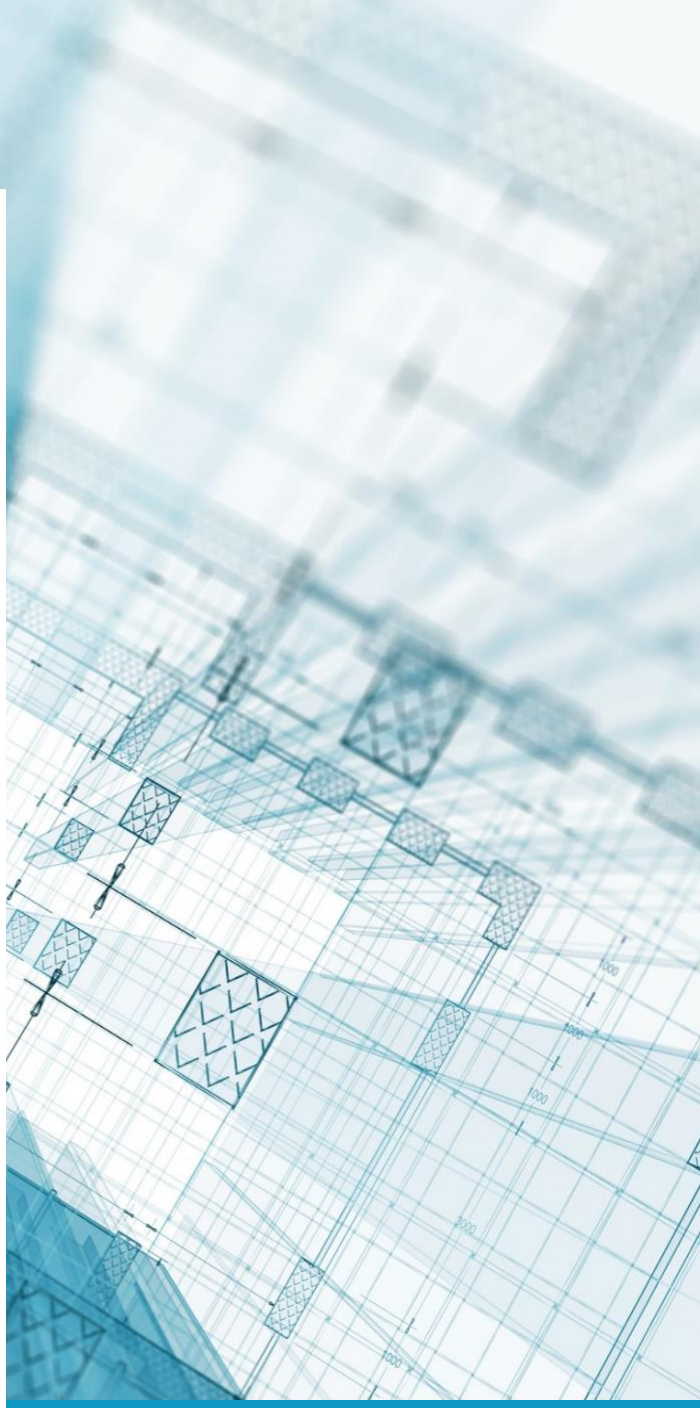
BUILDING SURVEY

92 JOHN WHITEWAY DRIVE, GOSFORD NSW 2250

QUAY NORTH APARTMENTS

THE OWNERS – STRATA PLAN 63548



Pinnacle
building consultancy

5 JULY 2024

Pinnacle Building Consultancy Pty Ltd

Prepared by: **Andrew Stewart BBCM (Hons)**

General Building Survey Report

Water penetration

Pinnacle Building Consultancy was engaged by The Owners – Strata Plan 63548 to investigate and report on mould and water ingress affecting the complex known as *Quay North* at *92 John Whiteway Drive, Gosford NSW 2250.*

The purpose of the inspection was to identify water penetration affecting the internal habitable areas of twenty-seven nominated lots within the building, their likely source(s) and the extent of these issues, and provide recommendations for remediation. The inspections were performed by our *Mr. Andrew Stewart* and *Mr. Cael Fitzgerald* on Wednesday 13 March 2024 from 0720hrs, and *Mr. Andrew Stewart* and *Mr. Hayden Hollis* on Tuesday 9 April 2024 from 0930hrs and Tuesday 28 May 2024 from 1500hrs.

