

BUSINESS CASES FOR STRUCTURE RENEWALS

Point of entry considerations

17 FEBRUARY 2021

VERSION 1.1

APPLICATION

This document describes the focus of the point of entry (PoE) that applies to activities which qualify under Work Category 322 – replacement of bridges and structures.

SIMPLIFYING THE POINT OF ENTRY

Where the purpose of a business case is to consider the potential renewal of a structure, it is possible to simplify the point of entry thinking significantly. This can also support the use of a simplified development pathway for any subsequent business case.

The reason PoE thinking can be simplified for such business cases is because there are essentially two valid reasons – or **triggers** – that will prompt the need to consider renewal of a structure as a potential investment.

Either:

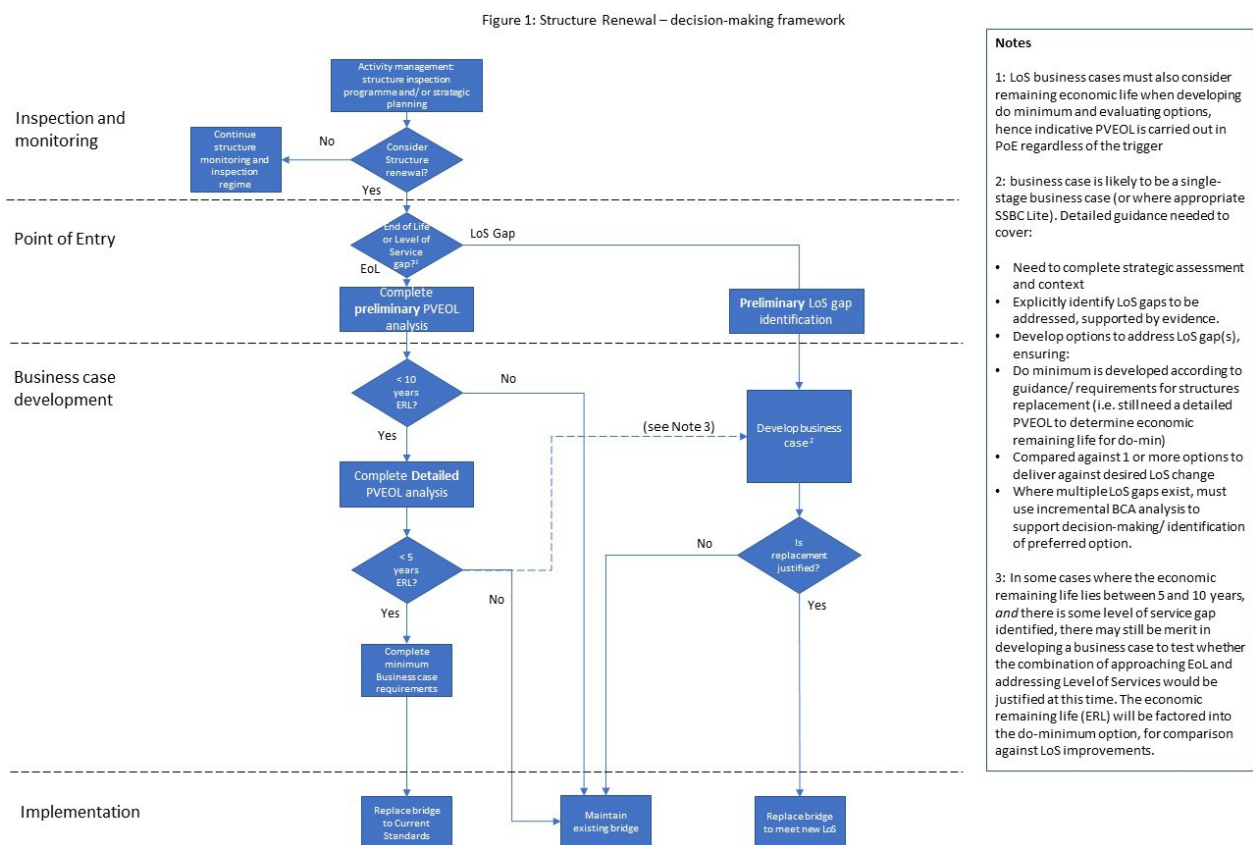
- It is believed a structure is approaching the end of its economic life, or
- It is believed there is a gap between the level of service the structure provides and what is needed, either now or in the near future.

These are referred to as ‘end-of-life’ or ‘level of service’ respectively throughout this guidance. It is important to note that, when a structure is being considered due to concerns regarding levels of service, it is also necessary to consider the remaining economic life of the bridge and factor that into investment decisions.

