Before the Expert Consenting Panel

under: the Fast-track Approvals Act 2024 (*FTAA*)

in the matter of: notices of requirement and applications for resource consents, wildlife approvals and archaeological authorities by the NZ Transport Agency Waka Kotahi to develop the Brynderwyn Hills section of the Alternative to the Brynderwyn Hills Project, a state highway from the intersection of State Highway 1 and Baldrock Road in the south, through the Brynderwyn Hills to Waipū in the north.

applicant: **NZ Transport Agency**

Requiring Authority and Applicant

Statement of Evidence of Warren Bird for NZ Transport Agency Waka Kotahi

Dated: 28 October 2026

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STATEMENT OF EVIDENCE OF WARREN BIRD

INTRODUCTION

1 My full name is Warren Stanley Bird.

2 I hold a Bachelor of Engineering (Civil) from the University of Canterbury. I am a Chartered Member of Engineering New Zealand and a Chartered Professional Engineer in the practice field: Water Engineering.

3 I am employed as a Technical Principal – Stormwater in the Earth, Environment and Water business of WSP (NZ) Limited, based in Auckland. In this capacity I am responsible for providing consultancy services, predominantly in the field of stormwater management, as well as supporting other professionals engaged in these activities.

4 My professional experience spans a total of 43 years. The first third of my career was spent with a small urban/rural local authority, working in all the diverse fields that that entailed: water supply, wastewater and stormwater disposal, urban flood protection, roading and traffic management, building and subdivision control and refuse landfill management. I have spent the last 29 years working for two different Auckland consultancies predominantly in the field of stormwater management in its many forms.

5 A significant part of my career has involved the drainage design of linear projects such as railways and state highways. I have been involved in the design of more than 40 arterial road design projects. Key among these was my leadership of drainage design for the Waikato Expressway Huntly Section and for tender design associated with Transmission Gully. I was Stormwater Technical Lead for the Auckland City Rail Link, and I also presented stormwater evidence before the Board of Inquiry in relation to the Peka Peka to North Ōtaki Expressway.

6 My evidence has been prepared to support NZ Transport Agency Waka Kotahi (*NZTA*) as part of the response to comments on the notices of requirement and applications for resource consents, wildlife approvals and archaeological authorities (together, the *Application*) to develop the Brynderwyn Hills section of the Alternative to the Brynderwyn Hills (*Project*), a state highway from the intersection of SH1 and Baldrock Road in the south, through the Brynderwyn Hills to Waipū in the north.

7 I have been involved in the Project as Stormwater/Hydrology Lead since 2024. I am the co-author of the Assessment of Operational

Stormwater and Flooding Effects (*Flooding Assessment*) lodged on 8 April 2026 in support of the Project.[1]

CODE OF CONDUCT

8 Although this matter is not before the Environment Court, I confirm that I have read the Environment Court's Code of Conduct for Expert Witnesses in its Environment Court Practice Note 2023. I agree to comply with that Code. My qualifications as an expert are set out above. I confirm that the issues addressed in this brief of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

9 My evidence addresses comments received on the operational stormwater and flooding conditions from:

9.1 Northland Regional Council (*NRC*);

9.2 Patuharakeke Te Iwi Trust Board (*Patuharakeke*); and

9.3 Te Parawhāu ki Tai (representing Te Parawhau and Te Pouwhenua o Tiakiriri Kukupa Trust) (*Te Parawhau*).

PART B: RESPONSE TO COMMENTS

10 In this section, I will address comments from NRC, Patuharakeke and Te Parawhau on the flooding, operational stormwater and culvert conditions for the Project. In particular, I address comments relating to:

10.1 Climate change and rainfall scenarios for flood modelling;

10.2 Restrictions on flood level increases outside the Proposed Designation at non-habitable buildings;

10.3 Flood modelling requirements and reporting;

10.4 Operational stormwater design requirements;

10.5 Permanent culvert design requirements; and

10.6 Provision of ecological passage and its interface with stormwater infrastructure.

[1] Vol B, Appendix D11 – Assessment of Operational Stormwater and Flooding Effects (*Stormwater and Flooding Assessment*).

The climate change / rainfall scenarios for flood modelling are currently appropriate

11 In its comments, Patuharakeke seek amendments to the conditions that require flood modelling to be undertaken for different Average Recurrence Interval (*ARI*) events[2] and to incorporate a different design end year (ie the 50-year ARI event and extending 100 years from when the Project becomes operational).

