Approved Document S – Mitigation of overheating risk

Consultation version – November 2020

This draft guidance accompanies the November 2020 Stage 2A consultation on Part L and Part F of the Building Regulations. The Welsh Government is seeking views on the standards for existing dwellings, mitigating overheating in new dwellings, and amendments to non-domestic buildings. The Part L and F standards for new dwellings are not a subject of this consultation.

The approved documents

What is an approved document?

This Approved Document, which takes effect on [*TBC*] 2021, has been approved and issued by the Welsh Ministers to provide practical guidance on ways of complying with the ***energy efficiency requirements*** of the Building Regulations 2010 for Wales, as amended, which are referred to throughout the remainder of this document as 'the Building Regulations'.

These approved documents give guidance on each of the technical parts of the regulations and on regulation 7 (see the back of this document). The approved documents provide guidance for common building situations.

It is the responsibility of those carrying out building work to meet the requirements of the Building Regulations 2010. Although it is ultimately for the courts to determine whether those requirements have been met, the approved documents provide practical guidance on potential ways to achieve compliance with the requirements of the regulations in Wales.

Although approved documents cover common building situations, compliance with the guidance set out in the approved documents does not provide a guarantee of compliance with the requirements of the regulations because the approved documents cannot cater for all circumstances, variations and innovations. Those with responsibility for meeting the requirements of the regulations will need to consider for themselves whether following the guidance in the approved documents is likely to meet those requirements in the particular circumstances of their case.

Note that there may be other ways to comply with the requirements than the method described in an approved document. If you prefer to meet a relevant requirement in some other way than described in an approved document, you should seek to agree this with the relevant building control body at an early stage.

Where the guidance in the approved document has been followed, a court or inspector will tend to find that there is no breach of the regulations. However, where the guidance in the approved document has not been followed, this may be relied upon as tending to establish breach of the regulations and, in such circumstances, the person carrying out building works should demonstrate that the requirements of the regulations have been complied with by some other acceptable means or method.

In addition to guidance, some approved documents include provisions that must be followed exactly, as required by regulations or where methods of test or calculation have been prescribed by the Welsh Ministers.

Each approved document relates only to the particular requirements of the Building Regulations 2010 that the document addresses. However, building work must also comply with all other applicable requirements of the Building Regulations 2010 and all other applicable legislation.

How to use this approved document

This document uses the following conventions.

a. Text against a grey background is an extract from the Building Regulations 2010 or the Building (Approved Inspectors etc.) Regulations 2010 (both as amended). These extracts

set out the legal requirements of the regulations.

b. Key terms, printed in blue, are defined in Appendix A.

c. References are made to appropriate standards or other documents, which can provide further useful guidance. When this approved document refers to a named standard or other reference document, the standard or reference has been clearly identified in this document. Standards are highlighted in **bold** throughout. The full name and version of the document referred to is listed in Appendix D (standards) or Appendix C (other documents). However, if the issuing body has revised or updated the listed version of the standard or document, you may use the new version as guidance if it continues to address the relevant requirements of the Building Regulations.

d. Standards and technical approvals also address aspects of performance or matters that are not covered by the Building Regulations and may recommend higher standards than required by the Building Regulations. Nothing in this approved document precludes you from adopting higher standards.

e. **In this consultation version of the new Approved Document S, we are consulting on all sections within the document.**

User requirements

The approved documents provide technical guidance. Users of the approved documents should have adequate knowledge and skills to understand and apply the guidance correctly to the building work being undertaken.

Where you can get further help

If you are not confident that you possess adequate knowledge and skills to apply the guidance correctly or if you do not understand the technical guidance or other information in this approved document or the additional detailed technical references to which it directs you, you should seek further help. Help can be obtained through a number of routes, some of which are listed below.

a. If you are the person undertaking the building work: either from your local authority building control service or from an approved inspector

b. If you are registered with a competent person scheme: from the scheme operator

c. If your query is highly technical: from a specialist or an industry technical body for the relevant subject.

The Building Regulations

The following is a high level summary of the Building Regulations relevant to most types of building work. Where there is any doubt you should consult the full text of the regulations, available at www.legislation.gov.uk .

Building work

Regulation 3 of the Building Regulations defines 'building work'. Building work includes:

a. the erection or extension of a building

b. the provision or extension of a controlled service or fitting

c. the material alteration of a building or a controlled service or fitting.