Typically, an organisation’s activity management plan (AMP) will indicate when either of these triggers is approaching. For example, current practice is for inspection regimes to identify the approaching end of economic life of a structure at least 10 years ahead of critical failure (with the exception of unforeseen events). When an inspection programme identifies a trigger has been reached, the PoE phase must be used to capture and clearly communicate:

- Which of the above reasons are driving consideration of the renewal of the structure, and;
- The proposed start point and development pathway for the business case to support an investment decision.

The PoE discussion must establish whether the structure renewal is being considered due to end-of-life, level of service, or potentially a combination of both reasons. To assist with right-sizing the effort needed to develop the business case, the logic that must be applied in the PoE is shown in Figure 1 and described below.



See Appendix 1 for larger image.

Point of entry triggered by approaching end-of-life

A key tool for establishing whether a structure is genuinely approaching end-of-life is the present value end-of-life (PVEOL) analysis. Where the trigger for a point of entry is the approaching end-of-life of a structure, a PVEOL analysis must be carried out to support the PoE decision-making. An example would be where the maintenance and inspection regime in an Activity management Plan indicates a structure is within 10 years of the end of its economic life.

The PVEOL analysis will establish the economic remaining life of the structure and enable a simplified approach to developing the business case to be adopted.

For the purposes of the PoE phase, the PVEOL analysis may be carried out at an indicative level of detail; however a detailed PVEOL analysis is still required as the first step in the next phase of business case development.

Specific guidance on how and when to carry out a PVEOL analysis, including a spreadsheet template and worked example to support practitioners are available:

[Bridge replacement at end-of-life](#)

[PVEOL analysis report template](#)

[PVEOL analysis report sample: SH25 Pepe Stream Bridge](#)

Point of entry triggered by level of service

Where it is believed a structure may need replacing to enable a different (higher or lower) level of service (LoS) the point of entry will need to identify, at a high level, the nature of the LoS gap. This means considering whether the LoS gap relates to outcome areas such as safety, resilience, capacity, or potentially a third-party driven change, for example where changes in a flood management scheme prompt consideration of revised waterway widths and flood levels. Understanding these drivers for change will assist in right-sizing the business case and ensuring engagement with the right people.

Point of entry where both end-of-life and level of service are factors

In some cases where the economic remaining life is approaching **and** there are significant level of service gaps, it may be appropriate for the business case to consider whether early replacement is a valid option to address level of service deficiencies. To enable the correct assessment of options in such cases, the business case must be designed to include:

- a **do-minimum option** that includes replacement of the structure at the end of economic remaining life (determined by a detailed PVEOL analysis), and
- at least one **improvement** option that includes replacement of the bridge now.

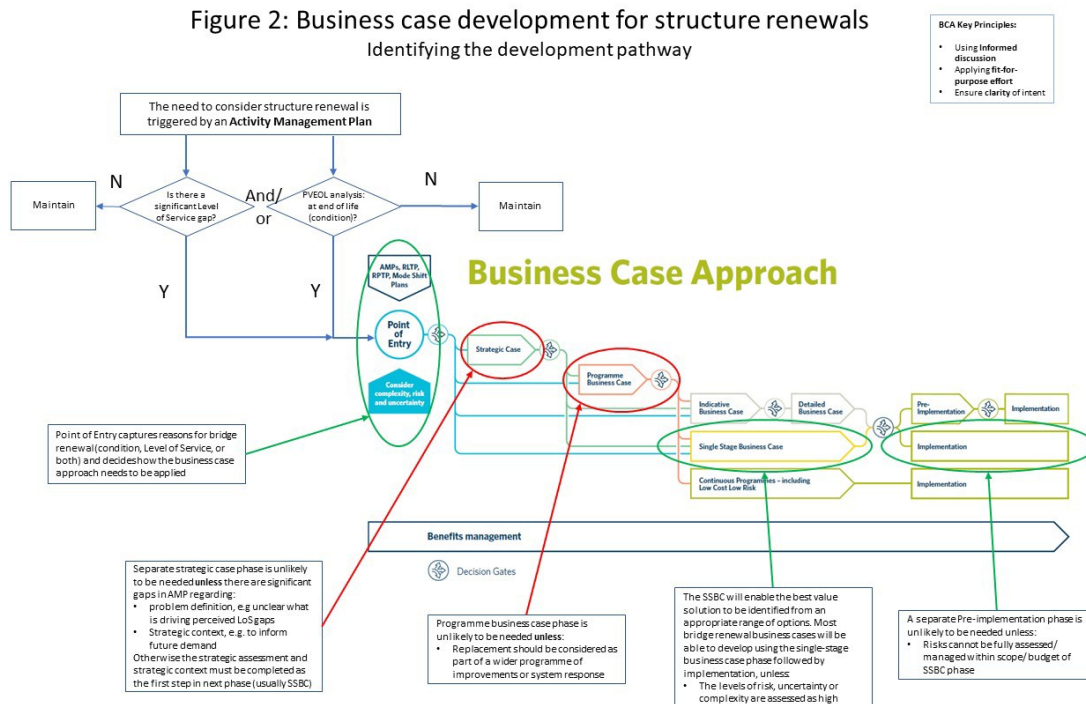
Where there is more than one level of service gap that could be addressed, a number of improvement options should be developed. Incremental benefit-cost analysis is then used to indicate the preferred option, for example to test the additional benefit derived from an increase from a single to a dual lane bridge.

