

Analysis of Responses to our Consultation on Conditions and Guidance for GCSE Engineering, and GCSE, AS and A level Design and Technology

February 2016

Ofqual/16/5843

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Executive Summary

Our consultation about the Conditions and Guidance for GCSE engineering and GCSE, AS and A level design and technology took place between 17th December 2015 and 20th January 2016. The consultation questions were available to either complete online or to download. A copy of the consultation is available at www.gov.uk/government/consultations/gcse-as-and-a-level-reform-regulations-for-engineering-and-design-and-technology.

There were 9 responses to the consultation – 2 from individuals and 7 from organisations. One of the organisations did not comment directly on our proposals, but instead provided general comments on the process for reform of GCSEs, AS and A levels.

Respondents broadly supported our proposals, but views were more mixed in some areas – most notably our proposed approach to assessing mathematical skills in all three subjects, and our proposed approach to allocating marks to assessment objectives in GCSE design and technology.

1. Introduction

The consultation on the Conditions and guidance for GCSE engineering and GCSE, AS and A level design and technology

This report is a summary of the views expressed by those who responded to our consultation on the Conditions and Guidance for GCSE engineering and GCSE, AS and A level design and technology. This consultation took place between 17th December 2015 and 20th January 2016.

Background

New GCSE, AS and A level qualifications are being introduced in England. We have consulted on and announced our policy on the general design of these new qualifications. We have also set out our policy and technical arrangements for the subjects where first courses began in September 2015,¹ and for the subjects which will be introduced for first teaching from September 2016.²

Following earlier consultations,³ we took decisions on the design of the new GCSEs in design and technology and engineering, and the new AS and A level qualifications in design and technology that are to be introduced for first teaching from September 2017.

This consultation focused on the regulatory arrangements that we must put in place to make sure that awarding organisations design, deliver and award these new GCSEs, AS and A levels in line with our policy decisions.

¹ New GCSEs in English language, English literature and mathematics, as well as new AS and A levels in art and design, biology, business, chemistry, computer science, economics, English language, English language and literature, English Literature, history, physics, psychology and sociology.

² New GCSEs in art and design, biology, chemistry, citizenship studies, classical Greek, combined science, computer science, dance, drama, food preparation and nutrition, French, geography, German, history, Latin, music, physical education, physics, religious studies and Spanish. New AS and A levels in classical Greek, dance, drama and theatre, French, geography, German, Latin, music, physical education, religious studies and Spanish.

³ www.gov.uk/government/consultations/gcse-reform-regulations-for-design-and-technology and www.gov.uk/government/consultations/development-of-new-gcses-and-a-levels-for-teaching-from-2017

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2. Who responded?

We received a total of 9 responses to our consultation -2 from individuals and 7 from organisations. All of the responses were from individuals or organisations based in England or Wales.

Table 1: Breakdown of consultation responses
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Personal / organisation response	Respondent type	Number
Personal	Teacher	1
Personal	Educational specialist	1
Organisation	Awarding organisation	3
Organisation	Subject association or learned society	2
Organisation	Union	1
Organisation	Other	1

3. Approach to analysis

We published the consultation on our website. Respondents could choose to respond using an online form, by email or by posting their answers to the consultation questions to us. The consultation included 27 questions.

This was a consultation on the views of those who wished to participate and while we made every effort to ensure that as many respondents as possible had the opportunity to reply, it cannot be considered as a representative sample of the general public or any specific group.

Data presentation

We present the responses to the consultation questions in the order in which they were asked.

The consultation asked 27 questions and each had a different focus. Respondents could choose to answer all or just some of the questions.

For some of the questions, respondents could indicate the extent to which they agreed with our proposals, using a 5-point scale (Strongly agree, Agree, Neither agree nor disagree, Disagree and Strongly disagree), as well as providing free-form narrative comments on our proposals.

For these questions, we set out respondents' views using the 5-point scale. Where respondents provided further comments, we present these separately.

During the analysis phase we reviewed every response to each question.

4. Views expressed – consultation response outcomes

In this section we report the views, in broad terms, of those who responded to the consultation document. We have structured this around the questions covered in the consultation document.

As noted above, one respondent chose not to answer our questions directly, and instead submitted more general comments. We set these out under 'Other issues' below.