Regulation 4 states that building work should be carried out in such a way that, when work is complete:

a. For new buildings or work on a building that complied with the applicable requirements of the Building Regulations: the building complies with the applicable requirements of the Building Regulations.

b. For work on an existing building that did not comply with the applicable requirements of the Building Regulations:

   (i) the work itself must comply with the applicable requirements of the Building Regulations and

   (ii) the building must be no more unsatisfactory in relation to the requirements than before the work was carried out.

Material change of use

Regulation 5 defines a 'material change of use' in which a building or part of a building that was previously used for one purpose will be used for another.

The Building Regulations set out requirements that must be met before a building can be used for a new purpose. To meet the requirements, the building may need to be upgraded in some way.

Materials and workmanship

In accordance with regulation 7, building work must be carried out in a workmanlike manner using adequate and proper materials. Guidance on regulation 7(1) is given in Approved Document 7, and guidance on regulation 7(2) is provided in Approved Document B.

Independent third party certification and accreditation

Independent schemes of certification and accreditation of installers can provide confidence that the required level of performance for a system, product, component or structure can be achieved.

Building control bodies may accept certification under such schemes as evidence of

compliance with a relevant standard. However, a building control body should establish before the start of the building work that a scheme is adequate for the purposes of the Building Regulations.

Energy efficiency requirements

Part 6 of the Building Regulations imposes additional specific requirements for energy efficiency.

If a building is extended or renovated, the energy efficiency of the existing building or part of it may need to be upgraded.

Notification of work

Most building work and material changes of use must be notified to a building control body unless one of the following applies.

a. It is work that will be self-certified by a registered competent person or certified by a registered third party.

b. It is work exempted from the need to notify by regulation 12(6A) of, or Schedule 4 to, the Building Regulations.

Responsibility for compliance

People who are responsible for building work (e.g. agent, designer, builder or installer) must ensure that the work complies with all applicable requirements of the Building Regulations. The building owner may also be responsible for ensuring that work complies with the Building Regulations. If building work does not comply with the Building Regulations, the building owner may be served with an enforcement notice.

Contents

Section 0: Introduction

Introduction

0.1 This approved document **(Approved Document S)** deals with the requirements of Part S and Regulation **?? [Providing Information]** of the Building Regulations 2010.

Part S - Mitigation of overheating risk [Draft consultation requirement]	
Requirement	**Limits on Application**
Mitigation of overheating risk **S1** (1) Dwellings shall be designed and constructed in such a way to provide reasonable mitigation from the risk of summertime overheating, and (2) any mitigation measures shall be safe, secure and reasonably practical for occupants.	Requirement S1 applies only when a dwelling is erected.

Performance

Requirement S1: In the Welsh Ministers view, a building will meet requirement S1 if it is designed and constructed with safe, secure and reasonably practical measures which mitigate the risk of summertime overheating.

Regulation ??[Providing Information]: In the Welsh Ministers view, a building will meet regulation **??[Providing Information]** if Information according to the guidance given in section 3 is given to the owner of the building.

0.2 This approved document contains the following sections.

Approved Document Section	***Related Building Regulations requirements***
Section 0: Introduction	N/A
Section 1: Mitigating overheating risk in new dwellings	
Section 2: Applicability and usability of mitigation measures	**Requirement S1**
Section 3: Providing Information about Mitigation of overheating risk	**Regulation?? [Providing Information]**
Appendix A: Key terms	N/A
Appendix B: Reporting evidence of compliance	N/A

Appendix C: Documents referred to	N/A
Appendix D: Standards referred to	N/A

Application

0.3 Requirement S1 applies only when a dwelling is erected. The guidance in this volume of Approved Document S applies to new dwellings only.

New dwellings

0.4 Guidance for newly constructed buildings is given in **Sections 1 to 3** of this approved document.

Live–work units

0.5 A unit that contains both living accommodation and space to be used for commercial purposes (e.g. as a workshop or office) should be treated as a dwelling, as long as the commercial part can revert to domestic use.

0.6 The commercial part of a building can revert to domestic use if, all of the following apply.

a. there is direct access between the commercial space and the living accommodation; and
b. the commercial space and the living accommodation are within the same thermal envelope; and
c. the living accommodation comprises a substantial proportion of the total area of the unit. What constitutes a 'substantial proportion' should be assessed on a case-by-case basis.

