Before the Expert Consenting Panel

under: the Fast-track Approvals Act 2024

in the matter of: applications for resource consents and archaeological authorities and notices of requirement by the New Zealand Transport Agency Waka Kotahi to develop a rapid transit link and associated infrastructure and connections between Brigham Creek and Auckland City centre, alongside State Highway 16, known as 'North West Rapid Transit'

applicant: **New Zealand Transport Agency**
Requiring Authority and Applicant

Second Statement of Evidence of Gregory Maitland Sheppard for New Zealand Transport Agency Waka Kotahi

Dated: 9 July 2026

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SECOND STATEMENT OF EVIDENCE OF GREGORY MAITLAND SHEPPARD FOR NEW ZEALAND TRANSPORT AGENCY WAKA KOTAHI

1 My full name is Gregory Maitland Sheppard. I am the author of the Assessment of Groundwater and Settlement Effects (*Groundwater Assessment*).[1] I am also the author of the statement of evidence dated 3 June 2026 addressing groundwater-related aspects of the comments from National Trading Company of New Zealand Limited and Restaurant Brands Limited (*First SOE*).

2 My qualifications and experience are set out in the Groundwater Assessment. I reaffirm the Code of Conduct statement set out in the Groundwater Assessment.

3 My evidence has been prepared to support the New Zealand Transport Agency Waka Kotahi's (*NZTA*) response to comments on its notices of requirement (*NORs*) and application for resource consents and archaeological authorities (*Application*) for the North West Rapid Transit Project (*Project or NWRT*).

SCOPE OF EVIDENCE

4 My evidence responds to Technical Specialist Memo – Groundwater dated 18 May 2026 authored by Mr Richard Simonds (*Groundwater Memo*) at Appendix 19 of the Auckland Council comments.

GROUNDWATER DRAWDOWN AT POINT CHEVALIER STATION AND FRED TAYLOR DRIVE

5 The Groundwater Memo says:

> It is my opinion that the proposed works may not meet AUP (OP) Standard E7.6.1. 10 (3) at the location of the proposed Point Chevalier station, as the maximum unmitigated drawdown at the proposed Designation Boundary is predicted to be greater than 2.0 m. It is also my opinion that the proposed works may not meet AUP (OP) Standard E7.6.1. 10 (3) at the location of the proposed Fred Taylor Drive underpass.

Point Chevalier Station

6 The Groundwater Assessment assessed potential groundwater drawdown and settlement based on a conservative scenario (ie assuming unrestricted groundwater seepage to excavations). As noted in the Groundwater Assessment, the final design is likely to include pre-installed secant pile walls or diaphragm walls for ground support that will limit groundwater seepage to excavations.

7 As set out in my First SOE, I have undertaken a revised groundwater drawdown assessment for the Indicative Design at Point Chevalier adopting a less conservative "leaky" secant piling scenario.

[1] Attachment 6.16 – Assessment of Groundwater and Settlement Effects.

8 As the final design of the retaining walls is unknown, I adopted a conservative secant pile wall design incorporating 0.6 m diameter piles with a nominal hydraulic conductivity of 1E-8 m/s, which allows for minor discontinuities or imperfections in the secant piling that may have potential to leak (ie a "leaky" secant piling scenario). For comparison, the secant piling design adopted for a nearby recent project[2] (located in similar geological formations near Point Chevalier) adopted secant pile walls of 0.9 m diameter and a hydraulic conductivity of 1E-10 m/s, which for the purposes of a dewatering assessment is practically impermeable. The "leaky" secant piling scenario I adopted has an approximately two orders of magnitude greater equivalent conductance,[3] and therefore still remains relatively conservative.

9 Figure 1 shows the modelled water levels for the original unmitigated scenario (orange) and the "leaky" secant piling scenario (blue). In the "leaky" secant piling scenario, the maximum groundwater drawdown is approximately 0.4 m, with approximately 0.2 m of drawdown at the Proposed Designation boundary. I consider this drawdown is well within natural seasonal variation and will not result in consolidation settlement.

10 In the event that the final Project design is deeper than the Indicative Design and advances further below the water table, I consider the use of secant piling or similar ground support can effectively mitigate against groundwater drawdown and settlement.

11 In my opinion, the final design of the Project (which is likely to incorporate pre-installed secant pile walls or diaphragm walls where necessary) will ensure the Project will not cause groundwater drawdown that exceeds 2 m at the Proposed Designation boundary, and, as indicated above, any groundwater drawdown is likely to be substantially less than 2 m.