A consultation is not the same as a survey and the responses only reflect the views of those who chose to respond. Typically these will be those with strong views and/or particular experience or interest in a topic. What follows is a fair reflection of the views expressed by respondents to the consultation.

A list of the organisations that responded to the consultation is included in Appendix A.

Our approach to regulating GCSE engineering and GCSE AS and A level design and technology

Question 1: To what extent do you agree or disagree that – for each of GCSE design and technology, GCSE engineering and AS and A level design and technology – we should introduce a Condition which requires exam boards to comply with the relevant subject content and assessment objectives?

As illustrated in figure 1, all of the respondents who answered this question agreed or strongly agreed with our proposed approach.



Figure 1 - overview of responses to Question 1

Most respondents (5 organisations, 2 individuals) commented that it was important to require exam boards to comply with the subject content, as this would help ensure comparability between different specifications.

One organisation also commented on issues outside the scope of the consultation, which we discuss under 'Other issues' below.

Question 2 – To what extent do you agree or disagree with our proposed approach to interpreting the subject content requirements for equations in GCSE engineering?

As illustrated in figure 2, most respondents supported our proposed approach.



Figure 2 - overview of responses to Question 2

Agree Neither agree nor disagree Disagree No response

Of the respondents who agreed with our proposals:

- Two organisations commented that use of equations was an important realworld skills for engineers, but noted that this aspect of exams should not be too demanding at GCSE.
- One individual commented that this was needed to help maintain standards across awarding organisations.
- One organisation agreed that the subject content should be interpreted as permitting all three question types.

The organisation that disagreed with our approach commented that it was not clear whether knowledge of equations should be tested in the exam or non-exam assessment, and that the requirement to assess 'recall and apply' over the shortest time period could restrict assessment options and lead to predictability.

Of those who neither agreed nor disagreed, one organisation commented that we should provide guidance clarifying the number and range of equations which should

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be sampled in each year's exams. They suggested this could help ensure comparability across different exam boards.

Question 3 – To what extent do you agree or disagree that – for each of GCSE design and technology, GCSE engineering and AS and A level design and technology – we should introduce guidance which clarifies how exam boards should interpret our assessment objectives?

As illustrated in figure 3, all of the respondents who answered this question agreed or strongly agreed with our proposed approach.

Figure 3 - overview of responses to Question 3



Respondents who answered this question (5 organisations, 1 individuals) all commented that our proposed guidance was important to ensure a common understanding across the exam boards, and would help ensure comparability between different specifications.

Question 4 – To what extent do you agree or disagree that we should introduce rules for exam assessment to ensure exam boards take a consistent approach to assessing mathematical skills in GCSE engineering?

As illustrated in figure 4, all of the respondents who answered this question agreed or strongly agreed with our proposed approach.

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Figure 4 - overview of responses to Question 4



Respondents who answered this question (5 organisations, 1 individuals) all commented that it was important to ensure a common approach across the different exam boards, and would help ensure comparability of demand between different specifications.

Question 5 – To what extent do you agree or disagree that we should introduce rules for exam assessment to ensure exam boards take a consistent approach to assessing mathematical and scientific skills in GCSE, AS and A level design and technology?

As illustrated in figure 5, the majority of respondents who answered this question agreed or strongly agreed with our proposed approach, but one strongly disagreed.

Figure 5 - overview of responses to Question 5



Respondents who agreed (or strongly agreed) with our approach (6 organisations, 1 individual) all commented that it was important to ensure a common approach across the different exam boards, and would help ensure comparability of demand between different specifications.

The individual who strongly disagreed commented that there should be no compulsory requirements for mathematics and science in design and technology assessments, as this would disadvantage some students.

Question 6 – To what extent do you agree or disagree with our proposed approach to assessing mathematical skills (including our approach to the 15 per cent minimum weighting) for GCSE engineering?

As illustrated in figure 6, most respondents supported our proposed approach.

Figure 6 - overview of responses to Question 6



Of the respondents who agreed with our proposals, three organisations all commented that our proposals reflected the importance of mathematics within engineering, and within the subject content.

Of the remaining respondents, the only two that provided detailed comments (both organisations) supported the proposed minimum weighting, but expressed concerns about our proposal that only questions in exams could count towards it. Both suggested that effective use of mathematical skills should be an important part of the non-exam assessment, and that our approach needed to reflect this. One also commented that requiring 25 per cent of exam marks to focus on mathematical skills could lead to artificial, contrived assessments.