Note: A large non-domestic building that contains a small flat for a manager is not treated as a dwelling. A dwelling that contains a room used as an office or utility space is still treated as a dwelling.

Section 1: Mitigating the risk of summer overheating

Introduction

1.1 The approach to be followed depends on the dwelling type:

a. For flats, paragraphs 1.2 to 1.3 should be followed

b. Houses and bungalows with two or more parallel aspects to facilitate cross-ventilation are considered to adequately mitigate the risk of summer overheating. **Note**: that requirement S2 also applies (see Section 2); if cross-ventilation is restricted due to noise, pollution, safety or security concerns, then paragraphs 1.2 to 1.3 should be followed.

c. For houses and bungalows which do not have openings on two or more parallel aspects to facilitate cross-ventilation, paragraphs 1.2 to 1.3 should be followed

Approaches to mitigate overheating risk

1.2 A new dwelling must be designed and built to a minimum standard of performance to minimise the risk of summer overheating. This can be achieved through adopting one of the following two methods.

a. The Simplified method - this specifies measures to adequately mitigate the risk of summer overheating as set out in paragraphs 1.4 -1.8.

b. The Dynamic Thermal Analysis method - this uses the dwelling's characteristics to calculate the risk of overheating through the adoption of mitigation measures as set out in paragraphs 1.9 -1.16.

1.3 A compliance checklist is included in Appendix B. This should be used to demonstrate compliance to building control bodies for both methods.

The Simplified Method

1.4 The dwelling should include:

a. one of the mitigation approaches set out in Table 1.1 to limit solar gains; and

b. the approach for heat removal from the dwelling as set out in Table 1.2.

1.5 The glazing area in Table 1.1 should be calculated as the net glazed area excluding the window frame.

1.6 When selecting the preferred approach from Table 1.1, the ability to deliver adequate daylight levels and maximise winter solar gains should also be considered. Solar gains are beneficial during the winter to reduce space heating load but can cause overheating in the summer and design strategies should consider both aspects, for example through the use of adjustable external shading. Glazed areas should be distributed across all facades to ensure adequate daylight levels

1.7 Heat removal provisions in Table 1.2 can be met using a combination of openable windows and ventilation louvers. Openings and ventilation louvers should be distributed across all facades to ensure effective heat removal.

Table 1.1: Controlling for overheating by minimising summer solar gains

Mitigation approach	Single aspect dwellings	Dual aspect dwellings
Approach 1	Maximum glazing area of 15% of floor area	Maximum glazing area of 15% of floor area
Approach 2	Maximum glazing area of 20% of floor area Low g-value glazing (maximum g-value of 0.4)	Maximum glazing area of 35% of floor area Low g-value glazing (maximum g-value of 0.4)
Approach 3	Maximum glazing area of 20% of floor area External shutters with louvers/ retractable louvers on all facades. Overhangs can be used on south façade instead of external shutters on that façade. Overhangs should be designed to shade the windows from Jun-Aug.	Maximum glazing area of 35% of floor area External shutters with louvers/ retractable louvers on all facades. Overhangs can be used on south façade instead of external shutters on that façade. Overhangs should be designed to shade the windows from Jun-Aug.

Table 1.2: Controlling for overheating through heat removal

Heat removal	Single aspect dwellings	Dual aspect dwellings
Openable windows and ventilation louvers	Minimum free area of 18% of floor area	Minimum free area of 18% of floor area

1.8 The requirements set out in paragraphs 1.5 to 1.7 also generally apply to corridors and common areas in a block of flats. However, where corridors and common areas do not have any windows or glazing, and therefore no solar gains, it is not necessary to implement the measures in Table 1.1 and 1.2. The exception to the latter is where any of these spaces have communal or district heating pipework running through them, with a flow temperature greater or equal to 25°C, in which case the heat removal requirements in paragraph 1.7 would apply to those spaces with pipework installed unless suitable mechanical ventilation system is installed for heat removal.

The Dynamic Thermal Analysis Method

1.9 The Dynamic Thermal Analysis method provides greater design flexibility to meet the requirement for mitigating overheating risk taking into account the dwelling's characteristics.

