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Expert Panel

TO: Expert Panel considering Taharoa Ironsands Limited's substantive Fast-track application for the Central and Southern Blocks Mining Project

22 June 2026 WWLA0546

Taharoa Ironsands Limited Fast-track Application – Response to Comments from Invited Parties Relating to Hydrology

1. Introduction

Taharoa Ironsands Limited (TIL) has applied for all necessary approvals to continue mining of the Central and Southern Blocks at the Taharoa Ironsand mine (Application) under the Fast-track Approvals Act 2024 (FTAA).

Williamson Water & Land Advisory (WWLA) prepared the Lake Taharoa Hydrology Assessment[1] that was submitted as part of the Application. This report documented the lake water balance assessment undertaken to evaluate the potential effects of TIL's proposed water takes on lake water levels and hydrology.

The Expert Panel invited written comments on the Application from invited parties in accordance with section 53 of the FTAA, which have been submitted to the Panel.

The Panel also engaged Philip Kelsey (of Earthtech Consulting Limited) to advise it on hydrology and hydrogeology matters. Mr Kelsey has peer reviewed WWLA's Hydrology Assessment and prepared a report for the Panel dated 29 May 2026.[2]

This letter documents WWLA's response to comments received from invited parties regarding lake water levels and hydrology, and the report prepared by Mr Kelsey in respect of WWLA's Hydrology Assessment, on behalf of TIL. The response has been jointly prepared by Josh Mawer – Senior Hydrologist and Jon Williamson – Project Director and Principal Hydrogeologist and Hydrologist.

1.1 Qualifications and Experience

Josh Mawer

My full name is Joshua Carl Mawer.

I am a Senior Hydrologist at Williamson Water & Land Advisory. I hold a Master of Science (MSc) Degree with first class honours, majoring in Earth and Ocean Sciences, from the University of Waikato.

I have approximately 12 years of work experience at environmental consultancies in New Zealand, Australia, and the United Kingdom. My specific experience related to this project

[1] Appendix I – Hydrology Assessment: WWLA. Lake Taharoa Hydrology Assessment. Report prepared for Taharoa Ironsand Limited. WWLA0546. Rev 5.

[2] Technical Peer Review Report No. 1 For Fast Track Application Ftaa-2512-1153 – Appendix I: Hydrology Assessment.

include: numerous mine water management plan and resource consenting assessments for BT Mining, lake water balance assessments for Lake Okaihau (for Muriwai Downs), and Lake Kereta (for Ed Donald), and a wide range of surface water take consent applications for agricultural, horticultural, and municipal use across the upper North Island.

Jon Williamson

My full name is Jonathan Lindsy Williamson.

I am a Hydrogeologist and Hydrologist with 30 years of specialist expertise in water resource management, bore engineering, and environmental impact assessments. I hold a Bachelor of Science (BSc) in Earth Science and a first-class honours Master of Science and Technology (MSc Tech (Hons)) in Hydrology and Geology from the University of Waikato.

My sector experience includes energy and infrastructure projects such as hydropower, wind, solar, and geothermal developments, as well as roads, tunnels, shafts, and wastewater systems, alongside work in the mining and agriculture sectors with a focus on mine water management and irrigation, and in water supply, covering both municipal and rural potable and non-potable systems.

Throughout my career, I have led diverse projects across the full lifecycle of water resource management, including data collection, field investigations, testing and modelling, as well as engineering design and construction contract management. I also have extensive experience in technical report writing, community consultation, and stakeholder engagement.

As a recognised expert in my field, I am highly experienced in joint witness conferencing and have appeared numerous times as an expert witness in New Zealand before local councils, the Environment Court, Boards of Inquiry, and EPA Fast-track legislation hearings.

1.2 Code of Conduct

The authors have read the Expert Witness Code of Conduct set out in the Environment Court Practice Note 2023. We have complied with the Code of Conduct in preparing this report. The content of the report is within our area of expertise, and we have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in the report.

2. Comments Received

Comments relating to lake water levels and hydrology were received from the invited parties outlined in **Table 1**.