Further specific guidance on establishing remaining life, including how and when to carry out a PVEOL analysis:

[Bridge replacement at end-of-life](#)

DEVELOPMENT PATHWAYS FOR RENEWAL OF STRUCTURES

Figure 2 below shows the BCA phases and development pathways; the phases that will typically be needed to develop a business case for structure renewal are highlighted.



See Appendix 2 for larger image.

The business case must address the five cases (strategic, economic, financial, commercial and management) to the extent appropriate, and for structure renewals this will usually be achievable through a single stage business case (SSBC) phase. Where risk, uncertainty and complexity factors are assessed as **low** in the PoE phase, it may be acceptable to use the SSBC Lite pathway, enabling further efficiency in business case development.

The actual development needs for business cases that relate to structure renewals will depend on why renewal is being considered. From the triggers identified above, there are 2 broad scenarios:

Scenario 1 – Renewal due to end-of-life

In this scenario, the PVEOL analysis is critical to establishing whether a structure has genuinely reached, or is about to reach, the end of its economic remaining life (ERL). Often there are maintenance or partial repair options that can extend the remaining life of a structure, and the economic value of 'renew' vs 'maintain' options can be quickly and easily compared using the PVEOL analysis.

If the PVEOL shows that the ERL is less than 5 years, and there are no level of service Gaps to be addressed, the business case requirements are relatively simple and are shown in the left-hand pathway in Figure 1.

As part of the PoE, a qualitative check should still be made to make sure there are no significant level of service gaps anticipated; if so, the pathway under Scenario 2 may be needed to develop a more detailed business case that examines a wider range of options (shown on the right hand of Figure 1).

Scenario 2 – Renewal due to level of service gap

Under this scenario, a critical first check, carried out during the PoE, is to test at a **qualitative** level whether there are genuinely significant gaps in the LoS provided by the existing bridge. The PoE should also identify what outcome areas the LoS gaps are related to, as described above.

Note that even if there are no significant gaps in LoS found at this stage, it is good practice to still check the Economic Remaining Life, using an indicative PVEOL analysis. If the structure is nearing end-of-life, a business case that investigates both economic remaining life and LoS gaps may highlight sufficient reason for considering replacement at this time.

If the PoE shows there is qualitative evidence to indicate a significant gap in LoS, then a business case is needed to:

- Reconfirm the strategic assessment and strategic context, addressing any gaps remaining from previous work
- Test the perceived LoS gaps against quantitative evidence
- Ensure effective stakeholder engagement
- Clarify expected benefits from addressing the LoS gaps, and agree investment objectives
- Develop a long list of options for evaluation, to identify a short list or preferred option on which detail analysis will be carried out against a do minimum option
- Recommend a proposed option for implementation.

