Paper: ‘Assessment Years’ Approach to Large Scale Infrastructure Development

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Introduction

This paper examines the challenges of assessing impacts of large infrastructure projects where there is overlapping construction and operational activities.

Using airport development as an example it highlights how the worst-case environmental effects may not coincide with periods of maximum operational capacity. As a result, determining specific project phases and identifying the worst-case years for significant effects is necessary but difficult.

Context

The phasing of Airport development results in periods where construction and operational activities overlap, as the airport remains operational throughout delivery of the Project. To enable clear and robust assessment of the effects arising from this overlap, the assessment is structured into a series of defined phases. For each phase, the effects associated with construction are assessed alongside the incremental operational effects that occur as new elements of the Project become operational, over and above those assumed within the future baseline.

The effects of activities are likely to be experienced at different receptors, at different times. For example, one receptor may be affected by a construction activity whereas another, at the same time, is affected only by noise from overflying aircraft.

Typical construction activities included in the expansion of an airport:

- Site mobilisation and temporary construction areas
- Modification to roads and junctions
- Utility diversions and relocation
- Runway and taxiway construction
- Apron works (aircraft parking area)
- Blue and green infrastructure construction (network of landscape and water systems)
- Terminal building construction and/or extension
- Car parking construction
- Noise mitigation barriers

Furthermore, the point at which operational activities reach their maximum capacity does not represent the point at which environmental effects are most significant. For example, the introduction of newer more technologically advanced aircraft is expected to reduce noise emissions, even where air traffic movement (ATM) numbers increase. Similarly, the vehicle fleet is anticipated to become progressively less polluting over time as vehicles powered by

internal combustion engines are replaced by electric vehicles. As a result, increase in road traffic may may occur alongside improvements in air quality.

This means that for the technical impact assessments carried out within the Environmental Impact Assessment (EIA), there is no single year that would result in the identification of the 'reasonable' worst case effects, for all technical aspects.

This challenge can be addressed by adopting an approach whereby the major periods of construction and operational activities are assessed by reference to several 'core' years.

Guidance and best practice in the UK does not prescribe fixed years—it requires a justified, proportionate selection that captures likely significant effects. Core expectations from decision makers include:

- Choose years that represent:
    - **Baseline**
    - **Construction peak**
    - **Opening year**
    - **Future "design year"**
- BUT crucially: Also include **any year where effects are likely to be greatest**

Key principle:

Assessment years must reflect **peak impact, not just peak development.**

Assessment Phases

Construction and operational phases are broadly defined and are based on the most dominating activities. The approach takes into account several factors including:

1. Existing airport operations;
2. Proposed operations associated with the Project;
3. Construction activities associated with the Project;
4. Long development programme – this involves some sites within the Airport Boundary changing their use over the duration of the Project;
5. Other airport related development proposals not sought for as part of the development; and
6. Growth trajectories and technology advances.

Luton Airport

For the construction of **Luton Airport expansion**, the development was intended to be delivered in increments to deliver capacity in line with forecast demand. For the purposes of assessment, three assessment phases were identified and described[1].

Assessment Phase	Passenger Capacity	Construction start year	Construction completion year	Year predicted passenger capacity reached
Phase 1	21.5 mppa	2025	2027	2027
Phase 2a	27 mppa	2033	2036	2039
Phase 2b	32 mppa	2037	2041	2043

The construction will be implemented incrementally over approximately 18 years, therefore, several assessment years were defined and considered in the EIA. These were defined by and are consistent with the aviation forecasts, surface access modelling and assessment, and predicted construction activity.

Core assessment years included:

- 2019: Baseline conditions – represents the environmental conditions when the airport

[1] https://nsip-documents.planninginspectorate.gov.uk/published-documents/TR020001-000660-5.01%20Environmental%20Statement%20Chapter%205%20Approach%20to%20the%20Assessment.pdf

was last operating at around full permitted capacity;

- 2027: Assessment Phase 1 – represents when passenger demand reaches design capacity of the Phase 1 works;
- the year of predicted maximum environmental effect during construction – this maybe different for technical disciplines and so was defined by each of the topics;
- 2039: Assessment Phase 2a - represents when passenger demand reaches design capacity of the Phase 2a works; and
- 2043: Assessment Phase 2b - represents the airport when passenger demand reaches design capacity of the Phase 2b works.

