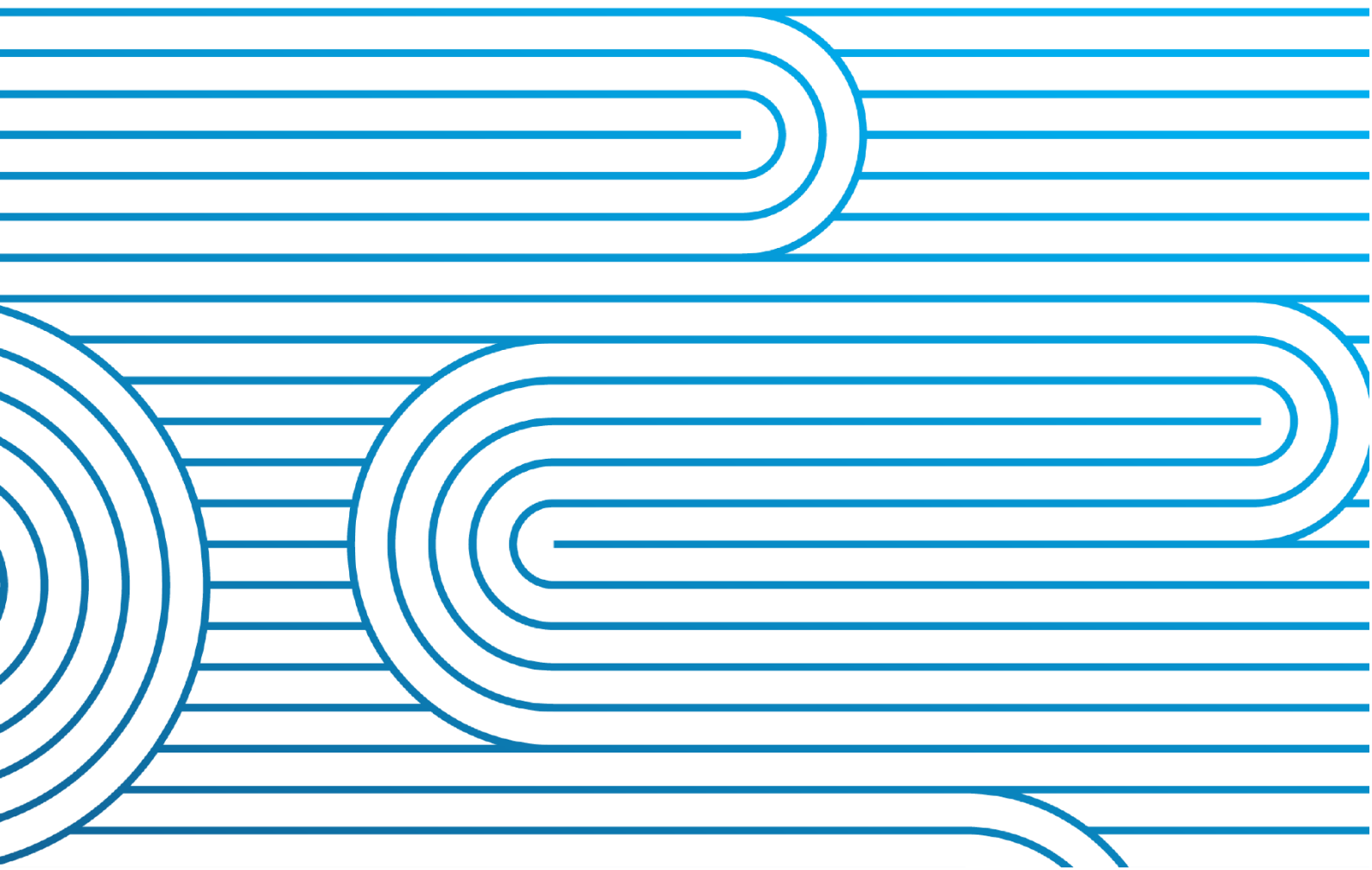


Causation Report 17th September Under-Frequency Event

System Operator event 4500

November 2024



IMPORTANT

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PURPOSE

On 17th September a reduction of energy into the power system caused the system frequency in the North Island to fall below 49.25 Hz, resulting in an under-frequency event.

