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NIF Infrastructure Zig Zag Tunnel Update



5 June 2017



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EXISTING FUNDING & SCOPE, OPTIONS FOR CHANGE

Released under NSW GIPA Act 2009

Existing Funding & Scope

Budget:

██████ (Un-escalated P90 cost) approved by FIC on 10/10/2016.

Scope:

Route Clearance to suit Medium Kinematic Rolling Stock from Springwood to Lithgow was approved in FIC paper on 10/10/16, including:

- Single Line Running on the Up track (KE+100) only through the Zig Zag tunnels, with no rolling stock passing whilst NIF is in the tunnels.

Exclusions:

- Signalling solution.
- Any adjustment to track.
- OHW modifications.
- Resolving existing non compliances.
- Modifications to services route.

Scope of Works – Typical Cross-Section

Revised Options Summary

[illegible]



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RSDEG MEETING – 18/05/17 ENDORSED OPTION 2

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Option 2 - Scope

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Standards Amendments

Option 2 solution will need to be supported through updating the standards – typically as follows:

- I [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
- I [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]

Construction Options for Option 2

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[illegible]



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CONSTRAINTS

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Constraints

Constraints	Current CABC	Endorsed Option 2
[REDACTED]	<ul style="list-style-type: none">[REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED]	<ul style="list-style-type: none">[REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED]
[REDACTED]	<ul style="list-style-type: none">[REDACTED][REDACTED][REDACTED][REDACTED][REDACTED]	<ul style="list-style-type: none">[REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED]
[REDACTED]	<ul style="list-style-type: none">[REDACTED][REDACTED][REDACTED]	<ul style="list-style-type: none">[REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED][REDACTED]

Age Group	Should Take Action (%)	Should Not Take Action (%)
18-29	85	15
30-49	85	15
50-69	85	15
70+	85	15

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[REDACTED]

[illegible]

Rolling Stock Impacts

- The NIF contract and ASA standards specify a Medium Electric Static outline, and standard kinematic parameters (2 degrees body roll, 60mm lateral displacement).
- It has been identified that passing clearances would be acceptable if reduced kinematic parameters can be achieved and maintained by the NIF train (e.g. 1.5 degrees body roll, 50mm lateral displacement) under certain operating conditions.
- Dynamic modelling is being undertaken to simulate the NIF train during transit through the slab track of the Zig Zag tunnels, to determine:
 - Actual kinematics of the vehicle with a range of operating parameters (e.g. operating speed, track defects)
 - A set of reduced operating parameters (ASA track maintenance standards and/or operating speed) which would allow the NIF train to comply with the required kinematic outline for the life of the fleet.
- The new parameters would be used as input to new or updated ASA standards, which would then be a TfNSW requested variation to the NIF contract (requiring agreement with RailConnect).
- Verification of actual performance will be complex.

RSDEG Required Next Steps

Further comments and discussion by the RSDEG:

- **NOTED** that the NIF project team to consider:
 - innovative solutions to minimise impact on freight and commuters.
 - the total train journey times.
- **ACTION:** NIF project team to develop a paper recommending Option 2 to Peter Regan, Deputy Secretary, Finance and Investment Division and Tim Reardon, Secretary for approval.
- **ACTION:** NIF project team to provide a status update to the RSDEG Meeting on a fortnightly basis
- **ACTION:** NIF project team to provide Data Sheets to RSDEG members

New Intercity Fleet: Enabling Works – Passage of Medium Rolling Stock Through the Zig Zag Tunnels – Forward Strategy

Issue

A two-part paper for the purposes of:

- A. Providing the NIF PCG and TfNSW Executive with an insight into the existing passing clearances through the 10 Tunnel Deviations (aka Zig Zag Tunnels or Lithgow Tunnels) on the Blue Mountains Rail Line.
- B. Seeking endorsement to pursue an alternative strategy to that of the existing Contract Award Business Case of single line running for the NIF. The alternative being to clear both sides of the tunnels to allow two NIFs to pass each other, effectively providing dual line running of the NIFs.

Management Sponsors

Murray Harris Project Director, New Intercity Fleet Infrastructure and Services

Recommendation

It is recommended that PCG:

- 1. Under Part A, **NOTE** that based on modelling, the current rolling stock passing clearances within the Zig Zag tunnels do not comply with the ASA Track Standard, ESC 215 and,
- 2. Under Part B, **ENDORSE** the proposed alternate strategy of dual line running for the NIF trains through the Zig Zag tunnels.
- 3. Under Part B, **ENDORSE** the provision of additional extended closures as the preferred delivery method, to achieve completion for NIF deployment.

