HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
FINAL REPORT
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FIGURE 37
FLOOD DEPTHS
PMF EVENT
PENRITH

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation. Flood depths are indicative only. To determine the depth of flooding at a particular location, the flood level should be compared to a surveyed ground level.

Flood mapping over Penrith Lakes is indicative only as the flood modelling does not incorporate the latest infrastructure of the Penrith Lakes Scheme.

PENRITH LAKES
Andrews Rd
Castlereagh Rd
Victoria Bridge
PENRITH
Dunheved Rd
Great Western Hwy
EMU PLAINS
Mulgoa Rd
Great Western Hwy
Tench Ave
Jamison Rd
Jamison Park
GLENBROOK
Maxwell St
M4 MOTORWAY
Penrith Golf Course
The Northern Rd

N

Penrith Lakes Area (approximate only) - refer to note
Depth (m)
0 - 1
1 - 2.5
2.5 - 5
5 - 10
10 - 15
> 15

0 0.5 1 2 3 km

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HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
FINAL REPORT
JULY 2019

FIGURE 38
FLOOD DEPTHS
PMF EVENT
WALLACIA

Wallacia Weir
Mulgoa Rd
WALLACIA
Elizabeth Dr
Park Rd
THE NORTHERN ROAD
Warragamba Dam
WARRAGAMBA
Silverdale Rd
SILVERDALE
GREENDALE
N

Upstream extent of flood mapping
Depth (m)
0 - 1
1 - 2.5
2.5 - 5
5 - 10
10 - 15
> 15

0 0.5 1 2 3 km

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation. Flood depths are indicative only. To determine the depth of flooding at a particular location, the flood level should be compared to a surveyed ground level.

Flooding at Wallacia is complex due to the joint probabilty of flooding from the Nepean and Warragamba Rivers. This study uses a simplified hydrologic approach and the mapping is based on a 1d hydraulic model.

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FIGURE 39
PEAK FLOOD PROFILES
UPSTREAM

Bents Basin
Beres Creek Confluence
Scotcheys Creek Confluence
Blaxlands Crossing
Wallacia Weir
Warragamba River Confluence
M4 Bridge (Penrith Valley Bridge)
Penrith
Penrith Weir
Lynchs Creek Confluence

1 in 5 AEP
1 in 10 AEP
1 in 20 AEP
1 in 50 AEP
1 in 100 AEP
1 in 200 AEP
1 in 500 AEP
1 in 1000 AEP
1 in 2000 AEP
1 in 5000 AEP
PMF

Stage (mAHD)
68 66 64 62 60 58 56 54 52 50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8

Chainage from Ocean (km)
200 190 180 170 160 150

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wma water

HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
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JULY 2019

FIGURE 40
PEAK FLOOD PROFILES
DOWNSTREAM

Mahons Creek Confluence
North Richmond
Redbank Creek Confluence
Windsor
Bardenarang Gully Confluence
Cattai Creek
Ebenezer Gauge
Ebenezer
Sackville
Roberts Creek Confluence
Doyles Swamp Creek Confluence
Lower Portland
Leets Vale
Webbs Creek Confluence
Wisemans Ferry
Gunderman / Singletons Mill
Spencer
Berowra Creek Confluence
Brooklyn Bridge (M1)
Ocean

Limit of Mapping

1 in 5 AEP
1 in 10 AEP
1 in 20 AEP
1 in 50 AEP
1 in 100 AEP
1 in 200 AEP
1 in 500 AEP
1 in 1000 AEP
1 in 2000 AEP
1 in 5000 AEP
PMF

Stage (mAHD)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

Chainage from Ocean (km)

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10

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wma water

HAWKESBURY-NEPEAN VALLEY
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HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
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JULY 2019

FIGURE 41
PROVISIONAL FLOOD HAZARD
1 IN 100 AEP EVENT
FLOODPLAIN AREA

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation.

Flood mapping over Penrith Lakes is indicative only as the flood modelling does not incorporate the latest infrastructure of the Penrith Lakes Scheme.

The Nepean River Flood Study provides more detailed analysis of flood behaviour in the area shown for this flood event.

The provisional flood hazard shown is the hazard calculated at the peak flood level using the Flood Hazard Guideline (AIDR, 2017) criteria. Higher velocities on the rising limb of the flood could alter the provisional hydraulic hazard shown.

Brooklyn
Sydney
Spencer
Pacific Motorway
Pacific Highway
Gunderman
Parramatta
Wisemans Ferry
Leets Vale
Cattai
Cattai Creek
Ebenezer
Lower Portland
Sackville
Pitt Town
Wilberforce
South Creek
Windsor
Freemans Reach
Rickabys Creek
North Richmond
Penrith
The Northern Road
Putty Road
Colo Heights
Yarramundi Bridge
Wallacia
Bents Basin
Bells Line of Road
Great Western Highway
Warragamba Dam

N

Catchment Boundary
Penrith Lakes Area (approximate only) - refer to note
Area of Penrith City Council Nepean River Flood Study - refer to note
Upstream extent of provisional flood hazard mapping

AIDR (2017) Flood Hazard Categories

- H1 Generally safe for people, vehicles and buildings
- H2 Unsafe for small vehicles
- H3 Unsafe for vehicles, children and the elderly
- H4 Unsafe for people and vehicles
- H5 Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
- H6 Unsafe for vehicles and people. All building types considered vulnerable to failure

0 2.5 5 10 15 20 25 km

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HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
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FIGURE 42
PROVISIONAL FLOOD HAZARD
1 IN 100 AEP EVENT
RICHMOND-WINDSOR