Table 1. Comments from invited parties and technical review documents

Organisation		Author	Document Title
1	Waikato Regional Council (WRC) compiled by Mitchell Daysh Limited	Mark Chrisp (Mitchell Daysh) Sung Soo Koh (WRC)	TAHAROA IRONSANDS LTD CENTRAL AND SOUTHERN BLOCKS MINING PROJECT [FTAA-2512-1153] WAIKATO REGIONAL COUNCIL SECTION 53 COMMENTS UNDER THE FAST-TRACK APPROVALS ACT 2024 (Reference Appendix B – Hydrologist Review)
2	Te Nehenehenui	Sam Mikaere	Attachment A: Te Nehenehenui Comments on the Fast-track Approvals Act 2024 Substantive Application for Taharoa Ironsands Limited
3	Te Ruunaunga o Ngāti Mahuta ki to	Iarau Limited	Ngaati Mahuta Ki Te Hauaauru Taharoa Ironsands Limited

Organisation		Author	Document Title
	Hauaaruru Charitable Trust, Maketuu Marae, Te Kooraha Marae, and Aaruka Marae (Ngaati Mahuta ki te Hauaauru)		Substantive Application Under The Fast-Track Approvals Act 2024
4	Department of Conservation (DOC) – Hydrology Review	Collaborations – James Blyth	Taharoa Ironsands Limited (TIL) – Central and Southern Blocks – Fast Track Application Hydrology Review
5	Earthtech Consulting Limited	Philip Kelsey	Technical Peer Review Report No. 1 For Fast Track Application Ftaa-2512-1153 – Appendix I: Hydrology Assessment

DOC's comments were authored by James Blyth (Director and Water Scientist) of Collaborations Limited, and WRC's comments were authored by Dr Sung Soo Koh (Groundwater and Hydrology Scientist at WRC), who are suitably qualified experienced persons (**SQEP**) in this area. The technical peer review requested by the Expert Panel was undertaken by Philip Kelsey (Principal Hydrogeologist) of Earthtech Consulting Limited.

Te Nehenehenui and Te Ruunaunga's comments were not made by a SQEP.

In responding to the comments received, we have grouped them into the following topics:

- Lake water balance model configuration/assumptions;
- Scenario design and intensification of takes and modifications of lake levels;
- Dam low flow pumping triggers and cease take levels;
- Dam / lake related flooding; and
- Planning Framework / Regulations.

Comments for each topic are collectively addressed in the sub-sections below.

2.1 Lake Water Balance Model Configuration

Te Nehenehenui and the DOC raised questions regarding the lake water balance model configuration and assumptions made as part of the model development.

We provide responses to the key points raised in their comments below.

Te Nehenehenui – Section 7

Comment: Te Nehenehenui questioned the appropriateness of the assumption regarding the interconnected nature of the three lakes (Lake Taharoa, Lake Numiti, and Lake Rotoroa). Te Nehenehenui state the model treated all three lakes as a single hydraulic unit and noted they are unlikely to respond identically to abstractions from Lake Taharoa due to the hydraulic restrictions between the lakes.

Response: It is correct, in a hydraulic sense, that they would not behave identically. They would respond in a similar manner, albeit with a time delay and attenuation due to hydraulic restrictions (i.e., the connection via small channels). However, the model used for our assessment is a daily timestep water balance model, and not a hydraulic model. From an overall water balance perspective, it is appropriate for the purposes of a daily timestep lake water balance assessment to consider the three lakes as a single combined unit.

Te Nehenehenui – Section 9

DoC[3] – Section 4.1, Para 7 and 8

Earthtech – RFI16

Comment: Te Nehenehenui, DoC and Earthtech commented that the use of a combined weir overflow and lake seepage outflow to configure the lake outflow is a limitation of the model.

Response: It is correct that the lake outflow curve was configured as a combined weir overflow and lake seepage outflow. As noted in our assessment (Section 4.3.5, Paragraph 3), this was because there were no detailed as-built or survey plans of the weir in its current form or measurements of lake seepage. Thus, the two processes were combined and considered as a bulk calibration parameter.

Weir overflow and lake seepage rates are both head dependent (i.e., flow increases during high lake water levels and vice versa) and therefore it is a reasonable assumption to combine the two. For a water balance type assessment that was primarily aimed with simulating lake water (storage) levels, the distinction between seepage and weir flow is only a concern if you need to simulate/predict the two processes independently – which was not a specific requirement for this assessment.

