Towns Fund Delivery Partner

DfT Transport Appraisal Guidance updates

Economic Case

June 2021

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Overview of changes

TAG updates

DfT recently announced forthcoming changes to the Transport Appraisal Guidance (TAG) to be published officially in the guidance in July 2021. These include changes to:

- Optimism Bias
- Appraisal period and residual values
- Capturing Local context
- Uncertainty toolkit
- Landscape monetisation guidance

This document provides an overview of the key updates to DfT's Transport Appraisal Guidance (TAG). These changes should be considered by towns appraising transport projects, especially the Economic Case.

Optimism Bias

Overview of Optimism Bias changes

Summary of updates

- Any measure of QRA and contingency should be excluded from the definition of costs
- QRA can be used as a complementary valuation technique to the optimism bias adjusted measure of costs, rather than a substitute (both QRA and OB approaches should be seen as complementary to form an overall picture of a scheme's cost)
- New values for Optimism Bias. One of the key changes are higher values for OB at FBC stage
- New guidance on how to deal with inflation rates (A1.2)
- **Changes will be published officially into the guidance in July in TAG A1.2 and TAG A5.3.**

Note that OB is only applicable to the Economic Case.

Key sources:

- Annex A - changes to TAG Units A1.3 and A5.3
- DfT (2021), Updating the evidence behind Optimism Bias in appraisals
- DfT (2021), Peer review of optimism bias research report

The three main elements of a cost estimate:

- the base cost (section 2) - the basic costs of a scheme before allowing for risks, though these should incorporate realistic assumptions of changes in real costs over time, for example cost increases or reductions relative to the rate of general inflation
- adjustment for risk (sections 3-3.4) – this should cover all the risks that can be identified, the majority of which then need to be assessed and quantified through QRA. This takes an 'inside view' to form a risk-adjusted cost estimate using a 'bottom-up" approach
- adjustment for optimism bias (section 3.4.2) – to reflect the well-established and continuing systematic bias for estimated scheme costs and delivery times to be too low and too short, respectively, and results in the optimism bias-adjusted cost estimate. This method takes an 'outside view' using a "top-down" approach to cost estimation based on reference class forecasting (RCF) techniques

The use of QRA does not remove the need to make adjustments for optimism bias. Bottom-up QRA refers to project specific cost items and well quantified risks, while top-down optimism bias adjustments seek to capture unforeseen risks which are difficult to quantify ex-ante.

RCF is likely to be more reliable in earlier stages of the project where cost estimates are less mature, while QRA may be more informative in later stages as more detailed information becomes available. At any given business case stage, a significant divergence between cost estimates obtained using QRA and those derived by applying TAG OB rates to base cost may indicate project risks have been misunderstood.

Overview of changes

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How to apply Optimism Bias

- OB should be applied to base costs
- OB should be applied based on new recommended uplifts based on a research report by Oxford Global (2020)
- Real cost inflation should also be applied (default value of 2.1%)

Recommended OB CAPEX uplifts for different projects at different stages of the life of a transport project

Category	Types of projects	Stage 1	Stage 2	Stage 3
Roads	Motorway, trunk roads, local roads	46%	23%	20%
Rail	Metro, Light rail, Guided buses on tracks, line upgrades, high-speed rail	56%	33%	30%
Fixed links	Bridges and Tunnels	55%	32%	28%
Building projects	Stations and Terminal buildings	70%	48%	44%
IT projects	IT system development	69%	50%	42%
Land and property	Property purchases	33%	14%	0%
Rolling Stock*	Powered and unpowered vehicles	61%	38%	35%

Source: Oxford Global Projects (2020)

Key sources:

- Annex A - changes to TAG Units A1.3 and A5.3
- DfT (2021), Updating the evidence behind Optimism Bias in appraisals
- DfT (2021), Peer review of optimism bias research report

Overview of changes

Applying inflation

- The optimism bias uplifts in the updated guidance are calculated on the assumption that they will be applied to real-term estimates, and so account for real-term cost overruns. However, **real cost inflation, defined as inflation over and above the GDP deflator, should also be accounted for**.

- As a baseline assumption, the new guidance recommends including for **real cost inflation over and above the GDP deflator of 2.1%,** for appraisal where a bespoke real cost inflation estimate is not available. This is based on a reference class forecast of the difference between GDP deflator and construction sector specific inflation, as set out in OGP (2020).