Kurmond Rd
Creek Ridge Rd
Wilberforce Rd
Terrace Rd
Crooked Ln
Slopes Rd
Kurrajong Rd
NORTH RICHMOND
PITT TOWN
Cattai Rd
RICHMOND
Richmond AFB
Lennox St
Hawkesbury Valley Way
Windsor Bridge
WINDSOR
Windsor Rd
Scheyville Rd
Castlereagh Rd
Blacktown Rd
Windsor Railway Station
Macquarie St
Pitt Town Rd
MCGRATHS HILL
BLIGH PARK
N

AIDR (2017) Flood Hazard Categories

H1	Generally safe for people, vehicles and buildings
H2	Unsafe for small vehicles
H3	Unsafe for vehicles, children and the elderly
H4	Unsafe for people and vehicles
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure

0 0.5 1 2 3 4 Km

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation.

The provisional flood hazard shown is the hazard calculated at the peak flood level using the Flood Hazard Guideline (AIDR, 2017) criteria. Higher velocities on the rising limb of the flood could alter the provisional hydraulic hazard shown.

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wma water

HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
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JULY 2019

FIGURE 43
PROVISIONAL FLOOD HAZARD
1 IN 100 AEP EVENT
PENRITH

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation.

Flood mapping over Penrith Lakes is indicative only as the flood modelling does not incorporate the latest infrastructure of the Penrith Lakes Scheme.

The Nepean River Flood Study provides more detailed analysis of flood behaviour in the area shown for this flood event.

The provisional flood hazard shown is the hazard calculated at the peak flood level using the Flood Hazard Guideline (AIDR, 2017) criteria. Higher velocities on the rising limb of the flood could alter the provisional hydraulic hazard shown.

PENRITH LAKES
Andrews Rd
Castlereagh Rd
Richmond Rd
Dunheved Rd
Victoria Bridge
PENRITH
Great Western Hwy
EMU PLAINS
Mulgoa Rd
Great Western Hwy
Tench Ave
Jamison Rd
Jamison Park
GLENBROOK
N
Maxwell St
M4 MOTORWAY
Penrith Golf Course
The Northern Rd

Penrith Lakes Area (approximate only) - refer to note
Area of Penrith City Council Nepean River Flood Study - refer to note

AIDR (2017) Flood Hazard Categories

- H1 Generally safe for people, vehicles and buildings
- H2 Unsafe for small vehicles
- H3 Unsafe for vehicles, children and the elderly
- H4 Unsafe for people and vehicles
- H5 Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
- H6 Unsafe for vehicles and people. All building types considered vulnerable to failure

0 0.5 1 2 3 km

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FIGURE 44
PROVISIONAL FLOOD HAZARD
1 IN 100 AEP EVENT
WALLACIA

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation.

Flooding at Wallacia is complex due to the joint probabilty of flooding from the Nepean and Warragamba Rivers. This study uses a simplified hydrologic approach and the mapping is based on a 1d hydraulic model.

The provisional flood hazard shown is the hazard calculated at the peak flood level using the Flood Hazard Guideline (AIDR, 2017) criteria. Higher velocities on the rising limb of the flood could alter the provisional hydraulic hazard shown.

Wallacia Weir
Mulgoa Rd
WALLACIA
Park Rd
THE NORT
Warragamba Dam
WARRAGAMBA
Silverdale Rd
SILVERDALE
GREENDALE
N

Upstream extent of flood mapping

AIDR (2017) Flood Hazard Categories

- H1 Generally safe for people, vehicles and buildings
- H2 Unsafe for small vehicles
- H3 Unsafe for vehicles, children and the elderly
- H4 Unsafe for people and vehicles
- H5 Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
- H6 Unsafe for vehicles and people. All building types considered vulnerable to failure

0 0.5 1 2 3 km

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HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
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FIGURE 45
HYDRAULIC CATEGORISATION
1 IN 100 AEP EVENT
FLOODPLAIN AREA

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation.

Flood mapping over Penrith Lakes is indicative only as the flood modelling does not incorporate the latest infrastructure of the Penrith Lakes Scheme.

The Nepean River Flood Study provides more detailed analysis of flood behaviour in the area shown for this flood event.

Floodways carry a significant volume of floodwaters during floods. Any blockage is likely to increase flood levels and/or flow velocities at other locations.

Flood storage areas are important for temporary storage of floodwaters during floods. The delineation between flood storage and flood fringe areas is yet to be determined.

The combined primary and secondary floodway is the total floodway area as defined by Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR 2017).

Brooklyn
Sydney
Spencer
Pacific Motorway
Pacific Highway
Gunderman
Parramatta
Wisemans Ferry
Leets Vale
Cattai
Cattai Creek
Ebenezer
Lower Portland
Sackville
Pitt Town
Wilberforce
South Creek
Windsor
Freemans Reach
Rickabys Creek
North Richmond
Penrith
Putty Road
Colo Heights
Yarramundi Bridge
The Northern Road
Old Hume Highway
Hume Motorway
Wallacia
Bents Basin
Bells Line of Road
Great Western Highway
Warragamba Dam

N

Catchment Boundary
Penrith Lakes Area (approximate only) - refer to note
Area of Penrith City Council Nepean River Flood Study - refer to note
Upstream extent of hydraulic categorisation mapping
Primary Floodway
Secondary Floodway
Flood Storage/Flood Fringe

0 2.5 5 10 15 20 25 km

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HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
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FIGURE 46
HYDRAULIC CATEGORISATION
1 IN 100 AEP EVENT
RICHMOND-WINDSOR

Kurmond Rd
Creek Ridge Rd
Wilberforce Rd
Terrace Rd
Crooked Ln
Slopes Rd
Kurrajong Rd
NORTH RICHMOND
PITT TOWN
Cattai Rd
RICHMOND
Richmond AFB
Lennox St
Hawkesbury Valley Way
Windsor Bridge
Castlereagh Rd
Blacktown Rd
WINDSOR
Windsor Railway Station
Macquarie St
Windsor Rd
Pitt Town Rd
Scheyville Rd
MCGRATHS HILL
BLIGH PARK

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation.