Ultimately, the lake water balance model calibration period spanned 11 years and covered a range of high and low lake level periods. The accuracy that was achieved relative to measured water level data gives confidence the lumped outflow curve is representative.

Earthtech (RFI16) requested we use the available dam level record and weir construction information to develop a record of the Wainui Stream flow (downstream of the dam) to enable separation of Wainui Stream flow and groundwater seepage losses in the model.

While original construction drawings of the outlet weir are available, the weir has been modified and raised with the V-notch plates. The date and exact construction details of these modifications are unknown. TIL have not been able to accurately survey the current configuration of the weir due to difficult unsafe access requirements.

As indicated above, the specific objective of the lake water balance assessment was to simulate lake levels. In our opinion, being able to separate outflows via the Wainui Stream (i.e., weir flows) and lake seepage losses would not provide material benefit to this assessment. One of the key reasons behind this is because the overflow weir and seepage would combine in the Wainui Stream downgradient of the weir structure anyway.

DoC – Section 4.1, Para 7

Earthtech – RFI15

Comment: DoC & Earthtech noted that the catchment inflow / rainfall runoff model (the Soil Moisture Water Balance Model) was uncalibrated.

Response: It is correct to point out that the SMWBM was not calibrated to measured stream inflows because no such data were available. However, the SMWBM parameters were set based on indicative physical characteristics of the catchment, and in this instance the SMWBM is not a standalone predictive flow model, but a sub-component of the lake water balance model, with the lake water balance model calibrated to measured lake water levels. We consider this an

[3] Note: the references to DoC relate to Sections of the letter from Collaborations, prepared by James Bltyh, attached as Appendix A to DoC's comments.

appropriate approach considering the specific objective of the assessment was to simulate and assess lake water levels.

In specific response to the request from Earthtech to undertake streamflow gauging of the Mangatangi Stream (flows into the lake) and use this to calibrate the model, we note that whilst we consider there is benefit to collecting gaugings, this could not be achieved within the timeframe required to respond to comments.

Earthtech also suggested that the SMWBM does not accurately model the catchment water balance (i.e., river inflows) given the high simulated groundwater recharge component (31%) of the model. We acknowledge this is likely on the upper end of the spectrum and may be why periods of high lake levels (~ >10.3 m RL) were under-predicted by the model. However, we reiterate the specific objective of the assessment was to simulate lake levels, and the lake water balance model was calibrated to measured lake water level data.

The successful simulation of lake water levels was the key objective as lake level directly relates to lake storage volume and hence volumes of water available for abstraction. The lake water balance model achieves this objective.

DoC – Section 4.1, Para 7

Comment: DoC also noted a point regarding periods of missing data in the rainfall and evaporation record.

Response: This is a common issue in hydrological assessments due to the paucity of weather monitoring stations across the country – especially in remote areas such as Taharoa. We note in this instance periods of missing rainfall add a degree of conservatism to the assessment, as in actuality rainfall and resulting catchment inflows to the lakes would have likely been greater than simulated (if rainfall did occur during the periods of missing data as higher rainfall would result in higher catchment inflows compared to those simulated) – and this would result in a corresponding increase in lake level.

The use of monthly average evaporation data to infill missing periods is considered appropriate for a water balance type assessment as daily fluctuations in evaporation do not lead to large temporal fluctuations in short-term water balance (whereas variation in rainfall can do – e.g., a large storm event).

Concluding Summary in Response to DoC's Comments Regarding Model Configuration

Overall, the DoC hydrology reviewer considered the model generally appropriate for scenario testing of the Application's potential effects on the environment, but noted that there was a lack of monitoring data that, in his view, increases the uncertainty in model results.

As with all environmental modelling assessments, some degree of uncertainty is unavoidable due to the complexity of natural systems and limitations in available monitoring data. In our opinion, the residual uncertainty in lake water levels due to TIL's proposed abstractions and resulting environmental effects are appropriately addressed via the proposed lake trigger level conditions.

Condition 10 of AUTH14203.05.01, which requires TIL to implement management responses to reduce as far as practicable the water being abstracted from the lake and engage an ecologist to monitor and report on the health of the lake margin wetlands.

Furthermore, the proposed take has been operational for >50 years and has been assessed multiple times, so any residual uncertainty regarding effects must be de minimis if operations were allowed to continue.

