

Technical Specialist Memo - Groundwater

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| To: | Warwick Pascoe – Premium Project Lead Celia Wong – Senior Planner, Resource Consents Louise Barclay & Jo Hart – Senior Planners, Notices of Requirement |
| From: | Richard Simonds - Principal Engineering Geologist – Fraser Thomas Ltd |
| Qualifications & Relevant Experience: | I hold the qualification(s) of: Bachelor of Science in Geology, Master of Science in Engineering Geology and have forty years of experience in engineering geology and groundwater assessments. I am a Chartered Member (PENGEOLOGIST) of Engineering New Zealand. I have prepared expert evidence and technical assessments for resource consent and fast-track applications, and have appeared as an expert witness before consent authorities and the Environment Court. I worked as a Senior Specialist at Auckland Council in the NRSI Team from 2015 to 2019, reviewing applications for dewatering and groundwater diversion. Since 2019, whilst at Fraser Thomas Limited, the majority of my work has been supporting Auckland Council by reviewing applications for dewatering and groundwater diversion. |
| Preparation in Accordance with the Code of Conduct: | I confirm that I have read the Environment Court Practice Note 2023 – Code of Conduct for Expert Witnesses (Code), and have complied with it in the preparation of this memorandum. I also agree to follow the Code when participating in any subsequent processes, such as expert conferencing, directed by the Panel. I confirm that the opinions I have expressed are within my area of expertise and are my own, except where I have stated that I am relying on the work or evidence of others, which I have specified. |
| Date: | 18 May 2026 |

1.0 APPLICATION DESCRIPTION

Application and property details

Fast-Track project name:

North West Rapid Transit

Fast-Track application number:

FTAA-2511-1146

Council Resource Consent Reference:
WAT60461586 (Groundwater)

Site address:

Generally alongside State Highway 16 between Brigham Creek and Auckland City Centre

- NWRT_Part 6_5_Property Schedule_Land within designation boundary and
- NWRT_Part 6_6_Property Schedule_Land adjacent to the designation boundary)

2.0 Executive Summary / Principal Issues

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.

It is also my opinion that the proposed works **do not meet** AUP (OP) Standard E7.6.1.10 (5a) because the distance to any existing building or structure (excluding timber fences and small structures on the boundary) on any adjoining site from the edge of any trench or open excavation that extends below the natural groundwater level, must be at least equal to the depth of the excavation.

The Application does not include the above reasons for consent, which I consider to be significant omissions.

I also note that an indicative cut/fill plans or information relating to the depth and extent of proposed excavations have not been provided; and therefore, I am not able to confirm whether the assessment of groundwater drawdown has been undertaken at the critical sections.

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.

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.

For these reasons above, 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.

3.0 Documents Reviewed

- Preliminary engineering drawings titled “*Northwest Rapid Transit Indicative Design – General Arrangement*”, prepared by Jacobs New Zealand, Sheets 01 to 10, Revision A, dated 28 November 2025.
- A report titled “*Te Ara Hauāuru –Northwest Rapid Transit – Assessment of Groundwater and Settlement Effects*”, prepared by Jacobs New Zealand, dated 15 December 2025.
- A report titled “*Te Ara Hauāuru –Northwest Rapid Transit – Assessment of Ecological Effects*”, prepared by Ian Bredin of AECOM New Zealand, dated 15 December 2025.
- A report titled “*Te Ara Hauāuru –Northwest Rapid Transit – Part 2: The Project*”, prepared by NZ Transport Agency Waka Kotahi, dated 15 December 2025.
- A report titled “*Te Ara Hauāuru –Northwest Rapid Transit – Part 4 - Resource Management Act 1991 Approvals*”, prepared by Helen Hicks and Karyn Sinclair, dated 15 December 2025.
- A document titled “*NWRT Fast Track Approvals Act Application – Auckland Council Comments on Groundwater Assessment*”, prepared by NZTA, dated 8 May 2026.

4.0 Additional Reasons for Consent Not included in AEE (Resource Consent only)

AUP (OP) Standards

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.

It is also my opinion that the proposed works **do not meet** AUP (OP) Standard E7.6.1.10 (5a) because the distance to any existing building or structure (excluding timber fences and small structures on the boundary) on any adjoining site from the edge of any trench or open excavation that extends below the natural groundwater level must be at least equal to the depth of the excavation.

The Application does not include the above reasons for consent, which I consider to be significant omissions.