Question 7 – To what extent do you agree or disagree with our proposed approach to assessing mathematical skills (including the proposed 10 per cent minimum weighting) for GCSE design and technology?

As illustrated in figure 7, views on this proposal were mixed. Four respondents (three organisations, one individual) strongly agreed with our proposal, but three (two organisations, one individual) either disagreed or strongly disagreed.

Figure 7 - overview of responses to Question 7



Of the respondents who strongly agreed with our proposals:

- Two organisations commented that appropriate use of mathematics was an important aspect of design and technology, and supported the proposed minimum level of demand. They also commented that mathematical skills in GCSE design and technology should be no more demanding than that expected in GSCE mathematics.
- One organisation commented that the proposed weighting was appropriate and should help ensure comparability across different specifications.

Of the respondents who disagreed (or strongly disagreed) with our proposals:

- Two organisations supported the 10 per cent overall weighting for mathematical skills, but expressed concerns that only exam questions could count towards this weighting. Both commented that this could lead to artificial, contrived assessments that focused too much on the more mathematical elements of the subject content.
- One organisation commented that effective use of mathematical skills should be an important part of the non-exam assessment, and that our approach needed to reflect this.
- One individual commented that allocating 20 per cent of exam marks to mathematical skills would disadvantage students who have strong design skills, but weaker mathematical and science skills.

The organisation which neither agreed nor disagreed with our proposals also supported the 10% overall weighting for mathematical skills, but expressed concerns about only allowing exam questions to contribute towards this weighting. Their view was that exam boards should be allowed to cover mathematical skills in both the exams and the non-exam assessments.

Question 8 – To what extent do you agree or disagree with our proposed approach to assessing mathematical skills (including the proposed minimum weightings) for AS and A level design and technology?

As illustrated in figure 8, views on this proposal were mixed. Four respondents (three organisations, one individual) strongly agreed with our proposal, but three (two organisations, one individual) either disagreed or strongly disagreed.

Figure 8 - overview of responses to Question 8



Respondents' comments were – in the main – similar to those made for GCSE design and technology under question 7 above. Of the respondents who strongly agreed with our proposals:

- Two organisations commented that appropriate use of mathematics was an important aspect of design and technology, and supported the proposed minimum level of demand. They also commented that it was important to maintain and extend the use of mathematical skills compared to GCSE.
- One organisation commented that the proposed weighting was appropriate and should help ensure comparability across different specifications.

Of the respondents who disagreed (or strongly disagreed) with our proposals:

Two organisations supported the 10 per cent overall weighting for mathematical skills in the majority of routes, but expressed concerns that only exam questions could count towards this weighting. Both commented that this could lead to artificial, contrived assessments that focused too much on the more mathematical elements of the subject content. Both organisations also felt that a higher weighting for mathematical skills in the design engineering route was inappropriate, as it could make assessments across different routes incomparable.

- One organisation commented that effective use of mathematical skills should be an important part of the non-exam assessment, and that our approach needed to reflect this.
- One individual commented that allocating 20 per cent of exam marks to mathematical skills would disadvantage students who have strong design skills, but weaker mathematical and science skills.

The organisation which neither agreed nor disagreed with our proposals also supported the 10% overall weighting for mathematical skills, but expressed concerns about only allowing exam questions to contribute towards this weighting. Their view was that exam boards should be allowed to cover mathematical skills in both the exams and the non-exam assessments.

Question 9 – To what extent do you agree or disagree with our proposed approach to assessing scientific knowledge, skills and understanding in GCSE, AS and A level design and technology?

As illustrated in figure 9, seven of the eight respondents who answered this question (six organisations, one individual) either agreed or strongly agreed with our proposals. The remaining respondent (an individual) disagreed.



Figure 9 - overview of responses to Question 9

Of the respondents who agreed (or strongly agreed) with our proposals:

- Five organisations commented that our proposals reflected the importance of scientific knowledge, skills and understanding within design and technology, while not compromising the integrity of assessments.
- Two organisations commented that without a minimum weighting there was a risk that different exam boards could take very different approaches to addressing scientific content, which might not be comparable.