- For schemes which have more limited exposure to inflation through appropriate commercial strategies or bespoke real cost inflation forecasts, an alternative approach is recommended based on a reference class forecast for optimism bias in inflation allowances for previous UK projects. This leads to a total uplift on scheme costs of around 4.3%.

Key sources:

- Annex A - changes to TAG Units A1.3 and A5.3
- DfT (2021), Updating the evidence behind Optimism Bias in appraisals
- DfT (2021), Peer review of optimism bias research report

Overview of changes

New recommended rail Optimism Bias

Recommended standard risk and OB adjustments

Project Development Level (Equivalent to Network Rail's GRIP stages)*	Level 1	Level 2	Level 3	Level 4	Level 5
Activity	Project Definition	Pre-feasibility	Option Selection	Single Option Refinement	Design Development
Equivalent HMT stage for determining OB rate	SOBC	SOBC	OBC	OBC	FBC
Capital expenditure: Optimism bias uplift to the base cost (% of present value capital)	New build rail: 56% Rolling stock: 61%***	New build rail: 56% Rolling stock: 61%***	New build rail: 33% Rolling stock: 38%***	New build rail: 33% Rolling stock: 38%***	New build rail: 30% Rolling stock: 35%***
Operational Expenditure: QRA, contingency	No	No	No	QRA at mean estimate	QRA at mean estimate
Operational expenditure: Optimism bias	41%	41%	21%	21%	1% per annum**

Sources: OGP (2020), Review of Large Public Procurement in UK (HM Treasury), SRA and Network Rail research

Key sources:

- Annex A - changes to TAG Units A1.3 and A5.3
- DfT (2021), Updating the evidence behind Optimism Bias in appraisals
- DfT (2021), Peer review of optimism bias research report

NOTES:

The rail capex OB rates are primarily derived from major new build rail projects. For smaller rail enhancement renewals projects with a low cost, the OB rates calculated by UCL (2015) are more appropriate. The OB rates on the left should be used for any project costing in excess of £7 million (2021 prices), which is approximately the 90th percentile of costs within the UCL (2015) reference class of Network Rail projects.

The Rolling Stock optimism bias uplift should only be applied to new rolling stock that has been procured. For schemes that will lease the rolling stock or buy an already available stock, the operational expenditure optimism bias uplift should instead be used.

For opex OB uplift, schemes may use the FBC rate at earlier stages if their opex estimates include the following activities that would typically be expected at FBC stage. These are:

- full circulation, stabling and rostering plan
- the exact class of rolling stock to be leased is known and there is a plan to lease it including where it will be cascaded from
- signaller and maintenance resourcing implications known
- driver training is reflected
- rationale for non-driver crew size

The Oxford Global Projects report (2020), includes some estimates for operating cost OB for rail and road projects, which can be found in the appendices to the report. **DfT still believes there is significant uncertainty associated with these results and that they are less robust than the capital cost OB figures presented. As such, those OB rates are not included in this TAG** Unit, but may be a useful starting point for bespoke analysis on operating cost OB where it is material and proportionate to do so.

Appraisal period and residual values

Overview of appraisal period changes

Appraisal period changes

- A recent review of current appraisal period guidance found that "*The current guidance in TAG prevents the consideration of costs and benefits beyond 60 years, meaning decision makers considering potentially long-term transformational investments currently do not have any way to present potential continuing impacts on social welfare or wider economic impacts after this point, as well as social and environmental impacts such as greenhouse gas emissions*."
- Changes to TAG Unit A1.1 are implemented to enable the consideration of long-term benefits.
- **The changes will be published in the guidance officially in July but users are welcome to start applying the guidance earlier than that.**

Key sources:

- Forthcoming changes: appraisal period update to TAG Unit A1.1 - July 2021

Updates to the guidance

- the standard period that must form the basis for the core appraisal is 60 years for assets with indefinite lives
- whilst an appraisal period of 60 years is suitable for the majority of schemes, where a significant proportion of a project's assets have an economic life exceeding 60 years, promoters may consider presenting the results of a longer appraisal period as a sensitivity test
- the appraisal length chosen should be linked to the expected economic life of the assets being appraised. This should not exceed the longest-lived asset constructed as part of the scheme and in all cases, should be no more than 100 years
- promoters are expected to demonstrate a strong strategic case rationale for the existence of significant impacts in the very long term
- the results of any extended appraisal period beyond 60-years should not be included in the core appraisal and promoters are expected to present a range of estimates for post-60-year benefits, not simply a point-estimate
- before carrying out a longer appraisal period sensitivity tests to support economic analysis, promoters should seek advice from DfT and include this provision as part of the appraisal specification process
- Phased opening of schemes - promoters should ensure that no single scheme or sub-component benefits from a longer appraisal period than if it were assessed on a standalone basis. This is to ensure comparability with schemes and options assessed using a standard 60-year appraisal period. Please contact DfT to agree a suitable approach in these circumstances.

Overview of appraisal period changes

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Appraisal period changes

Standard assumed economic asset lives

Asset type	Roads	Railways	Footways & Cycleways	Air	Maritime
Earthworks	100	100	100	100	Up to 50
Bridges/tunnels	Up to 100	Up to 100	Up to 100	Up to 100	
Foundation	40 *		40 **	100 ***	
Surface	10		20 **	10-15 ***	
Track		14 to 40			
Electrification		30 to 40			
Signalling		10 to 50			
Telecommunications		7 to 40			
Buildings	50	30-40		20 to 60 ***	Up to 50
Equipment	12			4 to 20 ***	2 to 30

Source for:

*Roads foundation life: Highways England (2020), DMRB CD 226 Design for new pavement construction.

**Footways & Cycleways foundation life: Highways England (2020), DMRB CD 239 Footway and cycleway pavement design

***Heathrow Airport Ltd (2019, p124)

****Atkinson et al. (2006) for footway/cycleway resurfacing – less frequent than for Roads due to reduced loading and traffic volumes. 'Economic asset life' refers to expected physical asset life before a major renewal is needed.

Notes: data relates to asset lives in the UK where possible.

Based on the UNITE Transport Account for the UK, Tweddle et al (2002), and World Bank Transport Note TRN-18: Projects with a Very Long Life (Mackie et al., 2005).

Key sources:

- Forthcoming changes: appraisal period update to TAG Unit A1.1 - July 2021

Overview of appraisal period changes

Assumptions for benefits growth

Summary of recommended long-term demand growth assumptions across scenarios

Scenario	Exogenous demand growth for modelling purposes (Up to NTM horizon)	Exogenous demand growth for modelling purposes (Post NTM horizon)	Post final modelled year extrapolation
Core Scenario	Based on NTEM horizon	ONS 0% future EU migration population variant	ONS 0% future EU migration population variant
Common analytical scenarios approach (preferred)	See Uncertainty Toolkit	See Uncertainty Toolkit – should reflect relevant ONS population variant	See Uncertainty Toolkit – should reflect relevant ONS population variant
TAG M4 approach (low and demand)	Text TAG Unit M4 for approach to pivoting low and high and low demand matrices off the core, extended to beyond 36 years if necessary	Text TAG Unit M4 for approach to pivoting low and high and low demand matrices off the core, extended to beyond 36 years if necessary	ONS low population variant for TAG M4 low demand, and ONS high population variant for TAG M4 high demand

Note:
Analysts should consider:

- whether the magnitude of impacts will continue to grow after the last modelled year and, if so, at what rate, including how that differs across scenarios
- whether the magnitude of impacts will decline in the future and, if so, at what rate and from when
- how and when the transition from growth to decline will occur

Key sources:

- Forthcoming changes: appraisal period update to TAG Unit A1.1 - July 2021

Overview of appraisal period changes

Residual value

- The DfT has published new research on appraisal periods and residual values. The research includes a review of the literature including how residual values are calculated in other countries and methodologies to do so.
- The forthcoming guidance on appraisal period recommends that residual values are estimated in special circumstances where the project's life is limited (e.g. a franchise), see notes on the right.

