Mix Design Procedure for Basegrade Stabilisation

General Notes:

- Start on the left hand side and work towards the right hand side;
- At any point in the chart, if the answer to a question is YES, follow the green solid line;
- At any point in the chart, if the answer to a question is NO, follow the red dashed line;

Specific Notes:

1a. Existing granular thickness can include bituminous wearing surface where no level restrictions exist. Additional material refers to a review of the opportunity to raise the level of the existing pavement with another suitable unbound material (eg. a granular overlay).

1b. Engineering judgement is required on a case by case basis to assess the heavy vehicle traffic spectrum for the site against the specific basegrade pavement being considered.

2a. The sieve analysis is for the combined pavement granular and subgrade material, ie. the basegrade mixture, prior to the addition of any stabilising binder/s.

2b. The linear shrinkage and plasticity index values are for the combined pavement granular and subgrade material, ie. the basegrade mixture, prior to the addition of any stabilising binder/s. Both variables do not need to comply together. If either the linear shrinkage or plasticity index variable is found to satisfy the respective assigned limits, progression to the next stage is permitted.

3a/3b. Insitu CBR usually refers to an estimate onsite during an investigation (eg. with a dynamic cone penetrometer, or back calculated from deflection data). This variable is only for the untreated subgrade.

3c/3d. This is the proportion of the subgrade as a percentage of the total basegrade thickness to be stabilised, eg. If the design thickness is 250mm and the existing pavement thickness is 150mm, the subgrade proportion represents 100mm of the total basegrade thickness, or 40%.

4a. For soft subgrades where the insitu CBR<3%, the suggested trial mix design is intended to be a two phase process where phase 1 is an initial lime pre-treatment to a thickness of at least 300mm. Phase 2 occurs after at least 24 hours of amelioration (usually the next shift) to the design thickness which is intended to be at least 50-100mm less than the initial lime pre-treatment thickness. This is to enable the phase 1 treatment to produce a subbase, or buffer between the cement/flyash treatment and the soft subgrade during phase 2. Binder type and application rates for phase 2 are based on optimisation from the research outcomes. Adjustments can be made based on local knowledge and/or experience.

4b/4c. Two binder types and two corresponding application rates are provided to trial. These are based on optimisation from the research outcomes. One or both mix designs can be trialled.