 One organisation commented that it was appropriate not to set a minimum weighting for scientific knowledge, skills and understanding

The respondent who disagreed with our proposals commented that scientific knowledge, skills and understanding would naturally be assessed through the design and technology subject content, and that specific requirements were unnecessary.

Question 10 – To what extent do you agree or disagree that – for each of GCSE design and technology, GCSE engineering and AS and A level design and technology – we should introduce a Condition which permits non-exam assessment, specifies the proportion of exam- and non-exam assessment, and allows us to set more detailed rules and guidance on non-exam assessment?

As illustrated in figure 10, all the respondents who answered this question (six organisations, two individuals) agreed or strongly agreed with our proposals.



Figure 10 - overview of responses to Question 10

All the respondents who provided further comments noted that it was essential to permit non-exam assessment in design and technology, and that our proposals were necessary to ensure exam boards take a consistent approach to non-exam assessment.

Question 11 – To what extent do you agree or disagree with our proposed approach to allocating non-exam assessment marks to assessment objectives in GCSE engineering?

As illustrated in figure 11, the majority of respondents (four organisations, one individual) agreed with our proposals, and none disagreed.



Figure 11 - overview of responses to Question 11

Of the respondents who agreed with our proposals:

- Three (two organisations, one individual) commented that while the division of marks for analysis and evaluation between exams and non-exam assessment was appropriate – evaluation within non-exam assessment should include both evaluation of finished prototypes and evaluation as part of design.
- One organisation commented that our proposals reflected the nature of the activities carried out within non-exam assessment.

Of the respondents who neither agreed nor disagreed with out proposals, only one (an organisation) provided further comments. That organisation noted that exams would need to contain a significant amount of analysis and evaluation, but that this could be achieved.

Question 12 – To what extent do you agree or disagree with our proposed approach to setting the brief(s) for non-exam assessment in GCSE engineering?

As illustrated in figure 12, the majority of respondents (four organisations, one individual) agreed with our proposals, and none disagreed.

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Figure 12 - overview of responses to Question 12



Of the respondents who agreed with our proposals:

- Two organisations noted that, in line with the subject content for GSCE engineering, identifying appropriate briefs should normally be done by exam boards rather than schools. They both went on to suggest that it would be beneficial if schools were allowed to propose alternative briefs for the exam boards to consider as this would allow students to work on issues they had identified themselves. One further individual also commented that set briefs could constrain students too much, and that exam boards should offer the option of submitting alternative briefs for approval.
- Three organisations all commented that our proposed approach to the number of briefs was appropriate – noting that setting several briefs would allow for flexibility, but that briefs also needed to allow students to demonstrate appropriate skills.
- One organisation commented that the non-exam assessment tasks should be designed to be completed in approximately 30 hours.

Of the respondents who neither agreed nor disagreed with our proposals, only one (an organisation) provided further comments. That organisation noted that – while the proposed timescales seemed appropriate – there was little guidance about what a brief might contain.

Question 13 – To what extent do you agree or disagree with our proposal that the briefs for non-exam assessment in GCSE engineering should be released no earlier than 1 June in the year before the qualification is to be awarded?

As illustrated in figure 13, the majority of respondents who answered this question (3 organisations, one individual) agreed or strongly agreed with our proposals, and only one (an organisation) disagreed – albeit strongly.

Figure 13 - overview of responses to Question 13



Of the respondents who agreed (or strongly agreed) with our proposals:

- All four (three organisations and one individual) commented that our proposals would prevent teaching being unduly focused on the non-exam assessment. Two of these organisations suggested our approach would encourage schools to offer students a broad range of practical experience, and the individual commented it would ensure students were better prepared for careers in engineering.
- One organisation also commented that schools and students would still have sufficient time to prepare for the non-exam assessment.

Of the respondents who neither agreed nor disagreed with out proposals, only one (an organisation) provided further comments. That organisation suggested that the release date for the non-exam assessment task could be later as (compared with GCSE design and technology) there was less need for exploration and investigation in GCSE engineering. They suggested a release date of 1 September in the academic year of the exams.

The organisation which strongly disagreed with our proposals suggested that teachers would need to have the non-exam assessment task available at the beginning of the course, so that they could plan content for lessons (and practical tasks) in a way that was coherent with the non-exam assessment.