How and when to apply residual values (forthcoming guidance):

Residual values should not be included for projects with indefinite lives with an appraisal period ending 60 years or more after scheme opening. Where a special circumstance, such as a franchise, limits a project's life, the residual value should be estimated by:

- estimating the 'unconstrained project benefits', the benefits disregarding the special circumstances, over the appropriate appraisal period (i.e. either the asset life or 60 years for an asset with an indefinite life)
- subtracting the benefits from the project life dictated by the special circumstance from the unconstrained project benefits to give the residual value

Key sources:

- Forthcoming changes: appraisal period update to TAG Unit A1.1 - July 2021
- ITS Leeds - Residual Values and Appraisal Period in Multimodal Transport Appraisal

Capturing local context

Capturing local context

Summary of updates

Local context has always been an important part of strategic and economic cases, but the 2020 Green Book update places greater emphasis on it. Key finding of the Green Book review was that promoters focus excessively on boosting the BCR, and don't give enough attention to showing how a proposal contributes to achieving strategic priorities.

The review recommends illustrating how the intervention interacts with local socioeconomic features and complementary investments, and capturing local economic and distributional impacts.

DfT view is that economic appraisal should capture local context by considering the following:

- Socio-economic context – e.g. local employment levels, wages, educational attainment
- Transport constraints faced by people in the local area e.g. the extent to which lack of connectivity constrains growth and access to centres of economic activity
- Role of the scheme within an overall package of intervention (which may include transport and non-transport schemes)
- Potential social welfare impact – user benefits, productivity, functioning of local labour markets, opportunities for local commercial/residential development
- Place-based analysis – how impacts vary across areas and groups of people

Key sources:

- Capturing Local Context in appraisal

Capturing local context

Summary of updates

Four analytical approaches are relevant to capturing local context:

1. Presenting the economic, social and policy context in the strategic case
- This is part of understanding the 'case for change' and strategic/policy alignment
- DfT recommends using the levelling-up toolkit
- Key things to explore are socio-economic characteristics of local area, extent to which transport is a constraint and potential local impacts

2. Wider economic impacts analysis
- TAG wider impacts guidance flexibly and proportionately, and with a clear economic narrative
- Include consideration of local market failures and displacement
- Use additionality modelling as described in TAG M5-3 i.e. calculation of jobs and GVA impact, accounting for deadweight, leakage, displacement, multipliers

3. Scenarios and sensitivity analysis
- can be used to test different assumptions on local housing & population growth

4. Place-based analysis
- local analysis + proportionate analysis at home country / UK level
- consider expected (including unintended) effects on target area and nearby areas
- consider whether there will be significantly different impacts by income group or protected groups
- alignment with local stakeholders' views and local public policy
- interdependencies – is achievement of project objectives dependent on delivery of other proposals?
- Also relevant for schemes that don't have a geographical objectives but have different impacts on different parts of the UK
- Distributional impact assessment as per TAG A4-2 (and alternative approaches)

Capturing local context

Summary of updates

The three case studies show examples of how local factors can be incorporated into the narrative and/or analysis

Case Study – Sunderland Strategic Transport Corridor

- Lack of network resilience – number of incidents, and impact on Nissan's just in time supply chain
- Congestion on river crossings – impact on access to employment sites including traffic modelling evidence to show congestion would stifle growth
- Estimation of wider economic impacts in a 'Level 2' adjusted BCR
- Connectivity between the city's manufacturing hub, city centre and port

Case Study – Newhaven Port Access Road

- Present constraints on the ability of Brighton to attract and accommodate business growth e.g. council forecasts on limited business space and low forecast new builds
- Interdependencies with proposed Enterprise Zone – impact of new road on Enterprise Zone's success
- Low BCR (0.l Level 1, 0.8 Level 2) so complemented by Additionality Modelling (more proportionate than full Level 3 LUTI modelling)
- Case study provides example of reasoning behind assumed leakage/displacement factors

Case Study – Midland Metro Edgbaston Extension

- Lack of reliable connectivity between the areas on the route
- High profile new developments along the route may not reach full potential if accessibility not addressed
- Potential for the intervention to promote access to jobs for people from deprived parts of Birmingham, including analysis of local age profiles and car ownership levels
- Sensitivity testing around the impact of another metro extension on this one
- Distributional impact analysis in line with TAG A4.2 including qualitative analysis of affordability
- Mapping of deprivation data to demonstrate benefits to more deprived areas

Uncertainty toolkit

Uncertainty Toolkit

Summary of updates

- A new Uncertainty Toolkit has been published by TAG, it is supplementary to and sits alongside existing TAG unit M4 (which deals specifically with forecasting and uncertainty).
- The Toolkit has been published with the intention of bringing together previously fragmented guidance on uncertainty.