12 Flood modelling to date has been based on climate change in accordance with RCP6.0 to the year 2110 (ie approximately 75 years following the Project's expected opening).

13 In terms of climate change scenarios, in an ideal world, we would model climate change 100 years from the opening of the Project. However, even the world's most eminent climate scientists are unwilling to predict climate change scenarios that far into the future and so published data is not presently available for 100 years out. What Patuharakeke are requesting would require those implementing the conditions to make estimates about what climate change scenarios might be 100 years after operation of the Project commences. I do not consider it appropriate to expect engineers implementing conditions to make estimations about such a climate change scenario without having this data available. Accordingly, I consider retention of an express climate change scenario to be appropriate.

14 The net effect of not modelling climate beyond 2110 is that the highway's level of service may be lower in 100 years' time if further resilience measures are not implemented. I consider that level of service is principally an owner choice rather than a consenting matter. With respect to flooding of others, since we are dealing with the *difference* between two otherwise equivalent scenarios, I do not consider there will be a markedly different outcome regardless of whether the basis of comparison is 2110 or 2140.

15 NZTA's conditions already require modelling of the 1% AEP (ie 100-year ARI) event with allowance for RCP6.0 climate change to 2110 (which is what the indicative design has been based upon). I consider this is the appropriate scenario to determine whether there is compliance with the flood level increase restrictions in the conditions.

[2] Storm events are normally described by their Annual Exceedance Probability (AEP), the probability of an event of a given magnitude occurring or being exceeded in a single year. The same event can also be described by its Average Recurrence Interval (ARI), the statistical number of years between events of equal or greater magnitude. Thus, a 1% AEP storm is the same as a 100-year ARI storm. Stormwater specialists typically prefer using AEP notation as it reinforces that the event could occur in *any* year.

16 As part of the Flooding Assessment, we also modelled two other scenarios to illustrate the range of potential effects:[3]

16.1 The 10% AEP (ie 10-year ARI) event in conjunction with RCP6.0 climate change to the year 2110; and

16.2 The 1% AEP (ie 100-year ARI) event in conjunction with RCP8.5 climate change to the year 2110. This represents a high-range, more-extreme climate scenario.

17 I consider the three modelled scenarios are appropriate and provide a good picture of flood behaviour. The Flooding Assessment includes the results of these three scenarios and demonstrates that flood effects are largely contained within the Site or are quite minor.

18 In my opinion, assessing the 50-year ARI flood as requested by Patuharakeke adds nothing useful to this picture and is therefore not warranted. To illustrate this, Table 1 below shows typical 6-hour rainfalls for a variety of return periods and climate change scenarios, with the already-modelled scenarios noted in red. I have found from experience that rainfall is the biggest factor that drives flood flow and therefore flood levels.

Table 1 – 6 hours of rainfall, Ahuroa River in the Brynderwyns

	Historical (noCC)	RCP6 / 2110	RCP8.5 / 2110
1% AEP (ie 100-year ARI)	137.0	169.5	192.1
2% AEP (ie 50-year ARI)	122.0	150.4	170.3
10% AEP (ie 10-year ARI)	88.6	108.3	122.1

19 You will see that the 2% AEP (ie 50-year ARI) rainfall figures lie between two existing modelled scenarios. The results can also be expected to lie between those two already-modelled scenarios, which we know are acceptable. As the 1% AEP (ie 100-year ARI) event, which NZTA's conditions require modelling against, shows the 'worst-case' outer envelope of effects, I see little benefit in modelling the 2% rainfall separately.

[3] In modelling we often call these "sensitivity trials": trials to define the envelope of likely effects and to assess how outcomes may vary if one parameter is changed. They are intended to aid understanding rather than to be the basis of conditions.

20 In summary:

20.1 The quantum of flooding is always lower for the 2% event than for the 1% event;

20.2 The difference between with- and without-Project scenarios might occasionally be greater for a smaller event, but always remains a small number; and

20.3 I consider that requiring modelling for a scenario 100+ years in the future and for the 50-year ARI event is unnecessary as it would not change the outcome of the assessment.