Question 14 – To what extent do you agree or disagree with our proposed approach to allocating non-exam assessment marks to assessment objectives in GCSE design and technology?

As illustrated in figure 14, views on this proposal were mixed. Although the majority of respondents (four organisations, one individual) agreed or strongly agreed with our proposals, three (two organisations, one individual) disagreed or strongly disagreed.

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Figure 14 - overview of responses to Question 14



Of the respondents who agreed (or strongly agreed) with our proposals:

- Two organisations commented that the proposals reflected the practical aspects of the subject content which could not be validly assessed in an exam – investigative skills, design and make skills, and the analysis and evaluation of their own prototypes.
- One organisation commented that there should be scope within the exams for students to analyse and evaluate designs and solutions they have proposed in response to exam questions.

Of the respondents who disagreed (or strongly disagreed) with our proposals:

- Two organisations agreed with our proposed approach to AO1, AO2 and AO3, but expressed some concerns about AO4. Both felt that testing knowledge, understanding and application of design principles in the exam could lead to artificial, contrived questions which poorly test design ability. They also commented that the non-exam assessment adequately assessed students' knowledge, understanding and application of design principles.
- One individual commented that AO4 is about application, and suggested that this cannot be tested easily in an exam – and should therefore be tested in both the exams and non-exam assessment.

Question 15 – To what extent do you agree or disagree with our proposal that the contextual challenges for non-exam assessment in GCSE design and technology should be released no earlier than 1 June in the year before the qualification is to be awarded?

As illustrated in figure 15, all but one of the respondents who answered this question (five organisations, two individuals) either agreed or strongly agreed with our proposal, with one organisation strongly disagreeing.

Figure 15 - overview of responses to Question 15



Of the respondents who agreed (or strongly agreed) with our proposals:

- All five organisations commented that this would allow students to spend an appropriate amount of time on their non-exam assessment, while also allowing sufficient time for teaching of theoretical content and other practical work.
- One individual commented that they should help ensure students' work better reflected their abilities, rather than the extent of teacher direction.

The organisation which strongly disagreed with our proposals suggested that teachers would need to have access to the non-exam assessment task at least four working months in advance to plan lessons for year 11.

Question 16 – To what extent do you agree or disagree with our proposed approach to allocating non-exam assessment marks to assessment objectives in AS and A level design and technology?

As illustrated in figure 16, almost all the respondents who answered (five organisations, two individuals) supported our proposal; one organisation disagreed.



Figure 16 - overview of responses to Question 16

Of the respondents who agreed (or strongly agreed) with our proposals:

- Three organisations agreed that both AO1 and AO2 should be assessed within the non-exam assessment, along with students' analysis and evaluation of their own work.
- Two organisations welcomed the flexibility of ranged weightings for the assessment objectives, noting that this would allow for different approaches across endorsed routes.
- One organisation commented that there should be scope within the exams for students to analyse and evaluate designs and solutions they have proposed in response to exam questions.
- One organisation commented that our proposals were acceptable.

The organisation which disagreed with our proposals commented on issues outside the scope of the consultation.

Question 17 – To what extent do you agree or disagree with our proposed approach to authenticating non-exam assessment in GCSE engineering and GCSE, AS and A level design and technology?

As illustrated in figure 17, all the respondents who responded to this question (six organisations, two individuals) agreed or strongly agreed with our proposals.



Figure 17 - overview of responses to Question 17

Respondents made the following comments:

 Four organisations commented that although remote video monitoring would be sufficient to support authentication, it might be difficult to implement in practice.

- Two organisations commented that it is important to ensure that students' work can be authenticated, and that exam boards all take a consistent approach to authentication.
- One organisation suggested a variation on our proposed approach might be needed at A level, where students might need to outsource manufacture of components of their work

Question 18 – To what extent do you agree or disagree with our proposed approach to marking of non-exam assessment in GCSE engineering, and GCSE, AS and A level design and technology?

As illustrated in figure 18, all the respondents who responded to this question (six organisations, two individuals) agreed or strongly agreed with our proposals.



Figure 18 - overview of responses to Question 18

Respondents made the following comments:

- Three organisations commented that the proposed flexibility around marking arrangements will help ensure non-exam assessment is valid and reliable.
- Two organisations commented that the flexibility to adopt different approaches to evidencing achievement is welcome, as is the potential this creates to move away from current, portfolio-based, assessment.