What is Uncertainty?

Authors of business cases need to be equipped to understand and describe uncertainty to ensure their analysis is robust and credible. Uncertainty can be classified into **three** main areas, namely:

- **(1) Known knowns (or risk):** referring to the inherent uncertainty that is always present due to an underlying probability distribution. Known knowns refer to events that we can estimate the probability of their occurrence with some degree of accuracy. Example – Interest rates
- **(2) Known unknowns:** referring to the lack of complete knowledge about the complex system being modelled. Example – Travel behaviour
- **(3) Unknown unknowns:** referring to factors or situations that have not been previously experienced and therefore cannot be considered due to lack of evidence. Example – Some of the consequences of climate change

The Uncertainty Toolkit focuses on the known knowns (1) and the known unknowns (2).

The four key principles that underlie the guidance in the Uncertainty Toolkit

1. The treatment of uncertainty is a core part of any transport analysis and is needed to inform robust decision making. It should be considered early in the development of a scheme.
2. Analysis should not focus exclusively on a core scenario. Decision makers need to be provided with analysis showing how different futures may affect the outcomes of the decision they take today.
3. Proportionate appraisal techniques for defining, measuring and reducing uncertainty should be used.
4. Uncertainty should be considered holistically across the strategic and economic cases throughout the planning process.

Key sources:

- TAG: forthcoming change to the uncertainty toolkit

Uncertainty Toolkit

Summary of updates

- Important initial distinction is between **uncertainty** and **risk**. Under risk, potential outcomes are known and can be quantified. Under uncertainty, potential outcomes can only be estimated.
- Uncertainty in transport modelling and appraisal can predominantly be categorised as either i) input uncertainty or ii) model specification uncertainty
  - Within i) scheme promoters should determine whether this input uncertainty could be classed as endogenous, and whether it is at local or national spatial scale;
  - Within ii) scheme promoters should determine whether uncertainty is introduced through either the estimation of parameter estimates or through model specification (or both). If the final forecast depends on a series of successive sub-models, scheme promoters should be aware that uncertainty can be spread throughout the modelling process.

TAG: Classification table of the sources of Uncertainty

Source of Uncertainty		Definition
Input Uncertainty	Endogenous Inputs	Inputs in which decision makers have influence on the future system outcomes through policy interventions (P)
	Exogenous Inputs	External forces outside of the decision maker's control which may influence the system significantly (X)
	Supply	Uncertainties associated with the existing and future transport network or the provision of transport services.
	Demand	Uncertainties due to current and future economic, demographic, technological, and behavioural change, policy led demand and proposed developments.
	National	Uncertainties that influence the whole of the country e.g. demographic, technological, behavioural.
	Local	Uncertainties that are specific to the area in which schemes are being developed e.g. population distribution.
Model Uncertainty	Parameter	Model Specification and Propagation uncertainties (R) including; elasticities, sampling errors and limited precision in input values

Note: TAG recognises the scope of uncertainty analysis should be reflective of the impact of uncertainty and the level of uncertainty *i.e. considerably more weight should be placed on understanding uncertainty for schemes with higher impacts, greater revenue risks and more uncertain outcomes*

See overleaf for three broad categories of impacts.

Key sources:
- TAG: forthcoming change to the uncertainty toolkit

Uncertainty Toolkit

Summary of updates

The level of scrutiny and analysis performed by authors should be proportionate to the level of impact of the project. TAG defines three levels of impact shown below. As a rule of thumb the potential benefits gained, or costs avoided, should be greater than the costs of doing the uncertainty analysis itself.