Pursuant to clause 8.60 of the Electricity Industry Participation Code (**Code**), the System Operator investigated the event to assist the Electricity Authority (**Authority**) in determining a causer of the under-frequency event.

This Causation Report is provided to the Authority pursuant to clause 8.60(5) of the Code and includes the following:

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- The System Operator's recommendation of the causer of the under-frequency event.
- The System Operator's reasons for forming its view.
- The information considered in reaching this view.

EXECUTIVE SUMMARY

At 14:03:59 on 17th September 2024 Genesis Energy's Huntly Unit 5 tripped.

The disconnection of generation from Huntly Unit 5 removed 239.232 MW of injection into the power system.

At 14:04:01 the North Island frequency fell to 49.16 Hz. Either of the North or South Island frequencies falling below 49.25 Hz constitutes an under-frequency event, as defined in the Code.

Genesis Energy Limited has stated that it believes the tripping of Huntly Unit 5 was the cause of the under-frequency event on 17th September 2024.

Investigation into the tripping and other system events supports Genesis Energy Limited's position that the trip of Huntly Unit 5 caused the under-frequency event.

Accordingly, the System Operator recommends Genesis be found as the causer of the under-frequency event on 17th September 2024.

SYSTEM EVENTS – 17TH SEPTEMBER 2024

Prior to the under-frequency event

According to the Grid Owner, there were no other grid events or protection operations on any grid assets on 17th September 2024 that may have contributed to the frequency falling below 49.25 Hz. The Grid Owner confirmed that the HVDC responded to the event by reducing its south flow power, which is an action automatically taken to assist in resisting the North Island frequency dropping further.

The under-frequency event

According to Genesis Energy Limited Huntly Unit 5 tripped on high drum level protection due to high feed water flow.

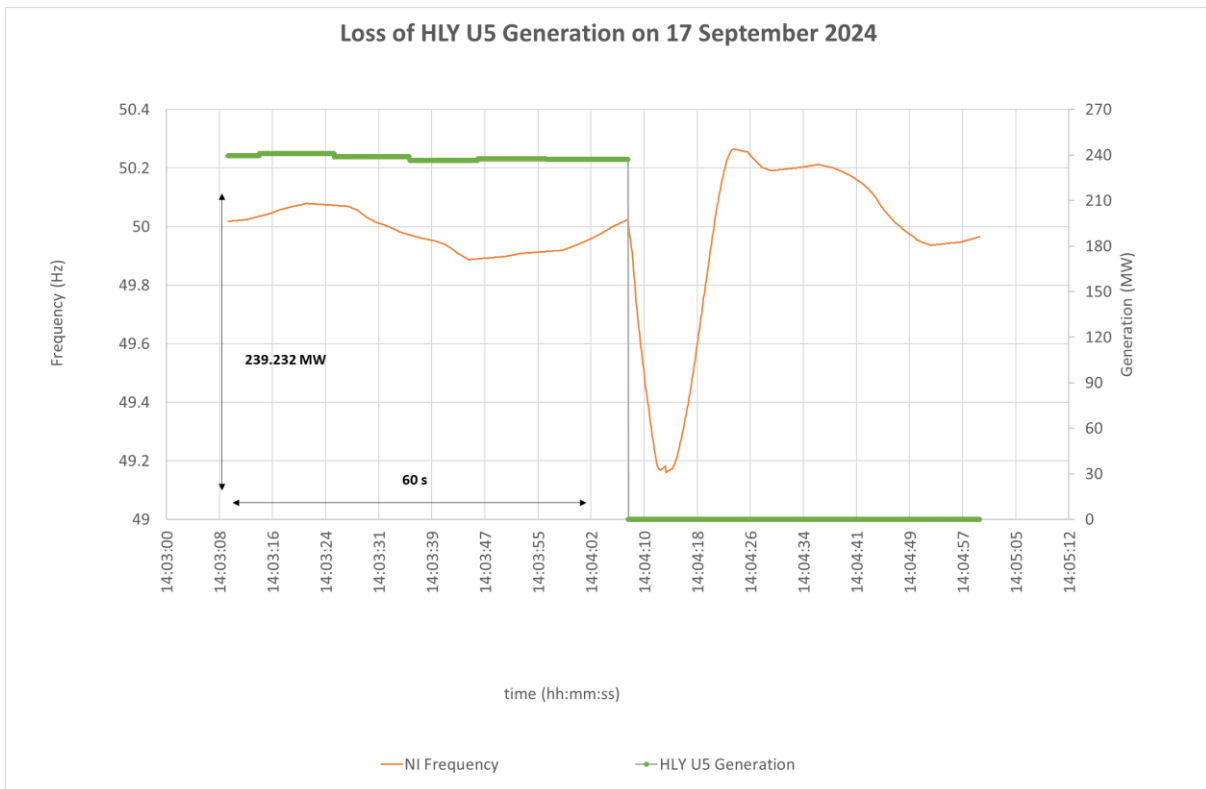
At 14:03:59 the disconnection of Huntly Unit 5 removed 239.232 MW of generation injection into the power system. Consequently, this reduced the system frequency in the North Island below 49.25 Hz at 14:04:01 (49.16 Hz).