Quay North | Strata Plan 63548

92 John Whiteway Drive, GOSFORD NSW 2250

Building description

The property known as *Quay North Apartments* at *92 John Whiteway Drive, Gosford NSW 2250* consists of a six and eight-storey *Class 2* residential complex constructed upon a steeply sloping block of land overlooking *Brisbane Water* that has been cut, filled, and retained.

The building comprises forty-eight lots and consists of load-bearing cavity brickwork walls supporting internal reinforced concrete floor slabs. Two levels of carparking are located on Levels 3 and 4, and are accessible via *John Whiteway Drive*. The carpark consists of core-filled reinforced blockwork walls, reinforced concrete columns, and suspended reinforced concrete floor slabs. 230mm face brickwork balustrade walls semi-enclose the carpark, and the fire stairwells are of core-filled reinforced blockwork construction.

The building facades are primarily of face brickwork construction with rendered concrete slab edges and powder-coated aluminium-framed windows and glass sliding door assemblies. Several south-facing units have access to terracotta-tiled courtyards bounded by a combination of brickwork dividing walls and powder-coated aluminium-framed balustrades with infill glazing, whilst the podium-level north-facing apartments have access to terracotta-tiled courtyards bounded by 230mm face brickwork walls. A communal swimming pool is located on the lower southern side of the building.

The buildings are enclosed by curved-sprung metal-deck roofs which are drained by eaves-mounted gutters and façade-mounted downpipes.

Vegetation surrounds all elevations of the building within masonry planterboxes that extend along the entry pathways. Terracotta-tiled pathways provide access to the six entryways via *John Whiteway Drive*, with ground floor (Level 1) units having pedestrian access via *Henry Parry Drive*.

Construction of the staged complex finished in the early 2000's, hence *Quay North Apartments* is approximately 18-24 years old.

Building classification

Quay North Apartments at *92 John Whiteway Drive, Gosford NSW 2250* attracts multiple classifications for its design and intended uses under the Building Code of Australia (BCA). These are:

Class 2	–	a building containing 2 or more sole-occupancy units each being a separate dwelling.
Class 7a	–	a building which is a carpark.
Class 10b	–	a structure being a fence, mast, antenna, retaining or free-standing wall, swimming pool or the like.

New construction work for a building of this height and classification must be of **Type A Construction** to achieve compliance with the requirements of the BCA.

Qualifications

1. For the purposes of this report, the *John Whiteway Drive* frontage of the building is deemed the northern elevation, and the *Henry Parry Drive* frontage the southern elevation.
2. It was warm, sunny and approximately 19-28°C at the time of the inspection dated Wednesday 13 March 2024.
3. It was fine, sunny and approximately 19°C at the time of the inspection dated Tuesday 9 April 2024.
4. It was fine, sunny and approximately 16°C at the time of the inspection dated Tuesday 28 May 2024.

5. All observations were made from within the respective lots and associated courtyards, balconies and terraces (where applicable), and the common areas of the complex.

Background

The Owners Corporation – Strata Plan 63548 would like to receive professional advice regarding various reported mould growth and water ingress issues affecting twenty-seven units within the complex known as *Quay North Apartments* at *92 John Whiteway Drive, Gosford*. The subject lots are *Units 1, 3, 4, 9, 10, 11, 13, 14, 15, 16, 22, 23, 24, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 39, 42, 45* and *48.*

Observations

General

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)	
	UNIT 1 (INTERCOM 2, LEVELS 1 & 2)		
1	General	1. Access to *Unit 1* was not provided at the time of inspection. 2. Instructed by the lot occupant at the time of inspection that there are no water penetration issues affecting *Unit 1*.	N/A
	UNIT 3 (INTERCOM 2, LEVELS 1 & 2)		
2	Ensuite	1. Rust and corrosion staining to the ceramic floor tiling and grouted perpendicular joints in the vicinity of the threshold. 2. The lot occupant advised that previous localised re-waterproofing and retiling work has been completed within the shower recess. This was evident in the form of mismatching floor tiles, including isolated tiles in the first row of wall tiles.	