Floodways carry a significant volume of floodwaters during floods. Any blockage is likely to increase flood levels and/or flow velocities at other locations.

Flood storage areas are important for temporary storage of floodwaters during floods. The delineation between flood storage and flood fringe areas is yet to be determined.

The combined primary and secondary floodway is the total floodway area as defined by Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR 2017).

N

Secondary Floodway
Flood Storage/Flood Fringe
Primary Floodway

0 0.5 1 2 3 4 Km

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HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
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JULY 2019

FIGURE 47
HYDRAULIC CATEGORISATION
1 IN 100 AEP EVENT
PENRITH

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation.

Flood mapping over Penrith Lakes is indicative only as the flood modelling does not incorporate the latest infrastructure of the Penrith Lakes Scheme.

The Nepean River Flood Study provides more detailed analysis of flood behaviour in the area shown for this flood event.

Floodways carry a significant volume of floodwaters during floods. Any blockage is likely to increase flood levels and/or flow velocities at other locations.

Flood storage areas are important for temporary storage of floodwaters during floods. The delineation between flood storage and flood fringe areas is yet to be determined.

The combined primary and secondary floodway is the total floodway area as defined by Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR 2017).

PENRITH LAKES
Andrews Rd
Castlereagh Rd
Victoria Bridge
PENRITH
Great Western Hwy
EMU PLAINS
Mulgoa Rd
Great Western Hwy
Tench Ave
Jamison Rd
Jamison Park
GLENBROOK
Maxwell St
M4 MOTORWAY
Penrith Golf Course
Tile Northern Rd

N

Penrith Lakes Area (approximate only) - refer to note
Area of Penrith City Council Nepean River Flood Study - refer to note
Primary Floodway
Secondary Floodway
Flood Storage/Flood Fringe

0 0.5 1 2 3 km

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HAWKESBURY-NEPEAN VALLEY
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FIGURE 48
HYDRAULIC CATEGORISATION
1 IN 100 AEP EVENT
WALLACIA

Wallacia Weir
WALLACIA
Mulgoa Rd
Park Rd
Elizabeth Dr
THE NORTHERN ROAD
Warragamba Dam
WARRAGAMBA
Silverdale Rd
SILVERDALE
GREENDALE
N

Upstream extent of flood mapping
Primary Floodway
Secondary Floodway
Flood Storage/Flood Fringe

0 0.5 1 2 3 km

Notes: The mapped flood information represents Hawkesbury-Nepean mainstream regional flooding including backwater effects, but does not include local catchment flooding or local overland flooding.

Flood behaviour information is subject to change as a result of new data, methods and technology.

The mapped flood information excludes the impacts of climate change and implementation of potential flood mitigation measures.

Any flooding information within the banks of rivers or streams should not be used for any assessment (other than flood extents) without detailed investigation.

Flooding at Wallacia is complex due to the joint probabilty of flooding from the Nepean and Warragamba Rivers. This study uses a simplified hydrologic approach and the mapping is based on a 1d hydraulic model.

Floodways carry a significant volume of floodwaters during floods. Any blockage is likely to increase flood levels and/or flow velocities at other locations.

Flood storage areas are important for temporary storage of floodwaters during floods. The delineation between flood storage and flood fringe areas is yet to be determined.

The combined primary and secondary floodway is the total floodway area as defined by Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR 2017).

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FIGURE 49
STAGE FREQUENCY CURVES
WINDSOR

