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SMARTRAIL MODELLING

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AIM

- To predict differential settlement over a certain length of track under dynamic train loading

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APPROACH

- Iterative approach used; feedback mechanism where the development of differential settlement increases the level of dynamic loading etc
- Properties of the track bed (ballast particularly) degrade with trafficking which will accelerate differential settlement

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STEPS (1)

1. An initial surface profile will be defined (using HSTRC data)
2. A fleet of representative vehicle models will be defined
3. A time increment for the simulation will be defined
4. Initial properties of the track-bed structure will be defined (eg stiffness etc)

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STEPS (2)

5. Dynamic train/track simulation performed and differential settlement resulting from a single pass of each representative vehicle model calculated
6. Total differential settlement for increment calculated by multiplying differential settlement due to a single pass by the number of representative vehicles

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STEPS (3)

7. Rail profile updated by subtracting total differential settlement from the initial profile
8. Properties of the track bed structure updated based on the amount of differential settlement

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STEPS (4)

9. Steps 5, 6 and 7 are repeated with the updated surface profile and track bed structure for the next increment until the simulation is terminated.

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VALIDATION

- Output from the track model converted into SD (35m length) given by HSTRC
- Predictions matched to HSTRC records
- Only sites where reasonably good information is available will be selected (FWD, ballast condition, traffic, maintenance history)
- Calibration as required

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