Genesis Energy Limited confirmed the MW lost as 239.232 MW.

There were no grid events or protection operations of any grid assets in the vicinity of Huntly on 17th September 2024.

There were no HVDC events that contributed to the UFE. At the time of the event, the HVDC was running south and ramping further south. The HVDC responded to the event by reducing its south flow power, which is an action automatically taken to assist in resisting the North Island frequency dropping further.

North Island Frequency



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After the under-frequency event

At the time of the event, the System Operator had dispatched:

- North Island (generation) instantaneous reserve providers to be available to provide 88.80 MW FIR and 109.80 MW SIR.
- North Island interruptible load providers to be available to trip 58.00 MW FIR and 83.10 MW SIR.

These reserve providers responded, returning the frequency to the normal band (49.8Hz – 50.2Hz) within seven seconds.

The System Operator is assessing the performance of instantaneous reserve providers in this under-frequency event to ascertain if these providers are meeting their respective ancillary service contract obligations.

RATIONAL FOR RECOMMENDATION

Factors considered

Only one event occurred in close proximity to the North Island frequency falling below 49.25 Hz, namely the tripping of Huntly Unit 5 at 14:03:59 on 17th September 2024.

Accordingly, assessment of this information confirms that only the tripping of Huntly Unit 5 can be linked with the North Island frequency falling below 49.25Hz.

Genesis Energy Limited and the Grid Owner were both asked if they considered themselves the causer of the under-frequency event.

Genesis Energy Limited confirmed that the tripping of Huntly Unit 5 caused the under-frequency event.

The Grid Owner does not believe it caused the under-frequency event.

CALCULATION OF MW LOST

The purpose of this calculation is to determine the MW value provided to the clearing manager for the purposes of calculating the under-frequency event charge.

The System Operator follows the procedure 'Calculating the Amount of MW lost' (PR-RR-017) to determine the MW lost. This procedure follows the formula set out in clause 8.64 of the Code for calculating an event charge.

The event charge payable by the causer of an under-frequency event (referred to as "Event e" below) must be calculated in accordance with the following formula:

$$EC = ECR \times \left(\sum_y INT_{y,e} - INJ_D \right)$$

where

EC is the event charge payable by the causer

ECR is \$1,250 per MW

INJ_D is 60 MW

$INT_{y,e}$ is the electric power (expressed in MW) lost at point y by reason of Event e (being the net reduction in the injection of electricity (expressed in MW) experienced at point Y by reason of Event e) excluding any loss at point y by reason of secondary Event e

y is a point of connection or the HVDC injection point at which the injection of electricity was interrupted or reduced by reason Event e

As the ECR and INJ_D values are constants the values to calculate and complete the formula are y and $INT_{y,e}$.