2.2 Scenario Design, and Intensification of Takes and Modifications of Lake Levels

Te Nehenehenui – Point 8

Comment: Te Nehenehenui note that while ship loading abstraction remains capped at 3,000,000 m^3/year, the Application signals the intention to increase the number of ship loading events compared to earlier years and hence a more intensive operation regime. They recommend further details are provided regarding the lake level triggers.

Response: This is correct at a practical level and hence was reflected in the hypothetical water abstraction scenarios that we assessed. However, TIL is not proposing to increase ship loading abstraction limits or ship loading events beyond existing consented limits.

Please refer to the planning response prepared Grant Eccles (Tonkin & Taylor Limited) with regards to Te Nehenehenui's comment regarding a requirement to notify WRC and implement reductions when lake levels drop to 9.0 m RL, and to specify the required reduction in abstractions when lake levels drop to 9.6 m RL.

DoC – Section 4.1, Para 9

Earthtech – RFI17

Comment: DoC and Earthtech note the maximum consented daily abstraction of 75,000 m^3/day was not modelled and that the use of average abstraction rates in the scenarios does not simulate peak demand conditions. As such they conclude actual drawdown rates could be higher than assessed.

Response: The maximum consented abstraction rate of 75,000 m^3/day was simulated as part of the basecase /calibration scenario (Section 4.4 of the Lake Hydrology Assessment). Review of the simulated lake levels from this scenario (and actual historical measured lake level data) indicates occasional abstractions at the maximum rate (or close to it) do not result in substantial lake drawdown. The larger, longer duration drawdown events (which presumably are the ones of potential concern) occur as a result of the combined effects of lower catchment inflows during summer and the cumulative abstraction volume through the summer period.

Figure 1 presents a comparison of daily abstraction rates and measured lake levels, focusing on the period 2019 to 2021 (inclusive). This shows that lake levels do not drop for extended periods of time during periods of episodic high abstractions (i.e. >60,000 m^3/day). For example, between the period of summer from 1 November 2019 and 1 April 2020 there were nine days where abstractions exceeded 60,000 m^3/day. However, lake levels dropped only dropped by 400 mm to ~9.6 m RL. However, during the period 1 November 2020 to 1 April 2021, there were 17 days where abstractions exceeded 60,000 m^3/day, but lake levels only dropped by 200 mm to ~9.8 m RL.

The fact that the summer 2021 period had a higher minimum lake level than the preceding summer, despite having a greater number of days of abstractions exceeding 60,000 m^3/day, demonstrates lake levels are a balance between catchment inflows and cumulative summer abstractions, rather than periodic larger abstractions.

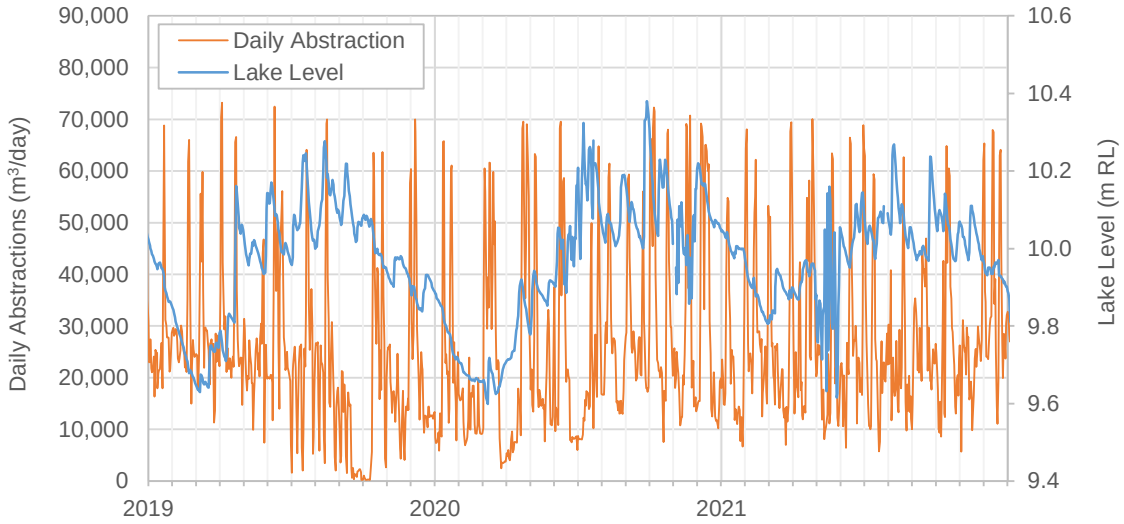

Figure 1. Comparison of measured lake levels and daily abstraction rates 2019-2021.