[2] Tonkin and Taylor, 2025. *Motions Catchment Improvement, Groundwater and Settlement Assessment of Effects*. Report prepared for Watercare Services Limited, August 2025.

[3] The ability of a material to transmit groundwater taking into consideration hydraulic conductivity and thickness.

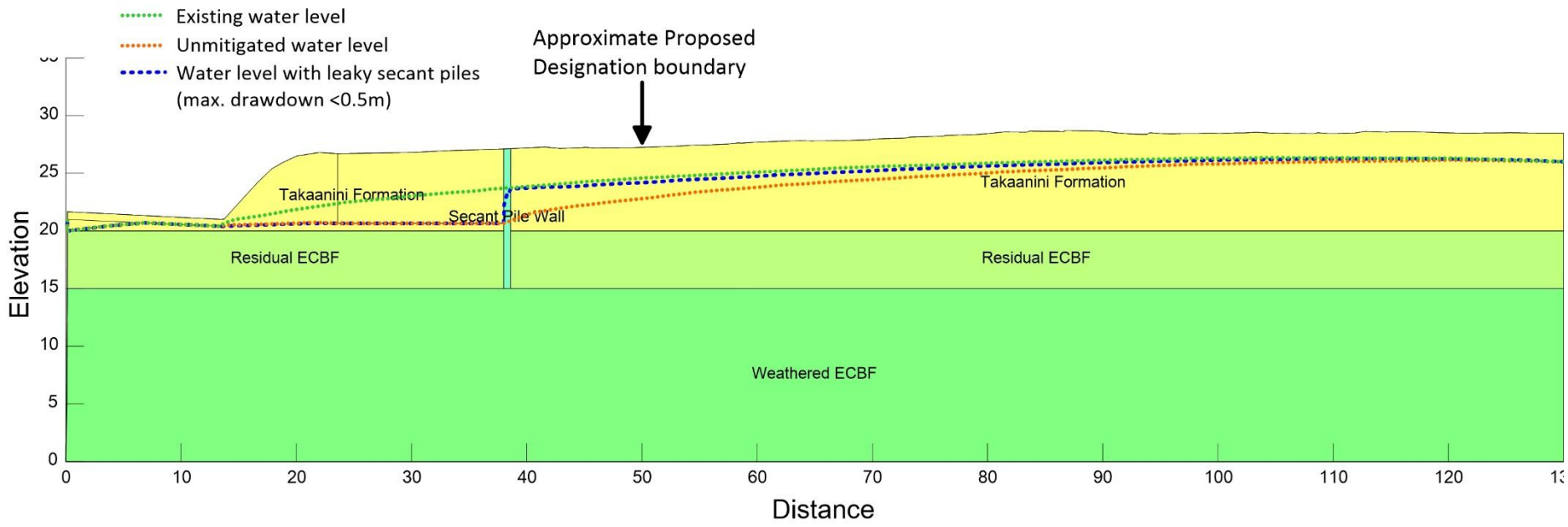

Figure 1 – Groundwater drawdown at the Point Chevalier station for the unrestricted groundwater seepage and the "leaky" secant piling scenarios

Fred Taylor Drive underpass

12 In my opinion, the Project is unlikely to encounter the water table in the vicinity of the Fred Taylor Drive underpass, and therefore it will not result in any groundwater drawdown beyond the Proposed Designation boundary. My reasons for this conclusion are:

12.1 Approaching from the north (Profile 1, Figure 2), the busway starts to gradually decline below the existing ground level to the west as it approaches Westgate Station. However, the design elevations remain above groundwater levels observed at BH012, at approximately 35 mNZVD; and

12.2 To the north of Fred Taylor Drive (Profile 2, Figure 2), the busway is at similar elevation to ground to the west. To the east, the existing motorway is up to 3 m lower than the busway; and

12.3 South of Fred Taylor Drive (Profile 3, Figure 2) the busway is approximately 3 m below the existing ground level to the west (2.5 m below the lowest point). To the east, the existing motorway is up to 3 m lower than the busway. The design level for the busway is similar to ground elevations further north and south of Profile 3 either side of Fred Taylor Drive; and