Table of indicative impact

	Indicative Impact		
	Low	**Medium**	**High**
Impact on public finances through budget cost or revenue risk	Tier 3 e.g. < £50m	Tier 2 e.g. £50-500m	Tier 1 e.g. > £500m
Corporate risk	Limited / risk of minor embarrassment	Risk of minor loss in confidence	Risk of major loss in confidence
Portfolio project	Local transport schemes	DfT approved or sponsored	Investment programme / strategy
Level of uncertainty	Input assumptions low range of uncertainty Short lifetime e.g. < 5 years	Input assumptions medium range of uncertainty. Medium lifetimes 5 – 50 years	Input assumptions high range of uncertainty. Long lifetimes e.g. > 50 years

The guidance presents the following techniques for a proportionate understanding of uncertainty:

i. Judgement based; simple judgement based approaches (Section 3.20) are introduced.
ii. Scenarios; the use of scenarios (Section 3.24) and the Common Analytical Scenarios (Section 3.33) provide significant insight into the impacts of key national level uncertainties for transport analysis. Horizon Scanning (Section 3.42) is useful as part of scenarios development.
iii. Sensitivity studies; Sensitivity studies (Section 3.52) and local scenarios are also powerful tools to reveal to decision makers project specific uncertainties.
iv. Monte Carlo; We cover certain risk analysis techniques such as Monte Carlo analysis (Section 3.58).
v. Other decision making approaches; These techniques (Section 3.66) are useful for decision making under deep uncertainty. When there is a significant learning-over-time component Real Options analysis can be used.
vi. Optimism Bias; (Section 3.70) is a technique focussed on cost uncertainty.

Key sources:

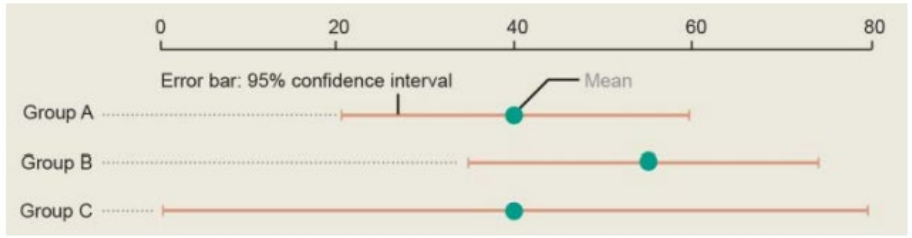
- TAG: forthcoming change to the uncertainty toolkit

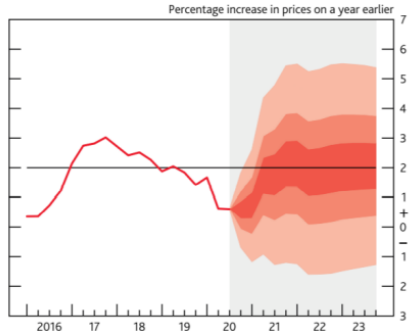
Uncertainty Toolkit

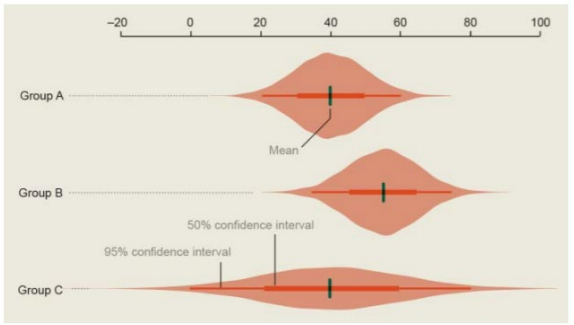
Summary of updates

What does this mean for developing / writing business cases?

- Uncertainty analysis should always be undertaken, but must be proportionate to the size of the project.
- There are various techniques to undertake the analysis, the techniques are more / less appropriate depending on the level of impact of the project.
- The following should be produced in the business case to communicate uncertainty analysis:
  - An uncertainty log which documents main assumptions and uncertainties;
  - An analytical quality assurance statement;
  - A BCR range from scenario / sensitivity analysis, and switching values;
  - A value for money category and statement
- There are a number of visualisation techniques to portray the analysis to the reader (see Section 4 of the Toolkit), including error bars, fan charts, and violin plots.