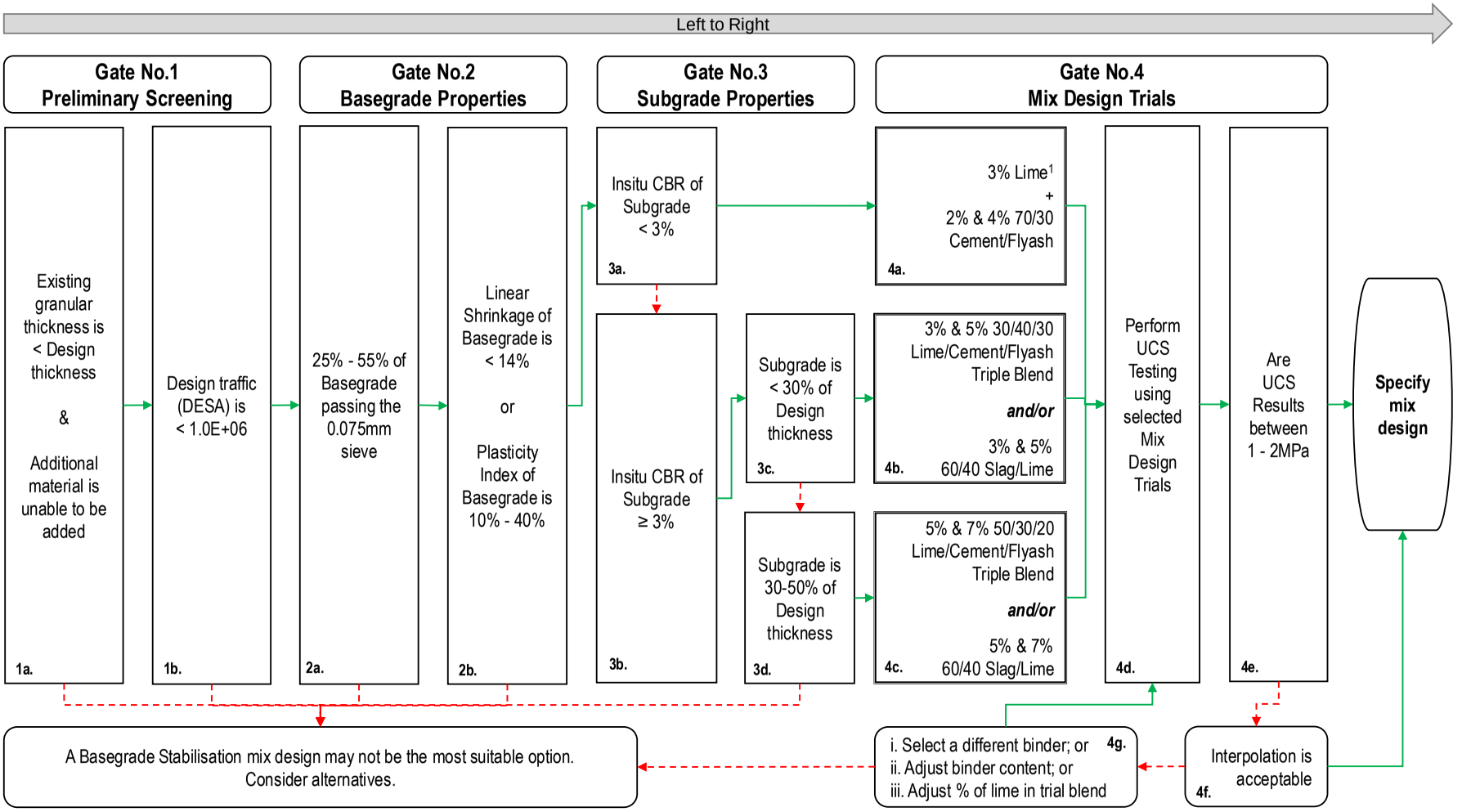
4d. UCS testing is recommended to be undertaken after 28 days of curing at ambient temperature in accordance with local government or state government jurisdiction test methods. Accelerated curing at raised temperatures to obtain results after 7 days may be undertaken in accordance where a test method exists (eg. Transport for NSW Test Method T131).

4e. Evaluation of a series of UCS results should be based on consideration of homogeneous lots, where the coefficient of variation does not exceed 30%. Typically the mean result from a series of UCS test results is evaluated against the target strength range of 1-2MPa. Outliers should be investigated further as they may skew the data set.

4f. Where UCS results are outside the target strength range of 1-2MPa, selection of a mix design application rate is permissible by interpolation from a plot of the results. Interpolation may not be considered suitable where all results are either below or above the target strength range (but not both). However forward or backward forecasting of trend lines with a moderate to strong coefficient of determination ($R^2 > 0.5$) may reveal adequate results.

4g. For option i. an adjustment to the binder type may produce different results (eg. the cement/flyash component of blends could be exchanged for a slag/cement.
For option ii. Adjustment of the binder application rate (%) may produce different results. A +/- 1% change in binder application rate may alter the UCS by +/- 0.25MPa to 0.5MPa.
For option iii. The lime content within the blends may be adjusted to produce different results (eg. 3% lime in the pre-treatment phase could be increased to 4%, or the 30/40/30 lime/cement/flyash triple blend could be adjusted to 40/40/20.

It is recommended that any adjustments to trial mix designs are done one at a time so that changes in results can be attributed to a single variable.



1. Minimum 24 hours amelioration period recommended prior to addition of 70/30 cement/flyash.