall into the longer term category, and are not critical to the legislation currently being worked on or to the roll out of the enhanced scheme. Government did however advise in their decision that these matters should be concluded by the end of 2022. The relevant items are;

Teach an Chustaim, Baile Átha Cliath 1, D01W6X0
Custom House, Dublin 1, D01 W6X0
T +353 1 888 2000 | name@housing.gov.ie
www.gov.ie/housing

1. A review of the I.S. 465[1] Standard and its application.
2. A review by NSAI Masonry Committee of the Irish Standard for Concrete Blocks (including aggregates).
3. A review of the impact of pumped cavity wall insulation on cavity wall construction and within homes susceptible to or impacted by defective concrete blocks.

1. Review of I.S. 465 Standard and its application

I note that the NSAI Committee responsible for I.S. 465 has also identified a need to review the standard to provide advice on the presence of pyrrhotite in defective concrete blocks, and the efficacy of the associated remediation options for dwellings.

The Department is supportive of this review and research on pyrrhotite. Regarding the research required, the Department would be prepared to consider providing funding once an appropriate scope and an estimate representing value for money has been agreed by all relevant parties.

Given that the DCB grant scheme has being operating since mid-2020, there is a large volume of technical data now available with over 800 I.S. 465 reports submitted to local authorities to date. These reports should help provide a deeper understanding of how I.S. 465 is being interpreted and applied and how damage is being assessed and categorised, which I expect will be of evidential value to the committee in reviewing the standard.

In this regard, the Department will make arrangements for a summary of this technical data to be made available to the relevant committee in an anonymised format. The underlying anonymised technical reports will also be available, upon request. To aid in this the Department will forward a small number of redacted I.S. 465 reports to NSAI for review. Advice from NSAI on what data sets within the I.S. 465 reports should be collated in summary format would be welcome.
In addition, the following queries and issues in relation to I.S. 465, have been identified [by the Working Group established by the Minister in June 2021], in the context of a review of

[1] I.S. 465 Assessment, testing and categorisation of damaged buildings incorporating concrete blocks containing certain deleterious materials and Amendment 1:2020

the defective concrete blocks grant scheme and the Department requests that these be considered within the review of I.S. 465;

1. Efficacy and longevity of remediation options 2 – 5;
2. It has been suggested by registrant engineers and Mayo County Council that remediation options 2 – 5 are not appropriate where the predominant deleterious material is pyrite and that option 1 the only realistic remediation option. This needs to be clarified as the remediation options exist within the standard but are not being recommended or applied;
3. Issue of deleterious materials other than pyrite or mica e.g. pyrrhotite;
4. Potential impact of deleterious materials on foundations;
5. Long term structural performance of retained blockwork post remediation;
6. Lack of guidance on ongoing monitoring and maintenance of lower order remediation options;
7. Whether external wall insulation should be considered as a potential remediation option for homes which have minimal damage and further damage may be preventable through wrapping of the home in external wall insulation;

The following issues are also suggested by the Department as meriting consideration;

1. Application of I.S. 465 leading to consistency of interpretation of the linkage between petrographic/ chemical results and damaged concrete blocks.
2. Consideration of the attributes that define Group 4 'Significantly damaged' and whether more definitive criteria can be applied for Group 1 to 3.

2. Review by NSAI Masonry Committee of Irish Standard for concrete blocks (including aggregates)

In light of the damage to dwellings, attributable to deleterious materials in defective concrete blocks, a review of the performance specification of aggregate concrete masonry units (including their constituent aggregate) in S.R. 325[2] and S.R. 16[3] has also been called for by Government.

Again, the evaluation of technical data mentioned above may inform this review.

[2] S.R. 325:2013+A2:2018/AC:2019 Recommendations for the design of masonry structures in Ireland to Eurocode 6

[3] S.R. 16:2016 Guidance on the use of I.S. EN 12620:2002+A1:2008 – Aggregates for concrete

The following queries and issues have also been identified [during the process of engagement with the Working Group during the summer of 2021] and the Department requests that these be considered within the review of S.R. 325 and S.R. 16.

1. Consideration of the provision of guidance on procurement of concrete blocks, more detailed and specific testing with respect to freeze thaw durability, certification and enhanced traceability process to be put in place.
2. Consideration of a minimum cement content requirement in the standard for concrete blocks
3. Consideration of specified maximum % content for deleterious materials e.g. pyrite, mica, pyrrhotite etc.

You will also be aware that in October 2021, NSAI withdrew a certificate of conformity of factory production control relating to the manufacture of aggregate concrete blocks (EN 771-3) by a manufacturer based in County Donegal. Given the history of defective concrete blocks in County Donegal and the impact this has had on houses and the State's role in making a voluntary contribution to assist Donegal homeowners whose homes have been damaged due to the use of defective concrete blocks, the Minister for Housing, Local Government and Heritage called for an audit of all quarries in County Donegal. The purpose of this specific audit is to evaluate relevant economic operators' compliance with the Construction Products Regulation (CPR) when placing relevant construction products (aggregate concrete blocks and/or aggregates for use in concrete products) on the market.

The audit is led by the National Building Control and Market Surveillance Office in conjunction with Donegal County Council and Geological Survey Ireland.

In due course, learnings from this audit may also inform NSAI's review of the relevant standards and offer an insight to the application of standards.

3. Review of Impact of Pumped Cavity Wall Insulation

It was identified during engagement with the Working Group that there may be a potential impact arising for DCB homes from pumped cavity wall insulation. There are concerns that the deployment of certain materials and processes in the retrofitting of dwellings may be causing unforeseen and unintended problems which may necessitate future remediation.

See attached submission from Engineers Ireland to the Working Group.

In this regard, it would be prudent that NSAI Agrément review such underlying certification. In addition, NSAI should review the guidance provided in S.R. 54[4] and in consultation with Sustainability Authority of Ireland who are responsible for the National Home Retrofit Scheme, satisfy themselves that installation of such products are fit for the purpose in which they are intended and in the conditions which they are used and being installed correctly.

Conclusions

In order to progress the matters above, I propose that a small steering committee be set up including NSAI, Geological Survey Ireland and the Department to develop a detailed scope for the work above and an implementation plan.

I would be obliged if you would make contact with John Wickham, Senior Adviser Building Standards (Email: johnr.wickham@housing.gov.ie) to make arrangements for same and we will be happy to discuss any of the above further in due course.

Yours Sincerely

Caroline Timmons,
Acting Assistant Secretary,
Housing Affordability, Inclusion and Homelessness Division

cc buildingstandards@housing.gov.ie

encl. Terms of Reference for the Expert Group on the Enhanced DCB Grant Scheme
Submission of Engineers Ireland to the Working Group on the DCB Scheme

[4] S.R. 54:2014+A1:2019 Code of practice for the energy efficient retrofit of dwellings

Appendix C - References

[1] Letter to NSAI regarding Cavity Wall Insulation (Appendix B).

[2] Document N237: Review of certification of NSAI Agrément Certified pumped Cavity Wall Insulation

[3] N359 Housing Agency - DCB Data Capture Combined

[4] Fabtrads Study: https://www.ucd.ie/biace/projects/fabtrads/

[5] Met Eireann Windrose date for Malin Head and Belmullet, 1956 to 2014.