Key sources:

- TAG: forthcoming change to the uncertainty toolkit

Landscape monetisation

Landscape monetisation

Summary of updates

- Current supplementary Value for Money (VfM) guidance on landscape monetisation advises that landscape impacts are most often included in a VfM assessment as a non-monetised impact alongside other environmental impacts, following an Environmental Capital Approach (ECA) set out in TAG Unit A3.
- The new guidance will set out a methodology to provide an indicative view of the scale of the monetary impact that can be presented alongside a non-monetised assessment. This includes a revised step-by-step guide (see next slide), updated landscape values to use in monetisation and a formula to monetise benefits, all explained in the new supplementary VfM guidance to be published. This is based on a review or the original landscape values commissioned in 2018.
- Where monetised landscape impacts are assessed, they should be reported as "indicative monetised impacts" and should not be included within any adjusted VfM metrics such as the Benefit-Cost Ratio (BCR) or Net Present Value (NPV).
- Results should be reported in the Appraisal Summary table and VfM framework as set out in the VfM framework, which now includes supplementary guidance on landscape.
- Users that need to use DfT guidance to quantify scheme landscape impacts are advised to adopt this new guidance as soon as possible.

Note on double counting

The reported landscape valuations do not just include landscape amenity benefits (where landscape character and quality combine to produce attractive views). They may also include the external benefits of recreation, biodiversity, cultural heritage, water environment and tranquillity. Some of these benefits may have been captured elsewhere in the appraisal, and so simply adding them to the appraisal may lead to an over statement of the impact.

Key sources:

- Forthcoming changes: landscape supplementary VfM guidance - July 2021

Landscape monetisation

Summary of landscape assessment process

The indicative monetised approach set out in the forthcoming guidance partially assesses impacts on ecosystem services by allowing for the valuation of two specific landscape-related services – the value of carbon sequestration and storage from habitats lost or gained (global climate regulation) and the value of air pollutant removal by vegetation lost or gained (air pollutant removal) – using the landscape monetisation workbook published alongside TAG. The table below shows the latest recommended steps.

Step	Description
1. Identify landscape features	Utilises information from the landscape worksheet1 and an environmental constraints map (identify moderate or large landscape impacts).
2. Segment the scheme	Segment the scheme where landscape impacts vary significantly.
3. Determine land type	From information or other sources (for example an environmental constraints map), determine the appropriate (mix of) land type.
4. Determine landscape “footprint”	Determine the size of the area affected by the landscape changes.
5. Mitigation	Identify any current mitigation structures or measures proposed to reduce impacts on the landscape.
6. Landscape impact valuation – using landscape values	Use the landscape values recommended in this guidance and the Landscape Monetisation Workbook to assess the landscape impact in monetary terms. See formula in the VfM Supplementary guidance.
7. Additional landscape impact valuation – based on ecosystem services approach (NEW)	Assess additional landscape impacts arising from ecosystem services (air quality regulation by vegetation, carbon sequestration) using the information obtained from steps 1-5 and the Landscape Monetisation Workbook.
8. Sensitivity tests	Sensitivity analysis for the key assumptions used in the assessment. This could include use of upper and lower bound landscape values.

Key sources:

- Forthcoming changes: landscape supplementary VfM guidance - July 2021

Landscape monetisation

Updated values

Table 2.3: Landscape values for different landscapes

Land type	Present Value per hectare (£) (2010 prices, for an appraisal start year of 2021a)			Comments
	Central values 100-year appraisal period assumed	Lower bound sensitivity values 60-year appraisal period assumed	Upper bound sensitivity values 250-year appraisal period assumed	
Urban core	4,378,481	3,068,371	8,544,302	Central urban area. Examples include public spaces and city parks.
Urban Fringe (greenbelt)	72,069	50,505	140,637	Areas of transition where urban areas meet countryside.
Urban Fringe (forested land)	218,944	153,433	427,255	Forested land on urban fringes, more valuable than typical urban fringe.
Rural forested land (amenity)	537,282	376,519	1,048,468	This value represents the range of forests in the UK, including both commercial and amenity forests.
Agricultural Land (extensive)	255,416	178,991	498,426	Areas of rough grassland where extensive agricultural practices such as sheep farming dominate. May include farm buildings forming part of the agricultural holdings.
Agricultural Land (intensive)	8,331	5,838	16,258	This type of land is usually in farmland under intensive agriculture (usually land under food production). May include farm buildings forming a part of the agricultural holdings.
Natural and semi-natural land	536,466	375,947	1,046,877	This includes uncultivated areas, wetlands, and areas with nature conservation designations.

Key sources:

- Forthcoming changes: landscape supplementary VfM guidance - July 2021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