Heathrow Expansion

For **Heathrow expansion**, the assessment phases are defined broadly and are based on the most dominating activities.

Assessment Phase	Construction activities	Operational activities
Phase 1 The Project is granted consent and construction and demolition activities commence. Early release of Air Traffic Movements (ATMs) is also achieved, at the end of the phase.	Consent Site mobilisation and start of construction Modifications to roads and junctions River diversions Major road tunnel construction and junction works Utilities diversions Runway and taxiway construction Apron works Landscaping and parkland works	Airport business as usual operations Continued growth in passenger numbers Early release of ATMs
Phase 2 Construction activities continue up to the point where the third runway is ready to be opened.	Major road tunnel constructed New local roads completed Major road junctions works Utilities diversions Runway and taxiway construction	ATMs increase in response to the third runway opening Passenger numbers continue to increase
Phase 3 Construction activities continue and the third runway is fully operational with ATMs increasing to achieve maximum ATM capacity.	Major road junctions works complete Utilities diversions complete Runway and taxiway construction complete Apron works complete Terminal works commence and complete Landscaping and parkland works complete	ATMs continue to increase with maximum capacity reached Passenger numbers increase to maximum capacity

Core assessment years for Heathrow will align with key milestones in the Project, which will be developed over the three phases.

- **Year of release of first phase of capacity.** This is the year at which at which the maximum number of early ATMs are operating for the first time and during a period where construction activities are intensive.
- **Year of Opening.** This is the first full calendar year when the new third runway is operational. During this year significant construction activities will also still be occurring.
- **Year of maximum ATM capacity**. This is the year when the runway will have reached its maximum forecasted capacity, and construction activities associated with the Project will conclude.

Furthermore, the Airports National Policy Statement (ANPS) requires assessment to be undertaken to demonstrate compliance with policy tests. These 'additional' assessment years are not required for all environmental aspects; where applicable, their use is defined and justified in individual aspect chapters. The identification of any 'additional' assessment years is informed by technical judgement, taking account of the characteristics of the emerging

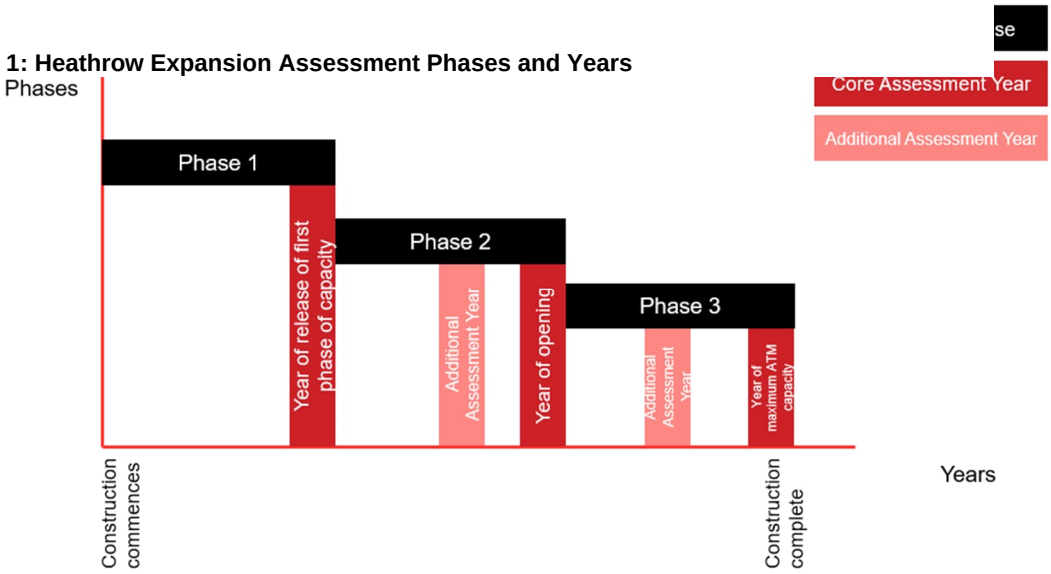
design and the sensitivity of effects to different stages of Project delivery and operation.