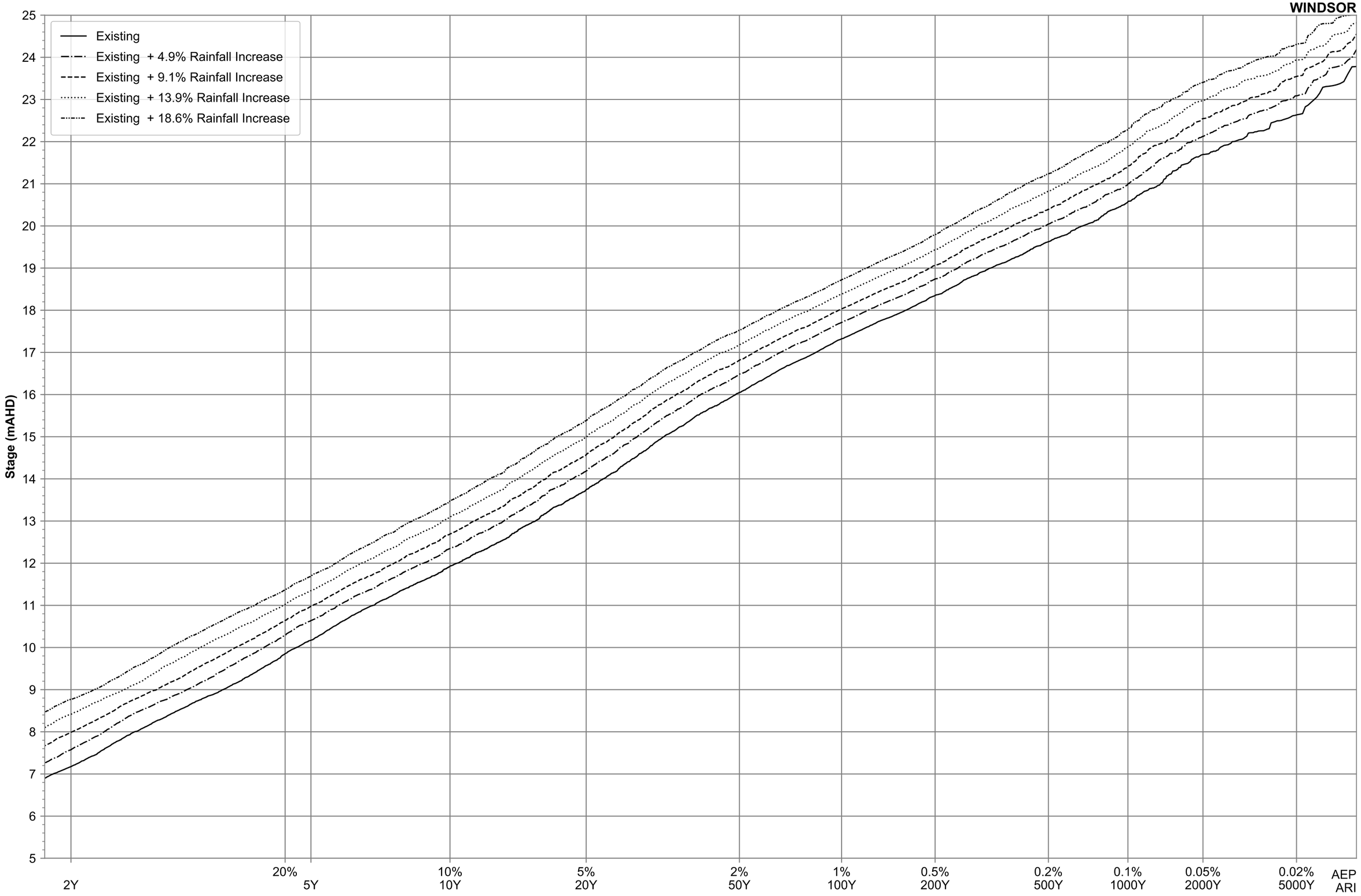

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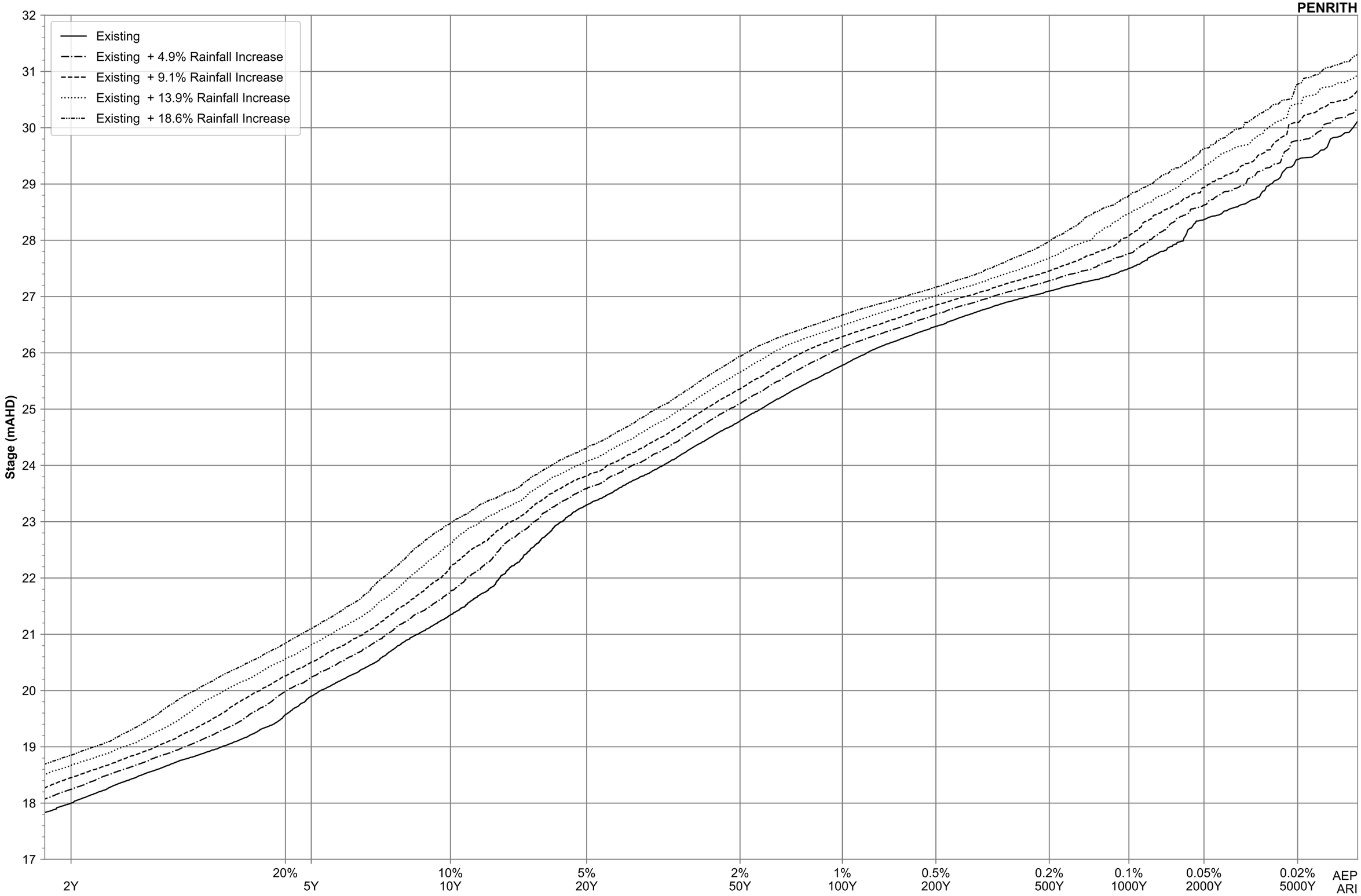
FIGURE 50
STAGE FREQUENCY CURVES
PENRITH