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
		
		
		

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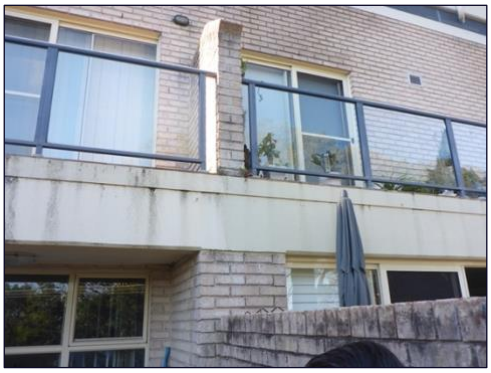
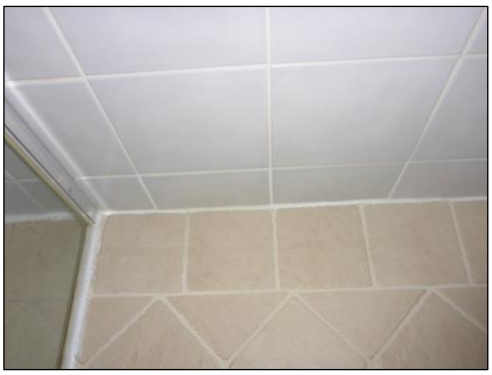
3	Living room	1. Evidence of water penetration in the form of rotten skirting boards and blistering and bubbling paint at the base of the western wall. The wall was wet to touch in this location at the time of inspection. 2. High-level moisture meter readings in the vicinity of 99.9% were recorded in the skirting board at the time of inspection. 3. High-level moisture meter readings ranging between 18.1% and 27.8% were recorded in the bubbling paintwork at the time of the inspection. High-level moisture meter readings are generally >16.0%.  