1.10 Where the Dynamic Thermal Analysis method is adopted, the person carrying out this work should be competent and appropriately trained in dynamic thermal modelling to assess overheating risk (e.g. a Low Carbon Energy Assessor (LCEA) Level 5) and follow the procedures given in CIBSE TM59 Design methodology for the assessment of overheating risk in homes.

1.11 To demonstrate compliance with Requirement S1, the dwelling should use dynamic thermal analysis to predict overheating risk following the methodology set out in *CIBSE TM59 Design methodology for the assessment of overheating risk in homes* (2017) and based on the specific modelling parameters set out in paragraphs 1.12 to 1.14.

1.12 The dwelling should meet the compliance criteria set out in CIBSE TM59 (2017) to demonstrate that the risk of overheating has been sufficiently mitigated. Compliance should be assessed using Type I occupancy (as per section 4.4 of CIBSE TM59), which assumes that the dwelling may be occupied by vulnerable occupants at some stage over its lifetime.

1.13 Developments of more than one unit should follow the approach set out CIBSE TM59 (2017) to select sample dwellings for demonstrating compliance.

1.14 The following opening regime for windows and doors applies and should be used along with any other guidance set out in Section 3.3 of CIBSE TM59 (2017).

a. For a room occupied during the day (8:00 to 23:00 hours), windows, patio and balcony doors should be set to open and/or close using these parameters.
    - Start opening when the internal dry bulb temperature exceeds 22°C
    - Open to a maximum angle of 30° when temperature reaches 26°C.
    - Start closing when the internal dry bulb temperature drops below 26°C
    - Be fully closed when temperature drops below 22°C.
b. For bedrooms occupied at nighttime (23:00 hrs to 08:00 hrs), windows should be modelled with restrictors to reflect security concerns, up to a maximum opening angle of 10°. Additionally, bedroom windows should be modelled as being open at night only if the temperature at 23:00 hours is greater than 23°C. They should then be assumed to remain open overnight.
c. Windows and doors should be modelled as closed in unoccupied rooms.
d. External doors should be modelled as closed at all times.

1.15 Passive measures to mitigate overheating risk must always be prioritised. Active measures such as air-conditioning should only be considered where it has been demonstrated that all reasonable passive measures have been applied first. This demonstration should include details of the different combinations of passive measures assessed in the modelling and the reason(s) that they were not sufficient, including how they performed against the CIBSE TM59 criteria.

1.16 Internal blinds should not be used in the building design to assess compliance.

Section 2: Applicability and usability of mitigation measures

Limiting external noise and air pollution

[The consultation is seeking views on how to demonstrate that noise levels are sufficiently low and that the ingress of external air pollution is sufficiently controlled to reasonably allow cross-ventilation. It is proposed that this should be sufficiently addressed through the Planning system.]

2.1 High levels of external noise or external air pollution can limit the use of cross-ventilation to mitigate the risk of summer overheating. External noise and air pollution are material considerations considered when applying for Planning permission and mitigating measures may be required in the design (e.g. non-openable windows) in order to obtain Planning permission and controlled through a condition imposed on the consent.

2.2 Any measures proposed for mitigating overheating in Building Regulations will need to acknowledge any constraints from the Planning approval (e.g. non-openable windows) and also any acoustic/air quality assessments carried out in connection with the Planning application. This may, for example, affect the approach taken to deliver heat removal in Table 1.2 and, if necessary, the Dynamic Thermal Analysis method can be used to determine alternative mitigation measures.

2.3 Indoor air quality, acoustic and overheating requirements should be addressed in an integrated way through good building design from the outset, in line with industry best practice guidance, to meet the objectives of both Planning policy and Building Regulations.

Safety and security

[Measures such as window openings and louvred shutters can be used to control overheating through heat removal. These measures will need to be safe and in accordance with other technical requirements set out in the Building Regulations, in particular, Part K (protection from falling, collision and impact) and Part N (Glazing – Safety in relation to impact, opening and cleaning). The consultation is seeking views on whether the existing Building Regulations are sufficient for the safe use of measures that may be used to control overheating]

[Part Q provides guidance which relates to the secure design of easily accessible windows and doors. The consultation is seeking views on whether the existing Building Regulations are sufficient for the secure use (e.g. increased risk from burglary from the use of measures that may be used to control overheating). The consultation is also seeking views as to whether the modelling assumptions in Paragraph 1.14 for window openings are reasonable from the point of view of security (the modelling assumes windows are only open during the day-time in occupied rooms and windows are only open in the night-time within occupied bedrooms with window restrictors installed)].