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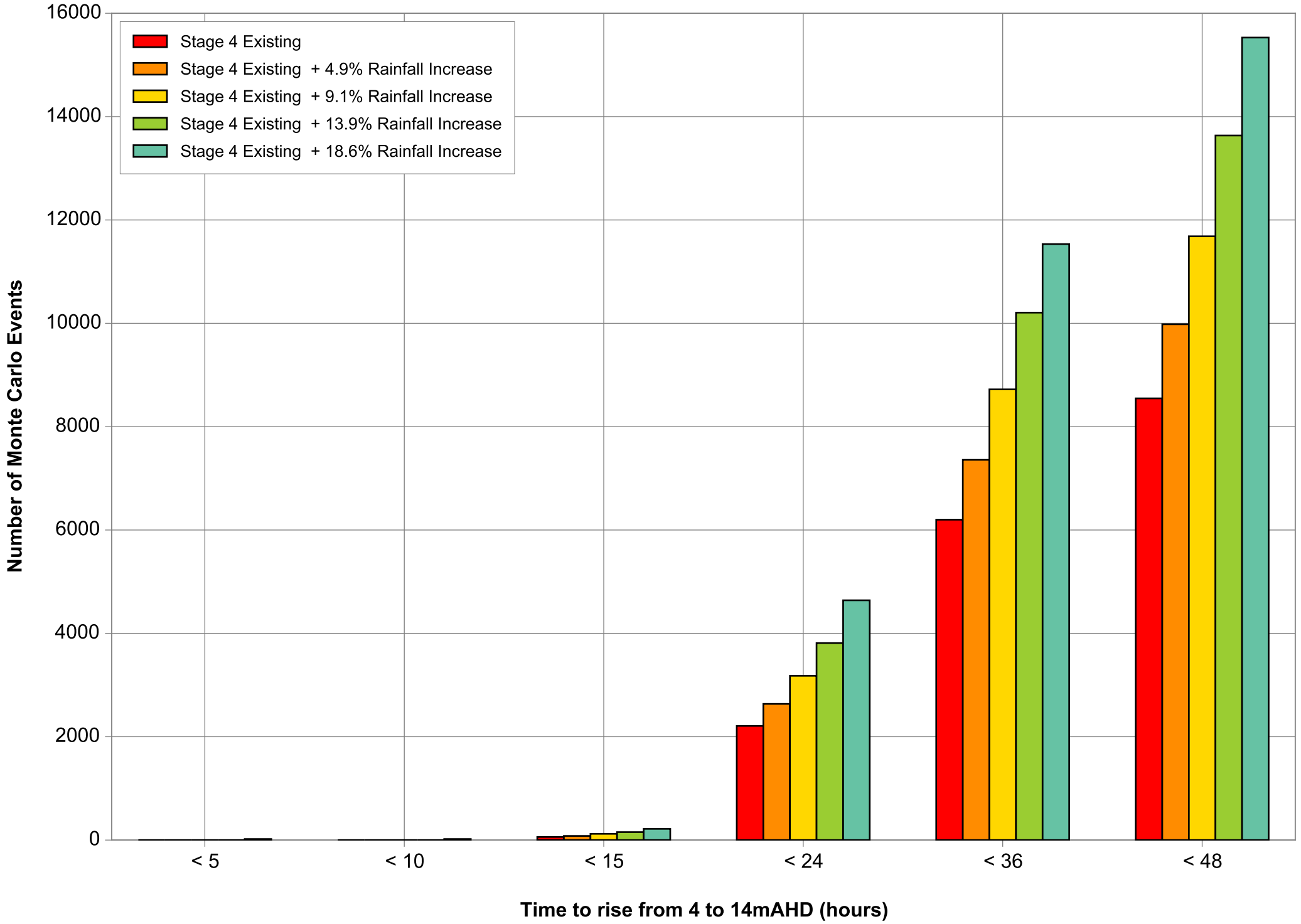

HAWKESBURY-NEPEAN VALLEY REGIONAL FLOOD STUDY
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TIME TO RISE FROM 4 TO 14MAHD
CLIMATE CHANGE COMPARISON AT WINDSOR BRIDGE

