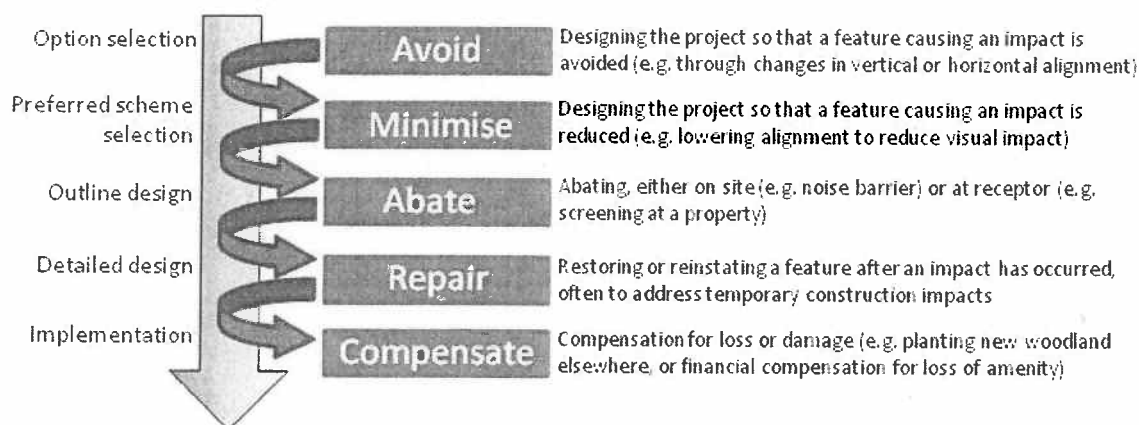# 9 Mitigation and monitoring

9.1 Mitigation

9.1.1 The AoS has established key design principles and supported the options sifting process. It has also identified potential adverse effects and helped guide refinements in the route alignment, as well as the introduction of specific mitigation features, such as tunnels and green bridges.

9.1.2 Different general types of mitigation are set out within a mitigation hierarchy, illustrated in **Figure 36**. The different types are shown in order of preference, with avoidance the most preferred and compensation the least preferred. The opportunity to apply each of these types of mitigation tends to vary with the stage in the scheme life cycle. At the earliest stages, and well before any designs are fixed, potentially adverse impacts may be avoided; for example by rejecting a damaging option in favour of a benign one. As scheme design increases in detail, flexibility to change it would decrease and alternative mitigation strategies become appropriate. In the latest stages of the project lifecycle, with any design fixed and agreed, mitigation might only be possible by providing compensation for an adverse impact that is otherwise deemed unavoidable. EIA would be fundamental in helping to establish the need for further mitigation and in determining the potential form of this.

9.1.3 In the development of HS2 proposals to date, mitigation has focused on avoiding impacts (mostly through option selection and through the use of tunnels and changes in horizontal and vertical alignment) and, to some extent, minimising impacts; for example through reducing the width of the proposed rail corridor within sensitive environments to minimise landtake.

Figure 36 – The mitigation hierarchy

Option selection	**Avoid**	Designing the project so that a feature causing an impact is avoided (e.g. through changes in vertical or horizontal alignment)
Preferred scheme selection	**Minimise**	Designing the project so that a feature causing an impact is reduced (e.g. lowering alignment to reduce visual impact)
Outline design	**Abate**	Abating, either on site (e.g. noise barrier) or at receptor (e.g. screening at a property)
Detailed design	**Repair**	Restoring or reinstating a feature after an impact has occurred, often to address temporary construction impacts
Implementation	**Compensate**	Compensation for loss or damage (e.g. planting new woodland elsewhere, or financial compensation for loss of amenity)

9.1.4 Since the publication of HS2 proposals in March 2010, various refinements to the design have been undertaken. These refinements are described within the text boxes in Section 3. They have almost all been undertaken to incorporate environmental mitigation, by way of small changes in alignment (avoidance and minimisation) or introduction of particular mitigation features, such as green bridges (abatement). Further opportunities to abate, repair or compensate for potential impacts would be sought in later stages of scheme development if HS2 progresses further.

9.1.5 Consultation will identify additional opportunities to mitigate the impact of any scheme. Once consultation has been completed, further design would commence and the engineers would further refine the scheme. This work would carefully consider issues that were raised in consultation, and would work to further reduce impacts on the environment. An EIA would then be undertaken which would provide a further opportunity to incorporate mitigation within the design.

9.2 Monitoring

9.2.1 HS2 Ltd would monitor the significant environmental effects of the implementation of the project in order to identify at an early stage unforeseen adverse effects, and to be able to undertake appropriate remedial action. Unforeseen effects are often interpreted as being underlying assumptions that turn out to have been incorrect or outside the context of the appraisal, for instance about population changes or economic growth.

9.2.2 In particular, EIA would identify the significant residual effects of HS2 (after mitigation measures have been incorporated) and set in train the process by which they could be monitored as part of the routine project planning process. This includes impacts on landscape/townscape, historic and archaeological heritage, biodiversity, water resources, flood risk, air quality, noise and vibration, health, security, land use, waste generation and resource use.

9.2.3 HS2 could also have some national level impacts; and some of the assumptions on which it is based could affect the development of future rail lines (conventional as well as high speed) in the UK. Going forward, a monitoring programme could be established which would address these strategic impacts and define mechanisms for dealing with them.

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