Finally, there may be instances where specific activities within a given phase are not adequately represented by either the defined 'core' or 'additional' assessment years. In such circumstances, it may be necessary for certain environmental aspects to assess effects associated with activities that occur during other years. For example, the construction of a specific facility may occur outside of the 'core' or 'additional' years of assessment but give rise to effects on a local community at the time the activity is undertaken. Furthermore, the 'core' or 'additional' years of assessment may not always represent the reasonable worst-case scenario for all environmental aspects. Where this is the case, further targeted assessment is required to ensure compliance with the principles set out in the ANPS. This approach is addressed by each technical aspect undertaking a comprehensive review of activities across all phases of the Project, and identifying where additional, activity-specific assessment is necessary to capture the likely significant effects.

In summary, each aspect will assess:

- Each phase (Phases 1 – 3) at a general, descriptive level;
- All 'core' assessment years as far as practicable (some aspects are unable to assess all years for various reasons. For example, because they have not received the appropriate data);
- All 'additional' assessment years' where for aspects it is required by the ANPS; and
- 'Other' years as necessary to assess worst case effects for specific activities.

Figure 1: Heathrow Expansion Assessment Phases and Years



Some aspects may have specific methodologies and use additional assessment years. Examples include:

- For **Carbon** - a mid-term assessment year might be included to reflect peak emissions prior to the widespread adoption of decarbonisation measures
- For **Air Quality** - an additional assessment year might be included to capture the period where traffic growth has occurred, but the fleet and background improvements have not been fully materialised, representing a realistic worst-case scenario.
- For **Landscape and Visual** – an additional assessment year might be included to capture the views when mitigation is not yet effective (such as landscaping and planting). The worst-case visual impact may occur in an interim year when built development is fully operational, but planting is yet to mature

Heathrow stakeholders are keen to work collaboratively with the EIA team to agree any additional years to ensure that the worst case is robustly represented for each aspect.

Sensitivity Testing

In an airport expansion (like Luton or Heathrow), the assessment relies on forecasts and assumptions, such as:

- Future passenger numbers
- Aircraft fleet mix (quieter vs noisier planes)
- Flight paths and runway usage
- Background traffic growth
- Emissions factors

Sensitivity testing systematically alters these assumptions to evaluate the reliability and robustness of the outcomes.

Benefits include:

- Testing can demonstrate robustness of the EIA and that the conclusions are credible even if in reality the forecasts are not completely accurate.
- Helping to justify that the assessed case is conservative enough and is not underestimating the impacts.
- Should the testing show impacts could worsen, then this can iteratively inform mitigation measures.
- Provides transparency and assurance to decision-makers on the conclusions.

Sensitivity testing in an airport EIA is about **stress-testing the assumptions** behind the assessment to ensure that:

- The results are robust and defensible
- Uncertainty is transparent
- Decision-makers understand best-case vs worst-case outcomes

Future Baseline and Cumulative Assessment

For projects of this nature which extend over a long period of time, the approach to the future baseline and cumulative assessment need to take into consideration the various assessment years.

Other developments which have been shortlisted need to be sorted into baseline,

future baseline and cumulative assessment prior to commencing the assessments.

In the example shown below (**Figure 2**), Project A is predicted to be in construction during Phase 1 of the Proposed Development timeline. Project A is due to be complete during the early stages of Phase 2. For assessment purposes, this means that for the first core assessment year, we need to treat Project A as a cumulative project and therefore will be considered within the cumulative effects assessment for that particular assessment year. For all proceeding assessment years Project A will be considered within the future baseline.

Key Takeaways

- A “design year only” approach is insufficient for assessing worst-case impacts in large-scale infrastructure projects such as airports.
- The EIA must consider multiple assessment years rather than rely solely on milestone years, as environmental effects may peak at different times for different aspects.
- Incorporating sensitivity scenarios can be helpful to test the robustness of assumptions and forecasts, ensuring results remain credible even if actual outcomes differ from projections.
- Stakeholder engagement is essential to agree on appropriate assessment years and ensure robust representation of potential impacts

Figure 2: Cumulative and Future Baseline Example