Using the event charge formula the calculation is as follows:

Event Charge = \$1250/MW * (239.232 MW – 60MW)

Event Charge = \$224,040.41

Appendix 1: CORRESPONDENCE

1.1 CONFIRMATION OF EVENT NOTICE



Customer Advice Notice

To: CAN NZ Participants
Sent: 19-sep-2024 14:40
Ref: 5636659667

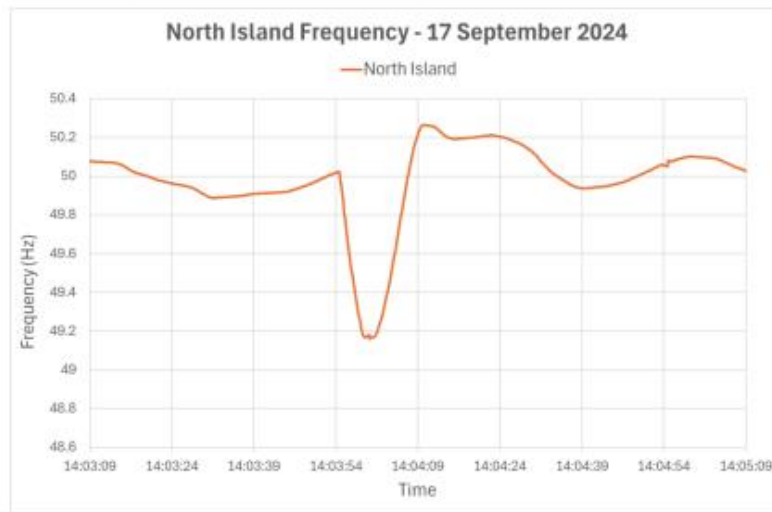
From: The System Operator
Telephone: 0800 488 500
Email: NMDData@transpower.co.nz

Revision of:

Under-Frequency Event Confirmation

The system operator wishes to advise market participants of an under-frequency event which occurred in the North Island on 17 September 2024.

Event ID:	4500
Affected Islands:	North Island
North Island Minimum Frequency:	49.16 Hz
Time (start of UFE):	14:03:59
Time (of min. frequency):	14:04:01



The System Operator is investigating the cause of the following under-frequency event in accordance with Part 8, clause 8.60 (1) of the Electricity Industry Participation Code 2010. Ancillary Services Agents who were dispatched to provide instantaneous reserves at the time of the event should be prepared to provide information to the System Operator within 5 Business Days of receiving a request for information in accordance with clause 8.60(4) of the Electricity Industry Participation Code 2010.

Market Operations

Transpower NZ Ltd
 P.O. Box 1021,
 Wellington 6140,
 New Zealand

A revision of this notice will be issued if there is any change to the situation above.

1.2 SYSTEM OPERATOR REQUEST FOR INFORMATION – GENESIS ENERGY LIMITED



Waikoukou
22 Boulcott Street
PO Box 1021, Wellington
New Zealand
Telephone +64-4-590 7000
Facsimile: +64-4-495 7100

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20 September 2024

Steve Leppien
Genesis Energy Limited
Private Bag 3131
Hamilton

Dear Steve,

17 September 2024 Under-Frequency Event

On 17 September at 14:03:59 an under-frequency event occurred in the North Island. We are investigating the event and require the following information from you:

- Could you provide information regarding the event and what you believe may have caused the under-frequency to occur on 17 September 2024.
- We have assessed the MW lost during the event as 239.232 MW at HLY Unit 5. Can you please confirm this assessment or provide data that indicates a different value of MW lost. We rely on SCADA data, but your data from site may be more accurate.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code

The information you provide will be used by the system operator to recommend to the Electricity Authority who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

Yours sincerely,

A handwritten signature in blue ink, appearing to read "Samantha Naidoo".