I note the Applicant is not applying a consent in relation to NES:FW 45 (4a to 4c) on the basis that the indicative alignment is not located within close proximity to the identified natural inland wetlands. I do however note that, as the indicative alignment may be altered within the Proposed Designation Boundary, a consent in relation to NES:FW 45 (4a to 4c) may be required if the indicative alignment is revised.

5.0 Specialist Assessment (Notice(s) of Requirement and Resource Consent)

Review of “The Jacobs GA Report”

The purpose and scope of “*The Jacobs GA Report*” was to evaluate the actual and potential effects of the Project on the environment in relation to groundwater and settlement considerations.

Jacobs has developed numerical groundwater models to simulate hydrological conditions at the approximate locations of significant excavation works, generally associated with the proposed stations or underpasses, for the purpose of evaluating the effects of groundwater drawdown and potential consolidation settlement. The models have been developed using groundwater monitoring data from eleven standpipe piezometers, numbered BH001 to BH012 inclusive (noting that Borehole BH007 was removed from the programme), installed at distances of up to approximately 260 m from the significant excavation works assessed.

The groundwater monitoring was completed between June 2025 and October 2025 and the results are considered to be representative of wet-winter groundwater levels. A range of in-situ permeability tests have also been undertaken to inform the hydrological model.

Consolidation settlement associated with the proposed groundwater-related activity has been predicted using conventionally acceptable methods.

Jacobs **has not** provided an assessment of the predicted mechanical settlement associated with the construction of proposed retaining structures; however, he has provided the following comment:

“Mechanical settlement is typically limited to within close proximity to the excavation compared to consolidation settlement due to drawdown, and will generally be constrained within the Proposed Designation boundary. In areas where excavations are closer to the Proposed Designation boundary, such as at Point Chevalier station and Royal Road station, lateral deflection of secant pile or diaphragm retaining walls can be managed through design; by increasing wall stiffness (pile diameter or wall thickness), incorporating ground anchors, and the use of lateral bracing. These construction and design options are commonly used to manage mechanical settlement and avoid settlement beyond acceptable tolerances.”

Jacobs concludes that:

“The maximum predicted settlement due to drawdown at the Proposed Designation boundary is approximately 6.5mm at Point Chevalier station.

The maximum predicted settlement at a building is approximately 6.5mm with a differential settlement of approximately 0.06%. This occurs at Point Chevalier station and the building in question is the heritage listed Auckland Savings Bank building at 1210 Great North Road. Refer to the Assessment of Built Heritage Effects report for discussion regarding the building’s heritage values.

It is noted that at Royal Road station, there are also buildings within approximately 14m of the proposed cut. However, the excavations at Royal Road station are within weathered ECBF as opposed to Takaanini Formation which has a greater strength and resistance to settlement, and the maximum predicted settlement at a building is only 2.6mm.

Based on this assessment, potential building damage due to settlement resulting from groundwater drawdown outside of the Proposed Designation boundary is in the negligible to very slight categories. Further, it is noted that the assessment of settlement due to groundwater drawdown assumes unrestricted groundwater seepage to excavations. In reality, the excavation

will be retained by secant pilings or similar that will act to restrict groundwater seepage and drawdown resulting in settlement.

Accordingly, in my opinion, potential settlement effects resulting from groundwater drawdown will be less than minor to negligible.”

Jacobs also comments on existing wetlands and states:

“While both of these exotic induced wetlands [located at 74 Trig Road, Whenuapai and Eric Armishaw Park, Point Chevalier] are within the Project Area, neither will be directly impacted by the Indicative Design and are away from areas of potential excavation and dewatering.”

I note that the location and extent of excavations may be revised within the proposed Designation Boundary, and therefore the proposed earthworks may be located within close proximity to natural inland wetlands.

In Section 5.2 of the Jacobs Report titled “*Sensitivity testing of Indicative Design*”, they state:

“I understand the Indicative Design may move within the Proposed Designation depending on the final design. The Proposed Designation allows for limited horizontal shifts of the Indicative Design and vertical shifts are also possible. Alternative designs could result in cuttings occurring in other locations across the Project Area or increases or decreases in existing proposed cut depths.

In my opinion, horizontal or vertical shifts to the Indicative Design within the Proposed Designation are unlikely to result in more than minor groundwater effects. This opinion is based on the low permeability of the formations and the limited propagation of drawdown resulting in settlement.

As noted earlier, my assessment is conservative, and in reality, I expect that the cuts will be retained by structural works such as secant piled or diaphragm wall retaining walls. In higher risk areas, where deep cuts are located closer to the Proposed Designation boundary and sensitive features such as buildings, those structural works will further act to limit groundwater seepage and drawdown propagation.”