12.4 Further south of Fred Taylor Drive, the Indicative Design busway is at grade (see Profile 4 in Figure 2 below).

12.5 As such, groundwater is not anticipated to be encountered.

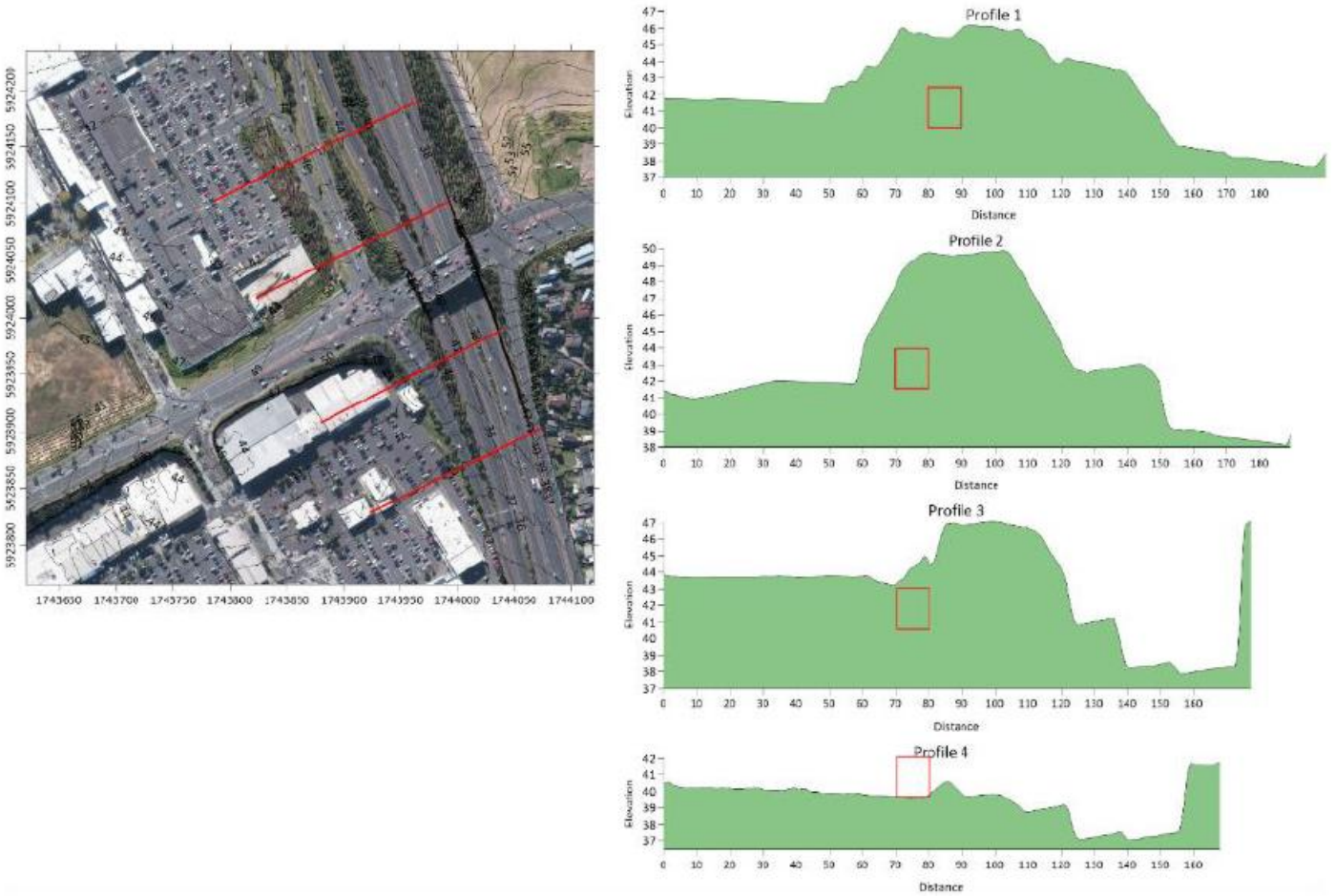

Figure 2 – Profile view of the Indicative Design at the Fred Taylor Drive underpass *The green shading represents the existing ground profile, based on the Auckland Part 1 LiDAR 1m DEM (2024). The base of the red rectangles represents the elevation of the Indicative Design at each profile. Profile locations are indicated on the adjacent aerial image from north (Profile 1) to south (Profile 4).*