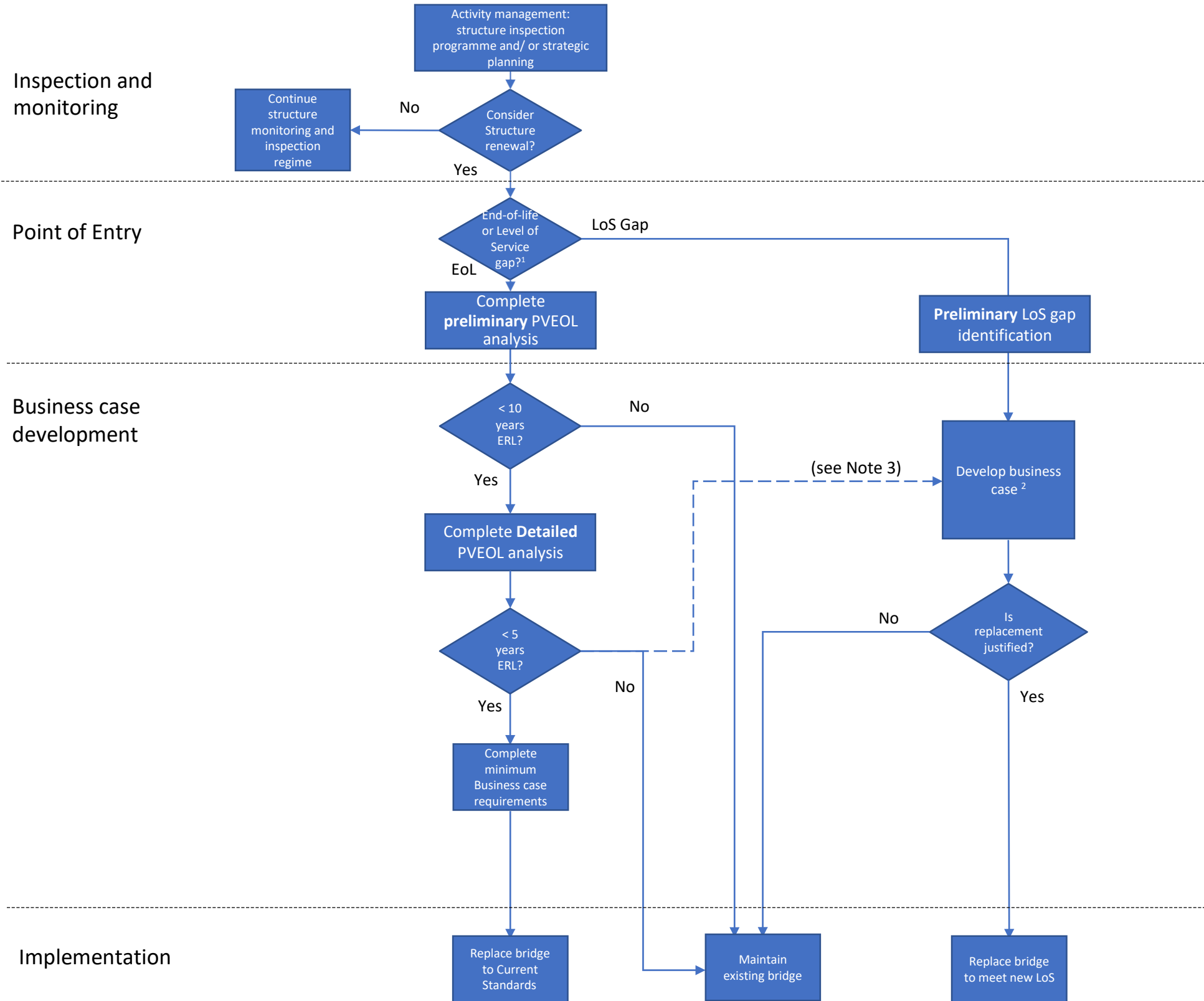
Note that in most cases under scenario 2 it will be possible to use a single-stage business case to complete the remaining requirements of the business case. However, it will still be necessary to complete the:

- Strategic context, and
- Strategic assessment (including problem and benefit definition),

as an initial step in the next phase. This helps to ensure that the reasons for considering renewal are clearly captured and communicated to the people working on the business case.

APPENDIX 1

Figure 1: Structure Renewal – decision-making framework



Notes

1: LoS business cases must also consider remaining economic life when developing do minimum and evaluating options, hence indicative PVEOL is carried out in PoE regardless of the trigger

2: business case is likely to be a single-stage business case (or where appropriate SSBC Lite). Detailed guidance needed to cover:

- Need to complete strategic assessment and context
- Explicitly identify LoS gaps to be addressed, supported by evidence.
- Develop options to address LoS gap(s), ensuring:
- Do minimum is developed according to guidance/ requirements for structures replacement (i.e. still need a detailed PVEOL to determine economic remaining life for do-min)
- Compared against 1 or more options to deliver against desired LoS change
- Where multiple LoS gaps exist, must use incremental BCA analysis to support decision-making/identification of preferred option.

3: In some cases where the economic remaining life lies between 5 and 10 years, *and* there is some level of service gap identified, there may still be merit in developing a business case to test whether the combination of approaching EoL and addressing Level of Services would be justified at this time. The economic remaining life (ERL) will be factored into the do-minimum option, for comparison against LoS improvements.

APPENDIX 2

Figure 2: Business case development for structure renewals Identifying the development pathway

- BCA Key Principles:
- Using **Informed discussion**
 - Applying **fit-for-purpose effort**
 - Ensure **clarity** of intent