FIGURE 51

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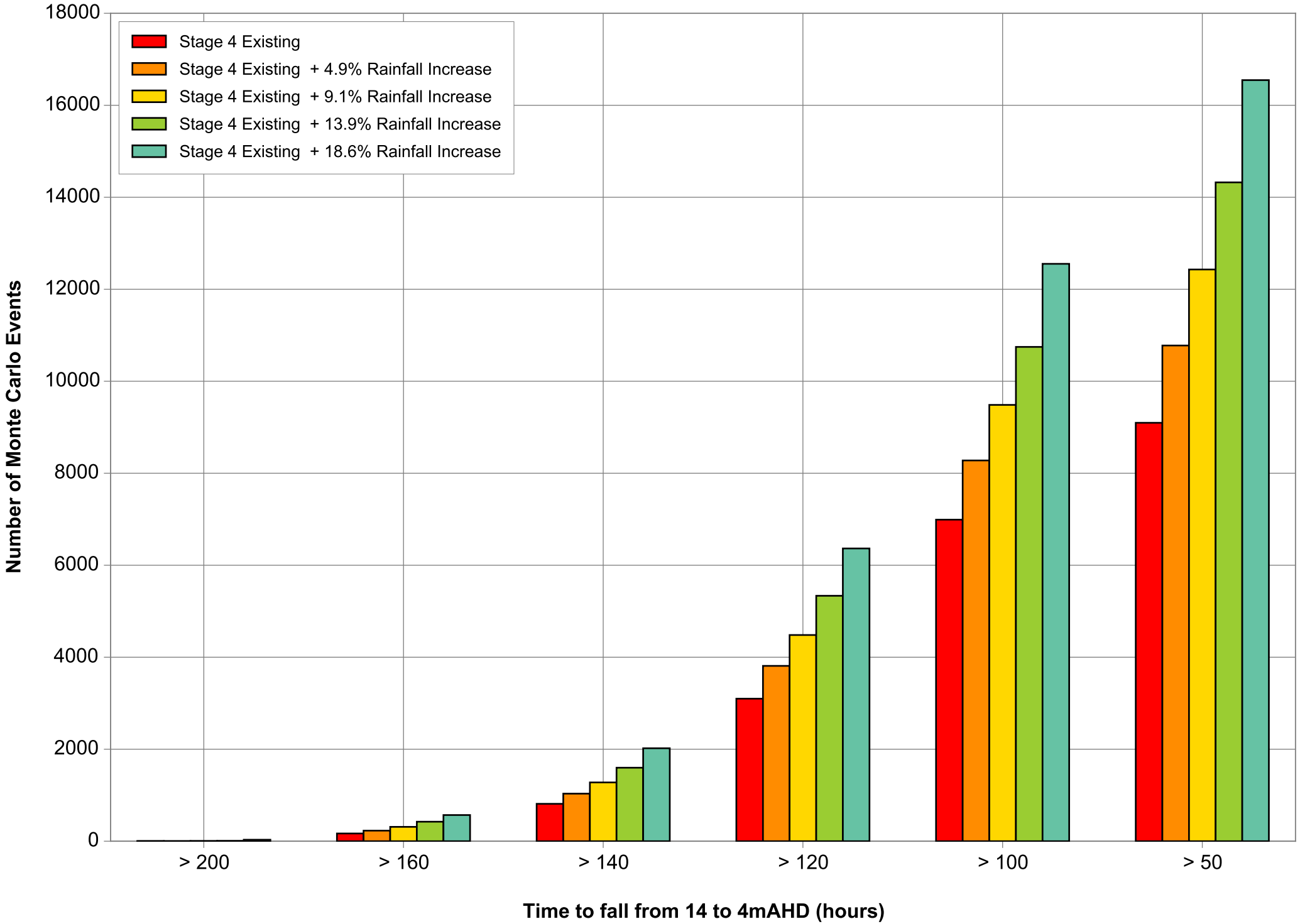

HAWKESBURY-NEPEAN VALLEY REGIONAL FLOOD STUDY
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TIME TO FALL FROM 14 TO 4MAHD
CLIMATE CHANGE COMPARISON AT WINDSOR BRIDGE