In my opinion, the sensitivity testing undertaken by Jacobs in relation to the position of the Indicative Design, in particular in relation to any retained excavations below groundwater within the Designation boundaries, is **not valid**.

My reason for this opinion is that the total (mechanical settlement plus consolidation settlement) and maximum differential settlement as a result of worse-case scenarios, such as retained excavations below groundwater in close proximity to the Designation boundaries, together with third-party assets, such as buildings (including those that are heritage-listed where relevant), structures and public and private services, close to or adjacent to the Designation boundaries, have **not been assessed**.

Therefore, it is my opinion that based on the information provided with the Application, it is not possible to confirm if the settlement effects of the proposed activity are likely to have significant adverse effects on nearby buildings, structures and public and private services.

Review of Supplementary Information Provided by NZTA/Greg Shepherd

Following a review of a draft of this memorandum, NZTA and Greg Shepherd have provided additional comment regarding the assumed groundwater levels and have undertaken additional groundwater drawdown assessments at the Point Chevalier Station and Fred Taylor Drive Underpass.

I note that the additional assessment indicates that secant pile/diaphragm retaining walls are likely to be constructed to limit groundwater drawdown effects, however the requested information relating to the potential mechanical settlement effects associated with retaining wall deflection has not been provided.

It therefore remains my opinion that, without assessing the potential mechanical settlement associated with any retaining wall deflection, the assessment of settlement effects is incomplete and hence the assessment of effects on 3rd party assets, i.e. buildings, structures and infrastructure, is invalid.

Based on information provided with the Application and subsequently by NZTA/Greg Shepherd, I am still not able to confirm whether or not the settlement effects, associated with the proposed activity on neighbouring buildings, structures, infrastructure and services adjacent to, or in close proximity to, the designation boundary, where excavations and retaining walls are proposed, are less than minor.

Review of the Engineering Plans

We note that the preliminary engineering drawings titled “Northwest Rapid Transit Indicative Design – General Arrangement”, prepared by Jacobs New Zealand, Sheets 01 to 10, Revision A, dated 28 November 2025, do not include proposed cut/fill depths or details around the depth and extent of proposed earthworks.

Review of Assessment of Ecological Effects Report

Ian Bredin has identified two wetlands within the project area and several wetlands within 100 m of the project area.

Ian Bredin provides comment on the impact on the wetlands and states:

“While both exotic induced wetlands are within the Project Area, neither will be directly impacted by the Indicative Design and the Project is not seeking approvals for works in proximity of these.

Wetlands adjacent to the Project Area, include Wetland 2 (i.e., it extends beyond the Project Area), and a large wetland in the vicinity of 4-6 Hobsonville Road. This wetland is associated with Totara Creek and is dominated by Carex sp. with planted native and exotic vegetation along riparian margins. Historical imagery indicates this wetland has been significantly modified and the stream has been realigned.

The identified wetlands (Wetland 1 and 2) are considered to have Low to Moderate ecological value.”

As discussed above, I note that the location and extent of excavations may be revised within the proposed Designation Boundary and therefore the proposed earthworks may be located within close proximity to natural inland wetlands.

At the time of writing this Memo, I have identified the following information gaps:

Description of Missing Information:

1. An indicative cut/fill plan or information relating to the depth and extent of proposed excavations.
2. Identification of all potentially affected buildings, structures and services.
3. Appropriate groundwater monitoring levels for the proposed underpass excavation at Fred Taylor Drive.
4. An assessment of the effects of total settlement (i.e. consolidation settlement plus mechanical settlement) and differential settlement on buildings, structures and public and private services outside the Designation boundary.
5. Proposed conditions relating to the Water Permit.
6. An appropriate draft GSMCP with details of proposed settlement and groundwater monitoring, such as alert and alarm trigger levels for building settlement pins, groundwater alert levels and identification of buildings, structures and services that require pre and post construction detailed condition surveys/CCTV surveys.

Why is this Information Essential?