Non-habitable buildings

21 In its comments, NRC raised concerns with only habitable buildings being beneficiaries of the proposed restrictions on flood level increases as a result of the Project.[4] Instead, NRC seeks that non-habitable buildings also benefit from such limitations.

22 In addressing this matter, my starting point is the NZ Building Code (*Code*), which provides restrictions on surface water entering buildings:

> E1.3.2 *Surface water*, resulting from an event having a 2% probability of occurring annually, shall not enter *buildings*.

23 Clause E1.3.2 includes the following limitation to such restrictions, so that they only apply to certain types of buildings:

> Performance E1.3.2 shall apply only to *Housing, Communal Residential* and *Communal Non-residential buildings*.

24 These types of buildings are defined in the Code as follows:

> *COMMUNAL RESIDENTIAL*
> *3.0.1 Applies to buildings or use where assistance or care is extended to the principal users. There are two types:*
>
> *3.0.2 Community Service*
> *Applies to a residential building or use where limited assistance or care is extended to the principal users. Examples: a boarding house, hall of residence, holiday cabin, [backcountry hut,] hostel, hotel, motel, nurses' home, retirement village, time-share accommodation, a work camp, or camping ground.*
>
> *3.0.3 Community Care*
> *Applies to a residential building or use where a large degree of assistance or care is extended to the principal users. There are two types:*
> *(a) Unrestrained; where the principal users are free to come and go. Examples: a hospital, an old people's home or a health camp.*

[4] Comments from Northland Regional Council (*NRC Comments*) on conditions at Condition RC56.

(b) Restrained; where the principal users are legally or physically constrained in their movements. Examples: a borstal or drug rehabilitation centre, an old people's home where substantial care is extended, a prison or hospital.

4.0 COMMUNAL NON-RESIDENTIAL
4.0.1 Applies to a building or use being a meeting place for people where care and service is provided by people other than the principal users. There are two types:

4.0.2 Assembly Service
Applies to a building or use where limited care and service is provided. Examples: a church, cinema, clubroom, hall, museum, public swimming pool, stadium, theatre, or whare runanga (the assembly house).

4.0.3 Assembly Care
Applies to a building or use where a large degree of care and service is provided. Examples: an [early childhood education and care centre], college, day care institution, centre for handicapped persons, kindergarten, school or university.

25 In essence, these definitions provide categories of buildings where flooding needs to be avoided for safety reasons – either because large numbers of people may be present or because vulnerable people may be present (children, disabled and the elderly but also anyone whether able-bodied or not who sleeps there).

26 By contrast, the Code is largely permissive for commercial and industrial buildings with respect to flooding. Such buildings may receive a flood hazard notation on their title under sections 71-73 of the Building Act 2004, and they may be subject to District Plan rules around hazards. But these matters aside, there is little to prevent a commercial or industrial building being constructed in a flood zone.

27 In my opinion, it is overly onerous to apply a restriction on flood level increases intended for habitable buildings to a hay barn, garage, wood shed or other non-habitable building. It would also be onerous to require a consent holder to apply a zero-change condition to an ancillary, commercial or industrial building. Further, these types of buildings do not present the same 'risk-to-life' as habitable buildings, and therefore I do not consider NRC's proposed amendment appropriate.

Flood modelling requirements and reporting

28 In this section, I will address comments from Patuharakeke, Te Parawhau and NRC on the Project's flood level restrictions, modelling and reporting requirements.

Flood level restrictions apply for appropriate times and locations

29 In its comments, Te Parawhau has sought that:

29.1 Flood effects are considered both inside and outside the Proposed Designation boundary; and

29.2 Flood effects should be managed for all phases of the Project, including construction.

30 Flood effects inside the Proposed Designation boundary have been assessed through the design process, but given NZTA is assumed to take control of the properties and environment within the boundary prior to construction of the Project, I do not consider it necessary to impose flood restrictions inside the Proposed Designation.

31 I do not consider it necessary to impose specific restrictions on flood level increases during construction. I understand that NZTA's construction water expert, Mr Graeme Ridley, is comfortable that any effects from erosion and sediment control associated with stormwater discharges from the Project during construction will be appropriately managed.

32 I further note that culverts are typically built early, ahead of any accompanying earthworks, meaning that the associated flow modifications from the Project will occur similarly early, and therefore any flood effects will fairly quickly take the form modelled. Prior to that time, earthworks will be lower-level or non-existent, so floodwater will overflow and return to its former path.