2.4 The construction of new buildings must satisfy all the technical requirements set out in the Building Regulations. When considering the incorporation of measures to mitigate overheating in new dwellings, attention should also be paid to satisfy all the technical requirements set out in the Building Regulations. The adoption of any particular measure to mitigate overheating should not involve unacceptable technical risk for another technical requirement. For example, installing security barriers which then obstruct a means of escape window. Designers and builders should refer to the relevant Approved Documents and to other generally available good practice guidance to help minimise these risks.

Regulation ??[Providing Information]: Providing information about Mitigation of overheating risk

This approved document deals with the requirements of regulation ?? [Providing Information] of the Building Regulations 2010.

Regulation??[Providing Information] - Information about Mitigation of overheating risk [Draft consultation regulation]

??.—(1) This regulation applies where paragraph S of Schedule 1 imposes a requirement in relation to building work.

(2) The person carrying out the work shall not later than five days after the work has been completed give sufficient information to the owner about any system(s) the building uses to mitigate overheating risk and their maintenance requirements so that the system(S) can be operated effectively in a practical, safe and secure manner.

Performance

When a new dwelling is erected, information about any systems the building uses to mitigate overheating risk must be given to the owner of the building.

In the Welsh Ministers view, Regulation?? [Providing Information] may be met by providing information according to the guidance given in **paragraphs 3.1 to 3.4**.

Section 3: Providing Information

Operating and Maintenance instructions

3.1 Operating and maintenance instructions should be provided to the occupiers of the dwelling. The instructions should contain sufficient information to help the occupiers mitigate overheating risk, and to verify compliance with the energy performance requirements of the Building Regulations. The documentation should be all of the following.

a. easy to understand,
b. specific to the dwelling
c. durable
d. in an accessible format.

3.2 For new dwellings, the operating and maintenance instructions should achieve all of the following.

a. Explain the following for any systems the building uses to mitigate overheating risk.
    i. what they are
    ii. what they are for
    iii. where they are located, using a floor plan
    iv. how to operate them
    v. how to control them, including the location and operation of timers and sensors
    vi. how to maintain them

b. Signpost other important documentation, which should include the following.
    i. appliance manuals (if applicable);
    ii. data used in the Dynamic Thermal Analysis method (if applicable);
    iii. the Report demonstrating compliance with the Dynamic Thermal Analysis method (if applicable).

Home Energy Guide

3.3 A Home Energy Guide should be provided for a new dwelling as described in accordance with Approved Document L1 (Section 9 – Providing Information). The home energy guide should contain a section on ‘Staying cool in hot weather’, which provides non-technical advice on how to keep the dwelling cool in hot weather. Any measures used to mitigate overheating risk in compliance with Part S should be taken into consideration when completing this section of the Home Energy Guide.

3.4 The Home Energy Guide is in addition to the Operating and Maintenance instructions. The Home Energy Guide is intended to be a non-technical overview for the occupiers which is expected to include some basic details on the operation and maintenance of the system. The Operating and Maintenance instructions provide further details as required.

Appendix A: Key terms

Building control body means a local authority building control department or an approved inspector.

Dwelling means a self-contained unit designed to accommodate a single household.

NOTE: Buildings exclusively containing rooms for residential purposes, such as nursing homes, student accommodation and similar, are not dwellings.

Dual aspect dwellings are those that have windows facing two or more directions. This includes dwellings with windows on two parallel or perpendicular facades, such as corner flats.

Easily accessible means either:
• a window or doorway, any part of which is within 2m vertically of an accessible level surface such as the ground or basement level, or an access balcony, or
• a window within 2m vertically of a flat or sloping roof (with a pitch of less than 30°) this is within 3.5m of ground level.

Floor area for the purpose of this Approved Document is the gross internal area measured in line with guidance by the Royal Institution of Chartered Surveyors (RICS)

Free area is the geometric open area of a ventilator.

Glazed area for the purpose of this Approved Document is the transparent area of a window or façade, excluding the area of any opaque elements such as window frame.

Single aspect dwellings are self-contained units that have windows in one direction only.