Samantha Naidoo
Corporate Counsel - Compliance & Impartiality

1.3 SYSTEM OPERATOR REQUEST FOR INFORMATION – GRID OWNER



TRANSPower

Waikoukou
22 Boulcott Street
PO Box 1021, Wellington
New Zealand
Telephone +64-4-590 7000
Facsimile: +64-4-495 7100

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20 September 2024

Mao Reyes
Grid Compliance Manager
Grid Owner
Transpower
Wellington

Dear Mao,

17 September 2024 Under-Frequency Event

On 17 September at 14:03:59 an under-frequency event occurred in the North Island. We are investigating the event and require the following information from you:

- Could you provide information regarding the event and what you believe may have caused the under-frequency to occur on 17 September.
- Could you also confirm whether or not you could have been the causer of the under-frequency event as per the Code.

The information you provide will be used by the system operator to recommend to the Electricity Authority who the causer of the event was. The Electricity Authority will make the final determination of causer.

Please contact me if you require any further information.

Yours sincerely,

Samantha Naidoo
Corporate Counsel - Compliance & Impartiality

1.4 GENESIS RESPONSE

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Genesis Energy Limited
The Genesis Energy Building
94 Bryce Street
Private Bag 3131
Hamilton 3204
New Zealand

T. 07 982 7909

25 September 2024

Samantha Naidoo
Corporate Counsel - Compliance and Impartiality
Transpower New Zealand Limited
P O Box 1021
WELLINGTON 6140

By email: samantha.naidoo@transpower.co.nz

Dear Samantha,

RE: 17th September 2024 Under-Frequency Event

I refer your letter dated 20 September 2024 requesting information from Genesis to help identify the causer of the 17th of September 2024 under-frequency event.

Information regarding the event

Huntly Unit 5 tripped on high drum level protection due to high feed water flow.

Loss of Injection Figure:

Genesis concurs with Transpower's assessment of the loss of injection figure.

Causer:

Genesis considers it (Huntly Unit 5) was the causer of the 17th of September 2024 under-frequency event.

Yours faithfully

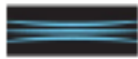
GENESIS ENERGY LIMITED

A handwritten signature in black ink, appearing to read "Steve Leppien".

Steve Leppien

Regulatory and Quality Assurance Manager

GRID OWNER RESPONSE


TRANSPower
Keeping the energy flowing

Waikoukou
22 Boulcott Street
PO Box 1021
Wellington 6140
New Zealand
P 64 4 590 7000
F 64 4 590 6968
www.transpower.co.nz

27 September 2024

Samantha Naidoo
Corporate Counsel – Compliance & Impartiality Manager
System Operations
Transpower
Wellington

Dear Samantha

17th September 2024 North Island Under-Frequency Event

I am writing in response to your letter dated 20th September 2024, concerning the under-frequency event (UFE) that transpired on the 17th of September 2024 in the North Island.

Our understanding of the event is as follows:

- At 14:03:59 on the 17th of September, a unit or units at Huntly tripped, resulting in an under-frequency event occurring in the North Island.
- Market participants were promptly informed of this occurrence through a frequency excursion notice (please refer to Attachment A). This notice, issued at 14:13 on 17th September, stated that Huntly generation had tripped, causing the frequency in the North Island to drop to 49.15Hz.
- A customer advice notice (please refer to Attachment B), issued at 14:40 on 19th September, confirmed the occurrence of an under-frequency event in the North Island at 14:03:59 on 17th September 2024.
- It is important to note that there were no grid event or protection operations of any grid assets in the vicinity of Huntly on 17th September 2024.
- Furthermore, there were no HVDC events that contributed to the UFE. At the time of the event, the HVDC was running south and ramping further south. The HVDC responded to the event by reducing its south flow power, which is an action automatically taken to assist in resisting the North Island frequency dropping further.