Modelling is the most appropriate way to determine compliance with restrictions on flooding level increases

33 In its comments, NRC has sought the conditions be amended to

> …include condition that requires that the works do not result in the flooding effects specified in RC55(a) and (b), rather than just a requirement to provide a report demonstrating that the specified effects will not occur.

34 The best tool currently available for assessing potential flood effects is a computer-based hydrologic/hydraulic model. All computer models have limitations, some arising from their numerical representation of reality, and some arising from the amount of effort or detail that can be practicably built-in (which often requires simplification to manage model build effort and computer run-time).

35 If we accept that a hydraulic model is the best tool, the second question is "when is the best time to carry out modelling?" Logically, the more advanced the design, the better the model is able to predict the final flood effects. NRC appear to be seeking one of two things, either:

35.1 modelling to be carried out post-construction to prove that the conditioned effects won't occur; or

35.2 a total restriction on the conditioned effects if they were to ever occur.

36 I see little benefit in modelling after construction has taken place. This is because:

36.1 If the constructed Project is consistent with the modelled design, there will be minimal change in flooding;

36.2 It is difficult (and often impossible) to change major drainage elements of large-scale infrastructure (eg culverts changed into bridges or enlarging culvert sizes) after construction.

37 In my opinion, modelling to confirm compliance with flood-level restrictions should follow completion of detailed design immediately prior to construction. This modelling will provide a high level of confidence in actual flood outcomes before construction reaches a point of no return. At this time the relevant modelling personnel are still on-board and have the ability to initiate late design changes should any unacceptable flood effects be identified.

Culvert requirements are appropriate

38 Patuharakeke have requested that all culverts be required to provide fish passage. In my view, generalising all culverts in this way will be expensive (and in some circumstances not possible) and therefore should not be required without clear justification. I understand Dr Keesing will speak to the ecological considerations for culverts.

39 There are also some culverts where fish passage may be impractical. This will typically be because the culverts are so steep that it would be impossible to manage water velocities or drop heights, or retain natural substrate in the base of the pipe. I support providing fish passage where it is shown appropriate but also see the need for retaining the "where practicable" condition caveat for the few culverts that present severe physical constraints.

40 Te Parawhau has sought that all culverts should meet Regulation 70 of the Resource Management (National Environmental Standards for Freshwater) Regulations 2020. I note that Regulation 70 covers permitted activities. The Project cannot always comply with the requirements of these regulations (and is seeking consent for such purposes), so I do not see why it would be appropriate to impose a requirement to comply with such permitted activity criteria.

Operational stormwater design requirements will appropriately manage effects

41 Both Te Parawhau and Patuharakeke have sought amendments to NZTA's proposed conditions in relation to the management of stormwater runoff from the operational highway. I address each in turn below.

Te Parawhau proposed amendments

42 Te Parawhau proposed revised Conditions RC50-51. Their proposed RC51(i) reads:

> (i) Where constructed wetlands or wetland swales form part of the stormwater treatment system, specialist freshwater ecological advice confirming how those systems have been designed to protect and maintain freshwater values and ecological function.

43 From their proposed conditions, Te Parawhau appear to agree that constructed wetlands are one of the best and most appropriate stormwater treatment mechanisms. They use natural wetland plants and processes to remove contaminants. However, these are not *natural* wetlands; they are engineered and optimised for the purpose of treating stormwater. Treatment wetlands are also *not* habitat features; even though fauna may choose to occupy them, they will need to be cleaned out (ie destroyed) every decade or so. Adding extra layers of specialist oversight on top of what is already recognised as best practice is superfluous, and the objectives sought are at least partially inconsistent with what is necessary for the functioning of an engineered stormwater wetland.

44 I consider Te Parawhau's additional clauses RC52(a)-(d) superfluous, as any stormwater system that does not meet these matters would be non-compliant with NZTA's proposed conditions anyway.

45 Te Parawhau have sought additional clauses RC54(a)-(f) to provide assurance of how the stormwater system will be operated and managed long-term. I consider these additions are unnecessary, as they are implicit in the wording of NZTA's proposed conditions, and any failure in these areas would already result in non-compliance with the conditions.