If TIL continuously abstracted ship loading water at the maximum rate of 75,000 m^3/day they would exhaust their annual limit of 3,000,000 m^3 in approximately 40 days. This is the equivalent of 10 ship loading events, assuming an average of 4-days per loading event. While TIL could abstract in this fashion under the consent conditions, it is not realistic given their intention to increase to an average of 35 ship loading events across one year.

As lake drawdown events are a function of lower summer inflows and cumulative summer abstractions from the lake, the use of average ship loading abstraction rates that sum to the annual volume limit is considered a more appropriate and realistic basis for modelling.

Our assessment utilised a Monte Carlo approach (i.e., random distribution) to distribute 35 ship loading events throughout the year, for each year of the simulation. This approach did reflect periods of more intensive summer ship loading events. Throughout the 35-year simulation, the number of ship loading events during the months of January to April (inclusive) ranged from 8 to 18, with an average of 12. Eighteen four-day long ship loading events is 72 days in total. Over the four-month period, that would leave on average only 2.6 days between each ship loading event. The scenarios as currently implemented are also conservative in the fact that they do not include any active management of the takes (i.e., reducing abstraction rates/volumes) when the 9.6 m RL trigger level is reached (which is currently proposed).

2.3 Dam Low Flow Pumping Triggers and Cease Take Levels

WRC[4] - Section 2.4

Comment: WRC agree with TIL's proposal to use a pump to sustain the minimum flow requirement immediately downstream of the dam (10 L/s), however suggest increasing the trigger levels slightly above the invert level of the weir (9.36 m RL) to 10 m RL so that flow is maintained rather than ceasing entirely.

Response: We note that Condition 4 of the proposed conditions for AUTH142032.02.01 already requires a flow of no less than 10 L/s to be maintained – so in effect this is already a requirement. We recommend that the trigger level to initiate pumping in the draft Lake Level and Water Management Plan (LL&WMP) is revised to 9.45m RL at the dam measuring site to reflect the initiation of pumping before flows would decrease to less than the required 10 L/s.

[4] Note: the references to WRC relate to Appendix B – Memo from Sung Soo Koh – Hydrology of WRC's report.

DoC – Section 4.4, Para 2

Comment: DoC noted an inconsistency between the draft LL&WMP and proposed consent conditions regarding the 9.6 m RL trigger level. The draft LL&WMP states a trigger level of less than 9.6 m RL for a continuous 30-day periods, whereas the relevant proposed consent condition (Condition 10, AUTH142035.05.01) does not specify a duration (i.e., appears to be an instantaneous trigger).

Response: The absence of reference to a continuous 30-day period in Condition 10 is an error. We recommend that Condition 10 is amended to reflect the requirement set out in the draft LL&WMP.

Te Nehenehenui – Section 8

Comment: Te Nehenehenui suggest re-imposition to notify WRC at RL 9.0 m and imposition of an additional requirement to notify WRC at RL 9.6 m. They also suggest that at RL 9.0 m the consent should specify further reductions in abstraction volumes.

Response: We note WRC have not requested any conditions requiring notification once a specified lake level is reached. Hence no notification requirement is proposed.

We do not consider a requirement that additional reductions in abstraction volumes are imposed at RL 9.0 m to be necessary. The proposed condition (Condition 10(b); AUTH142035.05.01) requires the consent holder to engage a suitably qualified and experienced ecologist to monitor and report on the extent and health of the wetlands on the margins of Lake Taharoa adjoining the Taharoa C Block if triggered by the lake level remaining below 9.6 m RL for a continuous 30-day period. The wetland monitoring programme (required by Conditions 8 – 10 of AUTH142035.05.01 and outlined in Section 2.5 of the Draft NIWBMP, Appendix DD) is designed to detect any shifts in wetland health. The consent conditions also set out required management responses to monitoring results. Consent condition 10(c) AUTH142035.05.01 requires the Consent Holder to review and update the LL&WMP to identify measures that can be implemented to address any identified adverse effects.