Background

Part A.

- 1. ESC 215 currently mandates for all rolling stock, a contingency of 200mm around the Kinematic Envelope (KE), i.e. KE+200
- 2. The attached modelling undertaken by the subject matter expert WSP Parsons Brinckerhoff, indicates that passing clearances as low as 21mm above the KE, i.e. KE+21, currently exist when two Narrow Non Electric (NNE) rolling stock pass each other through the tunnels
- 3. To date there have been no reported incidents within the Zig Zag tunnels involving any rolling stock contact while passing

Part B.

- 4. It is possible by considering rolling stock manufacturing and life cycle maintenance, reduced KE contingency and improved track conditions (the latter

two achieved through the application of concessions and tighter maintenance regimes) this will enable two NIFs to pass each other, and NIF to pass Narrow Non-Electric rolling stock, through the tunnels, noting that the outcome of the investigation is dependent on many factors, including the simulation of the NIF rolling stock to determine its kinematic performance in consideration of the track condition limits proposed and actual track geometry, and under what operating conditions (speed) this is achieved, and whether this is operationally feasible, the feasibility of maintenance of the track condition to the required tighter limits, the feasibility of the rolling stock suspension design to guarantee this performance, and what maintenance limits need to apply over the life of the rolling stock to achieve this.

Supporting Comments

Part A.

The alternate strategy that is being proposed will not worsen the current non-compliance issues with ESC 215 surrounding the existing rolling stock.

Part B.

To continue with the proposed alternate strategy, i.e. dual line running of the NIFs, the following will be required:

- I. approval for the investigation of the alternate strategy (dual line running), noting that any further delay in this approval may further impact completion, as construction work can only be undertaken during designated track possessions
- II. a significant drawdown of project and or program contingency, with corresponding cost and benefit analysis and FIC Approval, to fund further passing clearance studies, a new concept design for the tunnels, new costing, new planning approval, revised contracting strategy workshops, new construction staging and construction as well as potential rolling stock contract variations; noting
 - a. The impact of the revised design is unknown, however it is expected that milling works will be required on all 10 tunnels;
 - b. Staged delivery has also been assessed;
 - c. The cost of the CABC single line running was estimated at [REDACTED] (TOC including contingency) and full tunnel clearance (no concessions) was estimated at [REDACTED] (TOC including contingency). Further dual line running with train to train clearance for a NIF and NNE passing with no concessions, cost was estimated at [REDACTED] (TOC including contingency) – refer to Original Options.
 - d. It is reasonable to expect the cost of two side tunnel clearance (with no train to train clearance works (track slewing)) to be in the range of [REDACTED]
- III. acceptance that the revised Zig Zag tunnel portion of the project delivery schedule and therefore the deployment of the NIF from Mt Victoria to Lithgow, could be delayed by approximately 20 months (from 18/5/2020 to 18/1/2022) if

works are conducted based on the current calendar for possessions and close downs – refer to the attached Summary Schedule.

A review of possessions with subsequent planning for longer possessions and close downs will improve the delivery schedule to achieve current NIF deployment to Lithgow, but this will have a greater impact on passenger and freight services – refer to Revised Summary Schedule, and note the following:

- a. No tunnel works can take place with live overhead wiring, meaning that it is not possible to run electric services during any of the closure / closedown scenarios;
 - b. Implications of revised delivery options have not been costed, however it is likely that restricting access will prolong the construction duration, which will increase the delivery costs.
- IV. engagement by FS&P and I & S with the Freight Industry on the manageability of the related close downs
 - V. a review by I&S Integrated Planning and NSW Trains of alternate interim passenger services between Mt Victoria and Lithgow due to the delay in the deployment of the NIF associated with item (ii) above
 - VI. progress discussions with RailConnect on rolling stock design and maintenance specification requirements with a view that any required changes to the specification will need to be instructed through a formal variation of the contract
 - VII. initiate and progress discussions with ASA and Sydney Trains Engineering and Maintenance to confirm the revised Zig Zag tunnel track maintenance regime that is required (and in consideration of any rolling stock changes described above) for the life of NIF operations.
 - VIII. conclude any changes to current standards by ASA

Attachments

- (i) Passing Clearance Model Tabulation
- (ii) Passing Clearance graphs
- (iii) Summary schedule
- (iv) Revised summary schedule
- (v) Original Options for Mt Victoria to Lithgow