Amendments proposed by Patuharakeke

46 Patuharakeke have sought a requirement for the Stormwater Detailed Design Report (*SDDR*) to be provided at least 40 working days before the start of Project Works. I do not agree with this amendment. I see real value in compiling the SDDR fairly late in the design process. Operational stormwater features are usually constructed late in the construction process, perhaps the final year of a 4-5 year construction period. Confirming this design later allows it to respond to any refinements made throughout the broader construction process.

47 The indicative stormwater design already provides confidence that suitable stormwater measures are feasible for the Project and therefore the SDDR should provide confidence to the Council that the final design is fully compliant. This is why the conditions currently require the SDDR to be submitted to Council "40 Working

Days before construction of the permanent stormwater management system".

48 I am much less comfortable with the timeframes proposed by Patuharakeke, as they would create a 3-4 year interval before the stormwater devices are built, during which time numerous minor changes may arise.

49 In their proposed amendments to the requirements for the operational stormwater system in Condition RC50, Patuharakeke raise several issues requiring further comment.

50 Patuharakeke propose adding a requirement in Condition RC50(b) for the operational stormwater system to be "hydraulically neutral". I interpret this to mean that for a range of storms, small to large, the runoff from the Project should be no greater than the pre-Project state. For larger storms, this is unnecessary as flood modelling has already shown that flood effects from these events are small. For smaller storms, extended detention is already proposed to minimise stream scour effects. To provide additional flood detention to meet a hydrologic neutrality requirement would add substantial additional costs with negligible flood-related benefits because the flood effects are already shown to be small (and NZTA's proposed conditions require additional modelling to confirm that the final design also does not cause material flooding).

51 Patuharakeke propose an additional requirement, Condition RC50(c), requiring the system to "remove greater than 75% of Total Suspended Solids". I note that NZTA has agreed to incorporate a requirement to achieve 75% TSS removal on a long-term and annual average basis. However, the *'greater than'* component of what Patuharakeke has sought creates a difficult and expensive new obligation.

52 Removal of contaminants is an imprecise process that varies from site to site and day to day, depending on flow, pH, temperature and numerous other factors. Published standards are based on an expectation that compliant and well-maintained devices will achieve 75% sediment removal on a long-term average basis. To provably achieve a better standard would require the addition of an extra treatment process, or moving to a more "industrial" form of treatment, either of which would add considerable cost with diminishing benefits.

53 Patuharakeke's proposed Condition RC50(e), which would require the detailed design to "contain sediment drop-out zones such as forebays, sediment traps or sediment chambers", also raises difficulties. These features are standard on treatment wetlands, but they are not generally feasible on swales that are fed continuously along their length. I consider Patuharakeke's proposal should be denied, as forebays are already specified in the relevant best

practice guidelines when they are appropriate and should not be a blanket requirement applied to the Project's whole stormwater system.

54 Patuharakeke's proposal that stormwater devices should be protected from a 50-year ARI flood event creates major difficulties. To operate via gravity, stormwater devices need to be below road level at their inlet point. This means they will sometimes flood but, so long as this takes the form of gentle inundation without scouring or resuspension, I consider this is acceptable. To set all stormwater devices above the 50-year flood level would require the highway itself to be raised in numerous places, involving considerable additional earthworks and considerable cost. Alternatively, it would require road runoff to be pumped to higher-level devices, which is undesirable, due to the ongoing power, maintenance and operational requirements, as well as the risk of failure at critical times.

55 I accept that it is undesirable for treatment devices to be inundated too often or for too long. However, I do not consider a specific limitation is required in the conditions as a Suitably Qualified Person will make suitable provision as part of any stormwater system design, and the effects of occasional brief, gentle inundation will be negligible.

CONCLUSIONS

56 In my opinion, the indicative design is consistent with best-practice design standards, and will appropriately mitigate stormwater-related environmental effects. The indicative design has been tested using a flood model, which shows that flood effects outside the Proposed Designation are sparse and negligible. These outcomes will be secured through NZTA's proposed conditions of consent.

57 Several submitters seek greater specificity in the stormwater-related conditions of consent. In my opinion, most of these changes tend to add bulk and complexity without delivering enhanced environmental outcomes. In some cases, they expand requirements to an extent that is impractical or illogical.

58 NZTA has engaged with submitters and, where agreement has been reached, has incorporated submitters' requests into the Project's proposed conditions. I support these proposed conditions.

Warren Bird
28 October 2026