FIGURE 52

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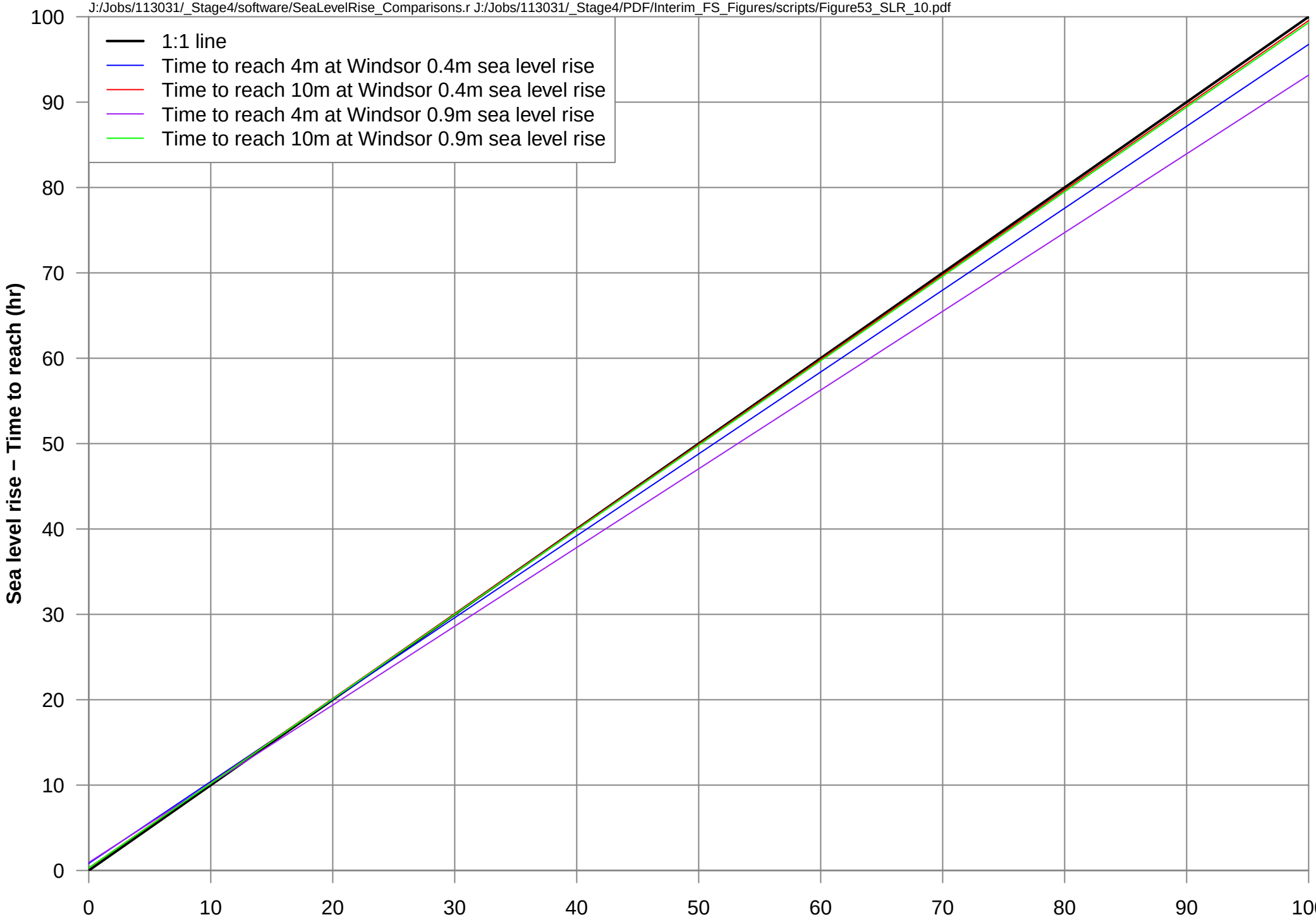

HAWKESBURY-NEPEAN VALLEY
REGIONAL FLOOD STUDY
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FIGURE 53
TIME TO REACH LEVELS AT WINDSOR
SEA LEVEL RISE COMPARISON