The absence of the above information significantly limits my ability to assess the effects as described below:

| Information gap | Nature of deficiency | Decision-making impact | Risk / uncertainty created |
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| 1. An indicative cut/fill plan or information relating to the depth and extent of proposed excavations has not been provided. | The extent and depth of significant cut earthworks is unknown. | I am not able to assess whether or not the settlement effects of dewatering and groundwater diversion are potentially adverse. | High/Potential for significant/critical excavations to occur within close proximity to the Proposed Designation Boundary for which the effects of the groundwater-related activity have not been assessed. |
| 2. Identification of all potentially affected buildings, structures and services. | Buildings, structures and services that may be affected have not been identified. | I am not able to assess the effects on potentially affected buildings, structures and services as they have not been identified. | Moderate/Potential for buildings, structures and services to be affected by the proposed activity which have not been assessed. |

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| <p>3. Appropriate groundwater monitoring levels for the proposed underpass excavation at Fred Taylor Drive have not been provided.</p> | <p>Borehole BH012, adopted for the assessment is located circa. 260 m from the proposed excavation and approximately 12 m lower than the ground level at the location of the Fred Taylor Drive underpass.</p> <p>The assessment of groundwater drawdown undertaken by the Applicant's Engineer – Jacobs, is invalid, because it is not informed by measured groundwater levels in standpipe piezometers in appropriately located boreholes. Hence the assessment of potential consolidation settlement on third party assets (such as buildings, structures and public and private services) undertaken by Jacobs is also invalid.</p> | <p>The assessment is invalid and therefore I am not able to assess whether or not the effects of dewatering and groundwater diversion are potentially adverse.</p> | <p>High / Potential for the groundwater levels at the cut location to vary from the assessed groundwater levels, resulting in potentially adverse effects. No monitoring is proposed to confirm the assumptions during construction.</p> |
| <p>4. An assessment of the effects of total settlement (i.e. consolidation settlement plus mechanical settlement) and differential settlement on buildings, structures and public and private services outside the Designation boundary.</p> | <p>The assessment of effects of the proposed activity is incomplete because no assessment of mechanical settlement has been provided.</p> | <p>I am not able to assess whether or not the total and differential settlement effects of dewatering and groundwater diversion are potentially adverse.</p> | <p>High/Potential for significant effect on structures located within close proximity to the retaining works outside the Designation boundary.</p> |
| <p>5. Proposed conditions relating to the Water Permit.</p> | <p>No conditions relating to the Water Permit have been provided.</p> | <p>I am not able to review the proposed consent conditions with respect to the proposed groundwater-related activity.</p> | <p>High /Potentially significant as the effects on third-party assets must be managed via conditions, which must include a Groundwater Settlement Monitoring and Contingency Plan (GSMCP), which has not been provided with the application.</p> |

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| <p>6. Requirement to prepare a Groundwater Monitoring and Settlement Contingency Plan (GSMCP).</p> | <p>The application information is incomplete.</p> | <p>I am not able to review the draft GSMCP document to confirm that adequate monitoring provisions and contingency measures will be adopted.</p> | <p>High/Potentially significant as the effects on third-party assets must be managed via conditions, which include a Groundwater Settlement Monitoring and Contingency Plan (GSMCP), which has not been provided with the application.</p> |
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7.0 Recommendations

I recommend that the Applicant:

1. Provide cut/fill drawings for the Indicative Design and identify critical cross sections for the settlement effects assessment - considering the deepest excavations, proximity to adjacent buildings, structures and public and private services.
2. Identify all buildings, structures and services that may be affected by ground settlement associated with the proposed activity.
3. Provide suitably conservative concept retaining wall designs and predictions of mechanical settlement associated with the deflection of the retaining walls for the critical cross sections.
4. Prepare annotated total (consolidation settlement plus mechanical settlement) profiles at the critical cross-sections. The profiles should be annotated with **maximum** differential settlement under neighbouring buildings/structures (including driveways /road reserves) and public and private services. The calculations of maximum differential settlement should be provided.
5. Prepare total settlement contour plans associated with the proposed excavations that are listed in Table 4.1 of “The Jacobs GA report” to present the extent of settlement beyond the Proposed Designation Boundary.
6. Provide an assessment of the effects of the predicted total and differential settlement on nearby third-party assets including buildings, structures, driveways /road reserves, public and private services.
7. Prepare a comprehensive draft Groundwater Settlement Monitoring and Contingency Plan (GSMCP).
8. Provide draft conditions relating to the proposed Water Permit.

8.0 Proposed Conditions (Resource Consent)

I have reviewed the proposed condition Conditions of Consent relating to the Resource Consent and note that no conditions have been provided for the Water Permit.

As outlined in Section 5.0, it is my opinion that, based on the information provided with the Application, it is not possible to confirm if the settlement effects of the proposed activity are less than minor. I am therefore unable to recommend appropriate Conditions of Consent for the Water Permit.

9.0 Supporting Documents

None