Therefore, an assessment of effects and identification of appropriate management responses are already initiated by the 9.6 m RL trigger level.

Earthtech – RFI20

Comment: Earthtech queries whether there were any alterations made to the dam/weir structure in 2022 as minimum lake levels appeared higher post this time.

Response: We are not aware of any alterations made to the dam/weir structure in 2022. The apparent higher minimum lake levels post this period is a function of catchment inflows and the abstraction regime over this period. Our lake water balance model simulated this response effectively.

2.4 Dam / Lake Related Flooding

WRC – Section 2.5

Comment: WRC acknowledge there is no active mechanism to control high lake level conditions without structural modifications to the dam and weir arrangements. WRC recommend that TIL should revisit the lake level record to provide further details on the depth of flooding on the road.

Te Ruunaunga o Ngati Mahuta Ki to Hauaaruru Charitable Trust also make brief mention of lake induced flooding in their comments, but do not provide any specific detail.

Response: As noted in Section 6.2 of our Hydrology Assessment, the low point of Taharoa Road is at approximately 10.5 m RL (TIL local datum). We have reviewed the daily average lake level data for the period 2013 through 2025 (a 13-year period) and there were nine events that exceeded 10.5 m. During these periods, the maximum depth across the road was approximately 0.45 m, and an average depth of 0.1 m across the nine events.

Flooding of the road also likely occurs as a function of intense rainfall and resulting high catchment flows, the location of the roading infrastructure, and would occur with or without TIL's operation and activities. In other words, the road is located at a topographical low point where upstream catchment floodwaters would cross irrespective of whether Lake Taharoa was present or not.

Earthtech – RFI19

Comment: Earthtech requested consideration of how a high-flow bypass of the dam structure could alleviate flood risk during periods of high lake level and a flood risk assessment on Taharoa Road including anticipated climate change impacts that could influence high intensity rainfall events over the next 50-years.

Response: The weir itself does not impede flow during high-flows, and effectively provides a high-flow bypass. This is because discharge rates through the weir increase as lake levels increase (rather than flow overtopping the dam). In that respect, no modifications are required in order to bypass high flows. Previous comments in relation to physical modifications of the weir or dam structure to alleviate potential flood risk were in relation active management of high lake level conditions (i.e., actively controlling lake level conditions).

Given the above, we do not consider a flood risk assessment considering climate change necessary.

2.5 Planning Framework / Regulations

Earthtech – RFI 18

Earthtech requested an explanation of which section of the Waikato Regional Plan the proposed abstractions are to operate under. We direct Earthtech to the Substantive Application report (Table 15.3) and to the planning response prepared Grant Eccles (Tonkin & Taylor Limited).

DoC – Section 4.2.1, Para 6

Earthtech – RFI 18

DOC and Earthtech have queried the relationship of the water take applications to the water allocation provisions of the Waikato Regional Plan. This query is addressed in the planning response prepared Grant Eccles (Tonkin & Taylor Limited).

3. Conclusion

A range of questions were received relating to the configuration of the lake water balance model, scenario design, and low flow or lake level trigger conditions. Whilst the majority of points raised were reasonable questions to ask, they do not materially change our position that the lake water balance model assessment is an appropriate tool for assessing the potential effects of TIL's proposed abstractions on lake levels. Our specific reasons for this are provided in the responses to individual points above (**Section 2**).

The minor amendments that have been recommended to the LL&WMP (e.g., the slightly increased trigger level for pumping over the weir), and the continuous 30-day period of lake levels below 9.6 m RL trigger (Condition 10) are not due to deficiencies in our assessment, but to address minor errors and provide consistency across the various project documents.

The comments received, and minor amendments proposed, have not materially changed our view that the lake water balance assessment is suitable, or altered the conclusions of our assessment of effects. We also reiterate that both WRC and DOC's reviewing hydrologists stated that the method and model utilised is considered appropriate.

We acknowledge that a degree of residual uncertainty exists, as is common with all environmental modelling assessments. In our opinion, the conditions proposed provide a robust contingency and appropriate environmental protection.

4. Sign Off

Yours sincerely,

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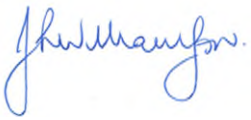

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