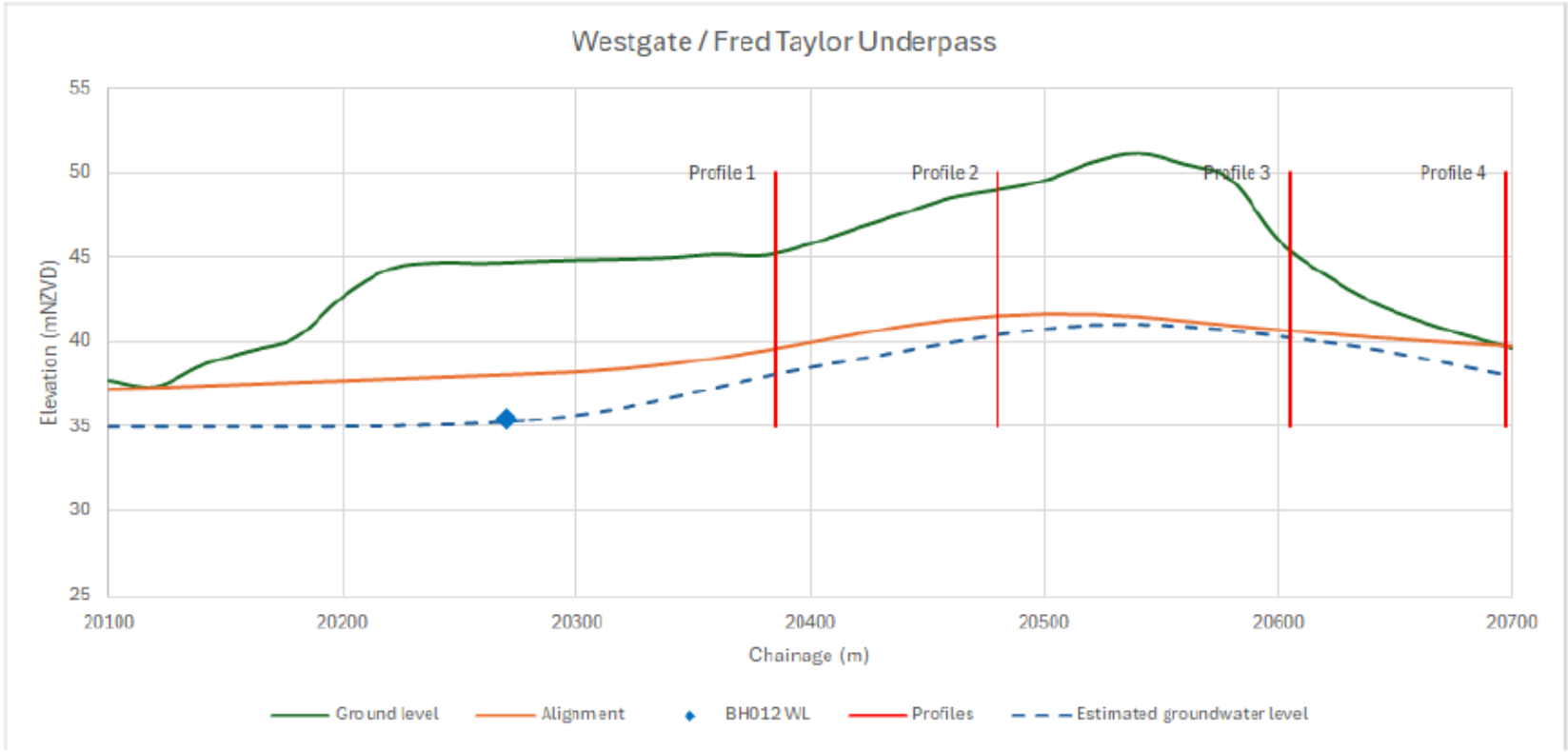

Figure 3 – Westgate Station to Fred Taylor underpass long-section

13 A long-section from Westgate Station and incorporating the Fred Taylor Drive Underpass is shown on Figure 3 above, and also shows the locations of the profiles and the observed groundwater elevation at BH012. The existing motorway to the east and the low-lying ground to the south of Fred Taylor Drive, combined with the observed groundwater levels to the north (BH012) limit the potential groundwater elevation in the vicinity of the underpass. If groundwater is encountered, it would most likely be associated with a localised elevated or perched water table that would not result in appreciable propagation of groundwater drawdown. Interception of a localised elevated or perched water table is unlikely to result in drawdown greater than 2 m at the Proposed Designation boundary, even under the unmitigated scenario.

14 As the Fred Taylor underpass is proposed to be constructed as cut and cover, it is possible that the full length of the underpass can be piled prior to excavation with appropriate staging and traffic management. In this case, the depth of the final design would not make a significant difference to potential drawdown at the Designation Boundary. A deeper design is more likely to encounter groundwater but as indicated for the Point Chevalier scenario, design features will effectively mitigate against groundwater drawdown and settlement.