Thermal element is defined in regulation 2(3) of the Building Regulations as follows:

2(3) In these Regulations 'thermal element' means a wall, floor or roof (but does not include windows, doors, roof windows or roof-lights) which separates a thermally conditioned part of the building ('the conditioned space') from:

a. the external environment (including the ground); or

b. in the case of floors and walls, another part of the building which is:

   i. unconditioned;

   ii. an extension falling within class VII in Schedule 2; or

   iii. where this paragraph applies, conditioned to a different temperature,

and includes all parts of the element between the surface bounding the conditioned space and the external environment or other part of the building as the case may be.

2(4) Paragraph 2(3)(b)(iii) only applies to a building which is not a dwelling, where the other part of the building is used for a purpose which is not similar or identical to the purpose for which the conditioned space is used.

Thermal envelope is the combination of thermal elements of a building which enclose a particular conditioned indoor space or groups of indoor spaces.

Appendix B: Reporting evidence of compliance

B.1 The following checklist should be completed and signed by the developer and submitted to the building control body at the construction stage.

1. Dwelling details and site context	
Dwelling address/es	
Postcode	
Scheme name	
Building type (flat/ maisonette/ house/ bungalow)	
No of aspects (single/ dual/ multiple)	
Storey (ground floor or story number)	
Ventilation strategy (natural / mechanical)	
Is the dwelling close to sources of noise and/or pollution?	
Are there security issues (e.g. accessible windows/ openings)?	
2. Overheating mitigation strategy – The Simplified Method *Please skip to section 3 if using the Dynamic Thermal Analysis Method for compliance*	
Chosen approach to meet compliance requirements for minimising solar gains (as set out in Table 1.1)	
Glazed area (%)	
Window g-value	
External shading devices used (description)	
Confirmation that the dwelling meets the compliance requirements for heat removal set out in Table 1.2 (Yes/ No)	
Free area (%)	
Where restrictors are used for safety reasons, is the free area calculated taking these into account? (Yes/ No)	

What issues of external noise and pollution, safety and security have been taken into account and what limitations this has on the mitigation strategy (e.g. window opening etc).	
3. Overheating mitigation strategy – The Dynamic Thermal Analysis Method *Please skip this section if using the Simplified Method for compliance*	
Software and version no.	
Weather location used for the modelling	
Sample size for modelling and reasons for excluding specific dwellings from the modelling (*Note: the term "sample size" is detailed in the CIBSE TM59 methodology)*	
Occupancy type *(Confirmation that Type I occupancy has been used as per section 4.4 of CIBSE TM59 (2017))*	
Confirmation that modelling is in line with guidance in CIBSE TM59 (2017) including assumptions on equipment gains etc.	
Confirmation that window and door opening regime is as per para 1.14	
Glazed area (%)	
Window g-value	
External shading devices used (description)	
Free area (%)	
Where restrictors are used for safety reasons, is the free area calculated taking these into account? (Yes/ No)	
Building fabric materials and U-values	
Air permeability ($m^3/h.m^2$ at 50 Pa)	
Mechanical ventilation flow rates, where applicable	
Mechanical ventilation operation profile, where applicable	
What issues of external noise and pollution, safety and security have been taken into account and what limitations this has on the mitigation strategy (e.g. window	

opening etc).	
Do the dwellings meet the compliance criteria on overheating risk as set out in Section 1 paras 1.10-1.15 (Yes/ No)	
4. Declaration by developer	
The dwellings have been designed and constructed as modelled (Yes/ No)	
Name	
Date	
Registration number	
4. For use by Building Control body	
Observation from construction stage inspections	
Date of inspection	
Have the dwellings been constructed in line with the details provided above? (Yes/ No)	
Has confirmation been received that sufficient information has been provided to the owner about any systems the building uses to mitigate overheating risk and its maintenance requirements so that the system can be operated effectively in a practical, safe and secure manner?	

Appendix C: Documents referred to

Legislation

The Building Regulations 2010, SI 2010/2214

Documents

Chartered institution of Building Services Engineers (CIBSE), TM59: Design methodology for the assessment of overheating risk in homes, 2017

Appendix D: Standards referred to

[Placeholder for any standards related to noise limits, safety, security etc.]

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*[**Note for consultation:** The index will be provided at implementation stage]*