FIGURE 54
PEAK FLOOD PROFILES - SEA LEVEL RISE COMPARISON DOWNSTREAM

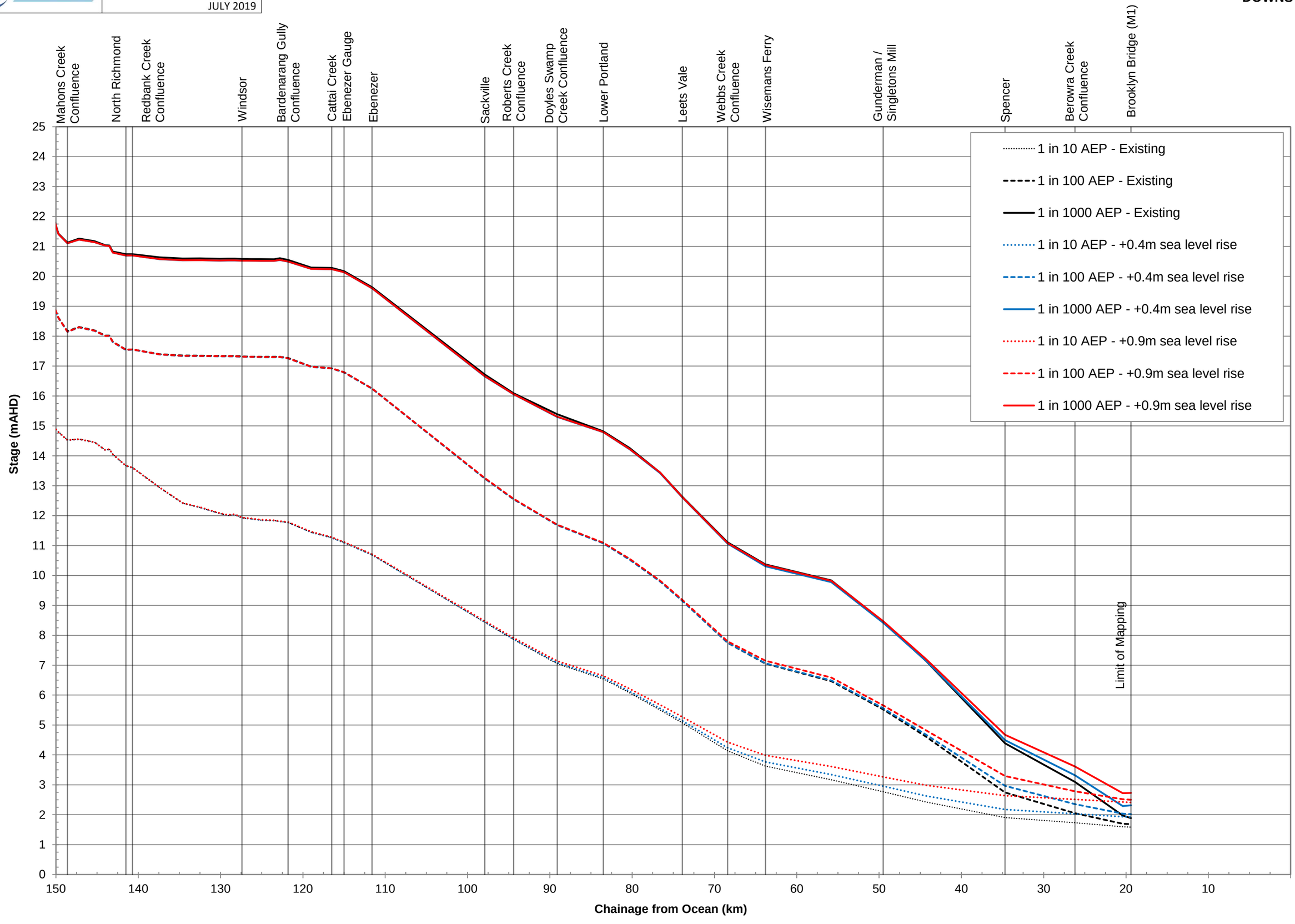

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FIGURE 55

**RATE OF RISE:
TIME BETWEEN 4M AND 4.5M AT WINDSOR, HAWKESBURY RIVER
AGAINST THE AEP OF THE PEAK FLOOD LEVEL AT WINDSOR, HAWKESBURY RIVER**

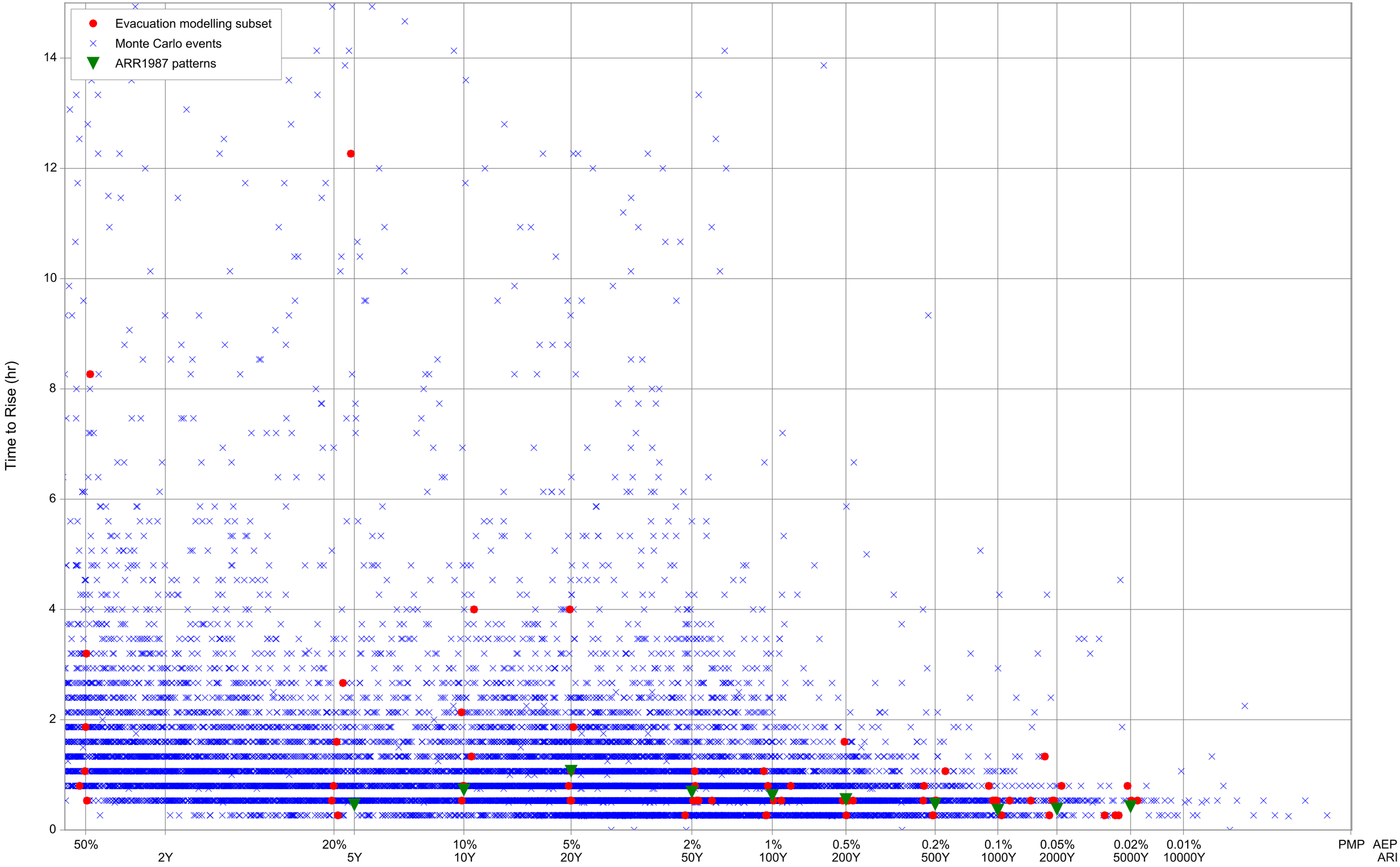

FIGURE 56

**RATE OF RISE:
TIME BETWEEN 4M AND 14M AT WINDSOR, HAWKESBURY RIVER
AGAINST THE AEP OF THE PEAK FLOOD LEVEL AT WINDSOR, HAWKESBURY RIVER**