GROUNDWATER LEVEL INFORMATION IS SUFFICIENT

15 The Groundwater Memo says:

> It is my opinion that the assessment of groundwater drawdown at the proposed Fred Taylor Drive underpass, undertaken by the Applicant's Hydrogeologist – Greg Sheppard from Jacobs New Zealand, is invalid, because it is not informed by measured groundwater levels in a standpipe piezometer in an appropriately located borehole.

16 In my opinion, I have sufficient information on the groundwater levels in the vicinity of the Fred Taylor Drive underpass based on interpretation of ground elevations surrounding the underpass and observed groundwater levels at BH012. This interpretation indicates that the potential for encountering elevated groundwater levels that would result in significant drawdown propagation is low, as is risk to the surrounding environment from drawdown or consolidation settlement effects, even when considering the unmitigated scenario.

17 I do not consider a borehole in the exact location of the Fred Taylor Drive underpass to be necessary for the assessment of groundwater and settlement effects. I have sufficient information to apply hydrogeological judgement and the potential risk to surrounding buildings is very low as I have explained above.

GROUNDWATER ASSESSMENT DOES NOT NEED TO ASSESS MECHANICAL SETTLEMENT

18 The Groundwater Memo says:

> Furthermore, it is my opinion that the entire assessment of the settlement effects, undertaken by Jacobs, is incomplete, because the assessment only relates to the effects of consolidation settlement and no assessment of mechanical settlement has been undertaken.

19 For typical soils and residual soils likely to be encountered within the Proposed Designation, mechanical settlement would generally be of smaller magnitude and more localised than potential consolidation settlement due to dewatering.

20 Empirical methods, such as Clough & O' Rourke (1990)[4] provide observational relationships for evaluating soil movements. Clough & O' Rourke (1990) report the following relationship for vertical settlement in settlement in stiff clays and residual soils for diaphragm retaining walls:

> *Maximum vertical movement (mm) = retained height (m) x 0.15%*

Under this relationship, for a 6 m high retained wall, the maximum settlement adjacent the wall would be of the order of 9 mm. Mechanical settlement also diminishes relative rapidly away from the excavation. Clough & O' Rourke (1990) demonstrate that for well braced retaining walls, mechanical settlement approaches zero at a distance of approximately 1.5 times the depth of excavation, or less.

21 It is noted that the empirical relationships referred to above are based on averages from numerous observations and that retaining structures can be designed for better performance. It is normal engineering practice for this matter to be addressed during detailed design of retaining walls.

22 For retaining walls that are intended as a structural component of a station building for example, tolerances for lateral deflection would be considerably stricter than for free-standing retaining walls and the resulting mechanical settlement would also be less.

23 As a result, I do not consider that cumulative settlement is likely to be materially different from that presented in my evidence. Accordingly, I consider the Groundwater Assessment is complete.

[4] Clough, G.W., and O'Rourke T.D., 1990. *Construction Induced Movements of Insitu Walls*. In Proc. ASCE Design Performance Earth Retaining Struct., eds. P. C. Lambe and L. A. Hansen, pp. 439–470. Ithaca, NY, June 18–21.

GROUNDWATER ASSESSMENT IS VALID

24 The Groundwater Memo says:

> … it is my opinion that the assessment of effects on third party assets (such as buildings, structures and public and private services), undertaken by Jacobs, is invalid.
>
> In addition, I note that no conditions have been proposed in relation to the Water Permit, nor a draft Ground Settlement Monitoring and Contingency Plan (GSMCP) prepared, which I consider to be significant omissions.

25 Overall, I consider that the Project is of low risk to groundwater and that groundwater effects beyond the Proposed Designation will typically be minor or less, even for the 'unmitigated scenario'. However, ground support would be used for deeper excavations as a matter of standard engineering practice. Accordingly, I consider my assessment of effects on third party assets as being less than minor is both reasonable and valid.

26 I acknowledge that NZTA has proposed conditions of consent in relation to total settlement and total differential settlement. In my opinion these conditions are appropriate and will ensure that the potential effects of groundwater drawdown and settlement beyond the designation boundary are appropriately managed through proposed design responses.

CONCLUSION

27 I consider the Groundwater Assessment is valid and any risk of groundwater drawdown and consolidation settlement can be effectively managed through design.

Gregory Maitland Sheppard
9 July 2026