Our proposed Conditions and guidance for GCSE engineering

Question 19: Do you have any comments on our proposed Conditions and requirements for GCSE engineering?

Only one organisation provided comments in response to this question. Those comments were on issues outside the scope of the consultation, which we have analysed under 'Other issues' below.

Question 20: Do you have any comments on our proposed guidance for GCSE engineering?

None of the respondents provided comments in response to this question.

Our proposed Conditions and guidance for GCSE design and technology

Question 21: Do you have any comments on our proposed Conditions and requirements for GCSE design and technology?

Two respondents (both organisations) provided comments in response to this question. Both strongly welcomed the requirement for exam boards to comply with the subject content requirements.

Question 22: Do you have any comments on our proposed guidance for GCSE design and technology?

Four respondents (all organisations) provided comments in response to this question:

- Two commented that the guidance should be clear that analysis and evaluation of design decisions and outcomes should take place within the non-exam assessment, with analysis and evaluation of wider issues in design and technology reserved for the exams. They also suggested that exams should focus almost exclusively on knowledge, understanding and application of technical principles, as knowledge, understanding and application of design and making principles would be covered indirectly through the non-exam assessment.
- One commented that our guidance on assessment objective AO3 was unclear on two points:
 - how underpinning knowledge and understanding which informed analysis and evaluation should be credited within the non-exam assessment; and
 - the meaning of the term 'wider issues within design and technology'.
- One commented that further guidance defining what is meant by a prototype would be helpful.

Our proposed Conditions and guidance for AS and A level design and technology

Question 23: Do you have any comments on our proposed Conditions and requirements for AS and A level design and technology?

Three respondents (all organisations) provided comments in response to this question:

- Two questioned our requirement that exam boards should set a contextual challenge for the non-exam assessment at AS, with one commenting that this would not represent a progression from GCSE, and another noting this could constrain assessment options and students' creativity.
- Two noted that if an exam board-set contextual challenge is used then there should be further guidance on when and how it should be set. Both suggested briefs should be set annually, and one suggested briefs should be released every December or January.

Question 24: Do you have any comments on our proposed guidance for AS and A level design and technology?

Two respondents (both organisations) provided comments in response to this question:

- One commented that further guidance defining what is meant by a prototype would be helpful.
- One commented that our guidance on assessment objective AO3 was unclear on two points:
 - how underpinning knowledge and understanding which informed analysis and evaluation should be credited within the non-exam assessment; and
 - □ the meaning of the term 'wider issues within design and technology'.

Equality Impact Assessment

Question 25: We have not identified any ways (beyond those we have identified in earlier consultations) in which the proposals for AS and A level environmental science would impact (positively or negatively) on persons who share a protected characteristic.⁴ Are there any potential impacts we have not identified?

Question 26: Are there any additional steps we could take to mitigate any negative impact resulting from these proposals on persons who share a protected characteristic?

Question 27: Do you have any other comments on the impacts of the proposals on students who share a protected characteristic?

No respondents provided comments in response to these questions. All the respondents who answered these questions confirmed they had no comments to make.

Other issues

As noted above, one respondent did not comment directly on our proposals. Instead they noted that it was important that relevant subject associations were consulted in individual subject, that qualification reforms needed to take account of the needs of all relevant stakeholders, and that reforms should be phased in gradually over time.

One organisation also commented that there was significant overlap between the subject content for GCSE engineering, and the equivalent subject content for GCSE design and technology and GCSE physics. They expressed concerns about possible convergence between engineering and design and technology at GCSE, and noted that the two subjects should remain distinct.

One organisation commented on the weightings of the assessment objectives for AS and A level design and technology, suggesting that AO2 should have a higher maximum weighting, with the maximum weighting of AO1 reduced to accommodate this.

⁴ 'Protected characteristic' is defined in the Equality Act 2010. Here, it means disability, racial group, age, religion or belief, pregnancy or maternity, sex, sexual orientation and gender reassignment.

Appendix A: List of organisational consultation respondents

When completing the questionnaire, respondents were asked to indicate whether they were responding as an individual or on behalf of an organisation.

Below we list those organisations that submitted a response to the consultation. We have not included a list of those responding as an individual; however all responses were given equal status in the analysis.

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