Considering the above information, I do not believe that the Grid Owner was the causer of the under-frequency event that occurred on this day.

I trust this clarifies our understanding of the event. Please do not hesitate to contact us should you require further information.

Yours sincerely

Mao Reyes
Grid Compliance Manager

Transpower New Zealand Ltd The National Grid

Attachment A



Excursion Notice

To: Excursion NI Participants
Sent: 17-sep-2024 14:13
Ref: 5632679588

From: The System Operator
Telephone: 0800 488 500
Email: NMData@transpower.co.nz

Revision of:

Excursion:	Frequency		
Time:	17-sep-2024 14:04		
Location:	North Island		
Affected Plant:	Huntly generation tripped		
SI Hz Level:		NI Hz Level:	49.15
Comments:			

Frequency Excursion notices are only issued if the deviation is out side 49.5 and 50.5 Hz.

A revision of this notice will be issued if there is any change to the situation above.



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Attachment B



Customer Advice Notice

To: CAN NZ Participants
Sent: 19-sep-2024 14:40
Ref: 5636659667

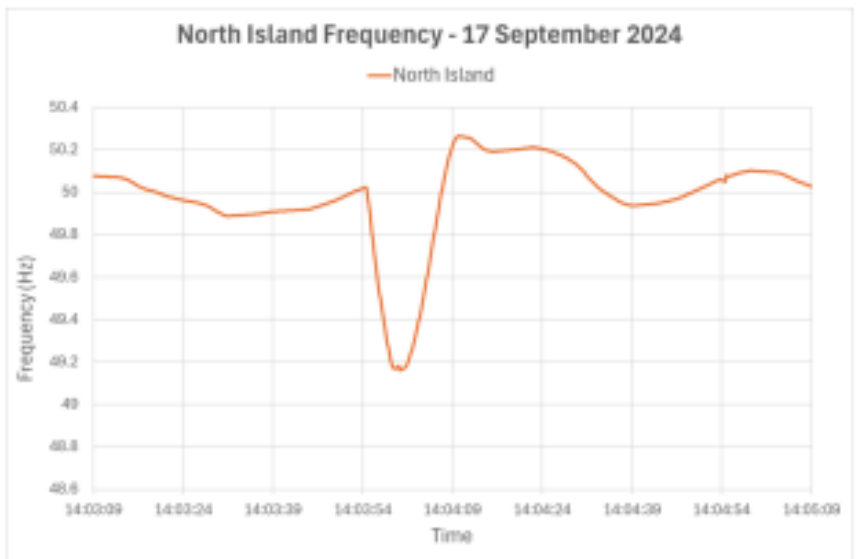
From: The System Operator
Telephone: 0800 488 500
Email: NMData@transpower.co.nz

Revision of:

Under-Frequency Event Confirmation

The system operator wishes to advise market participants of an under-frequency event which occurred in the North Island on 17 September 2024.

Event ID	4500
Affected Islands:	North Island
North Island Minimum Frequency:	49.16 Hz
Time (start of UFE):	14:03:59
Time (of min. frequency):	14:04:01



The System Operator is investigating the cause of the following under-frequency event in accordance with Part 8, clause 8.60 (1) of the Electricity Industry Participation Code 2010. Ancillary Services Agents who were dispatched to provide instantaneous reserves at the time of the event should be prepared to provide information to the System Operator within 5 Business Days of receiving a request for information in accordance with clause 8.60(4) of the Electricity Industry Participation Code 2010.

Market Operations

Transpower NZ Ltd
 P.O. Box 1021,
 Wellington 6140,
 New Zealand

A revision of this notice will be issued if there is any change to the situation above.

Telephone: 04 590 7470
market.operations@transpower.co.nz

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A revision of this notice will be issued if there is any change to the situation above.

Transpower New Zealand Ltd The National Grid

Appendix 2: CHARTS

System Frequency (North Island) and MW Trace 17th September 2024

North Island Frequency