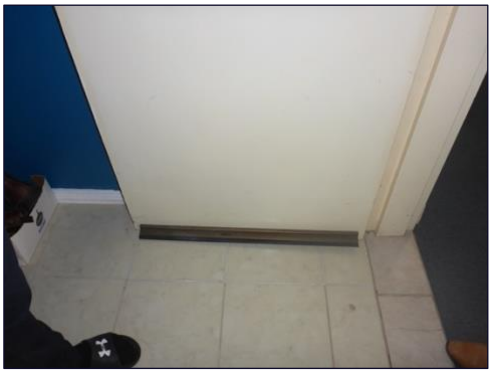
ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		 
4	*Unit 2* southern terrace (located adjacent)	1. Rot affects the timber quad mouldings at the perimeter of the fibre-cement (FC) sheet soffit lining, which is also stained in the north-eastern corner. 2. The FC sheet lining encloses the void created by the slab edge beam bearing on the external brickwork. 3. The source of the water penetration appears to be related to a possible cavity drainage issue and/or associated failed waterproofing provisions to the two separate balconies above (belonging to *Units 2* and *3*), and/or a stormwater drainage issue. 4. Further investigation is warranted given the seriousness of the leak affecting *Unit 3* living room.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		 
	UNIT 4 (INTERCOM 2, LEVELS 1 & 2)	
5	General	1. Access to *Unit 4* was not provided at the time of inspection. 2. Instructed by the lot occupant at the time of inspection that there are no water penetration issues affecting *Unit 4*. N/A
	UNIT 9 (INTERCOM 4, LEVEL 4)	
6	Living room	1. Vertical cracking to the southern wall surrounding the vertical movement joint. 2. Evidence of water penetration in the form of staining, mould growth and deteriorating paintwork. 3. Low-level (normal) moisture meter readings in the vicinity of 9.5% were recorded in this location at the time of inspection. Low-level (normal) moisture meter readings are typically <16.0%. 4. The lot occupant advised the affected wall had been recently painted. 5. This issue is also apparent in the adjoining common foyer and carpark along the same movement joint. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
7	Main bedroom walk-in-robe (WIR)	1. Hairline shrinkage cracking to the reinforced concrete floor slab above as viewed through the manhole within the main bedroom WIR. 2. Evidence of water penetration through same in the form of efflorescence, calcification and stalactite formation. 3. The lot occupant is using dehumidifying crystals to mitigate against moisture within the ceiling cavity. 
	UNIT 10 (INTERCOM 4, LEVEL 4)	
8	Living room	1. Evidence of water penetration in the form of staining to the suspended plasterboard ceiling lining adjacent to the eastern wall. 2. High-level moisture meter readings in the vicinity of 23.8% were recorded in this location at the time of inspection. 3. Instructed by the lot occupant at the time of inspection that *Unit 17* southern balcony (located directly above) was repaired approximately two years ago. 4. *Unit 17* southern balcony has a free-draining edge to a slab edge-mounted gutter. 5. *Unit 17* southern balcony has been retiled (with white-coloured tiles as opposed to the typically terracotta-coloured tiles throughout *Quay North Apartments*). 6. A damp-proof course (DPC) is not apparent within the 230mm face brickwork dividing wall separating *Unit 17* southern balcony from the eastern Level 5 Intercom 4, eastern terrace/walkway/stairwell. It is therefore possible water is bypassing the waterproofing provisions.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		  (*Unit 17* southern balcony, above)  (*Unit 17* southern balcony, above)
9	Ensuite	1. The shower recess has received a silane/siloxane *Megasealed®*-type surface coating as a temporary solution to the water penetration defect affecting the adjoining internal common foyer. 2. Refer to Item 84, indicating that the temporary waterproofing has not proven successful. 3. *Unit 10* ensuite requires re-waterproofing in full to achieve a positive outcome. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		  
	UNIT 11 (INTERCOM 3, LEVEL 5)	
10	Laundry	1. Evidence of water penetration in the form of staining, mould growth, and stalactite formation to the suspended plasterboard ceiling lining. 2. Water was actively dripping from the ceiling lining onto the washing machine at the time of inspection. 3. Instructed by the lot occupant at the time of inspection that the leak commenced approximately one month prior to our inspection. 4. *Unit 18* is located immediately above, and it would appear the leak relates to an internal wet area within that lot. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
	UNIT 13 (INTERCOM 2, LEVEL 5)	
11	Living room	1. Evidence of water penetration in the form of blistering and bubbling paintwork to the suspended plasterboard ceiling lining adjacent to the eastern wall. 2. Very high-level moisture meter readings in the vicinity of 98.9% were recorded in the ceiling linings. 3. Instructed by the lot occupant at the time of inspection this has been occurring for at least 18 months. 4. A stormwater pipe servicing *Unit 20* southern balcony is located directly above.  
12	Entry	1. The fire-rated entry door binds on the floor tiles. 2. The threshold tiles are cracked, drummy and delaminating. 
13	Southern terrace	1. Tenting/hogged terracotta tiles along the transverse and intermediate movement joints. 2. Various cracked, broken, and chipped tiles are located throughout the terrace. 3. The damaged floor tiling presents a trip hazard and personal injury hazard to those traversing the terrace. 

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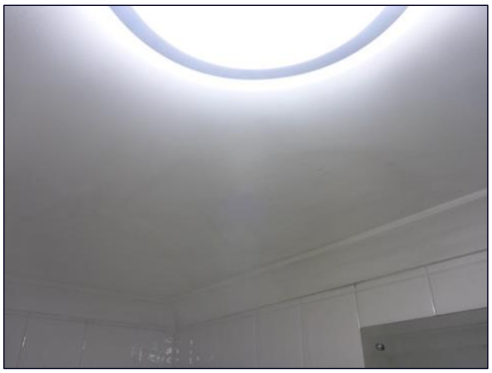
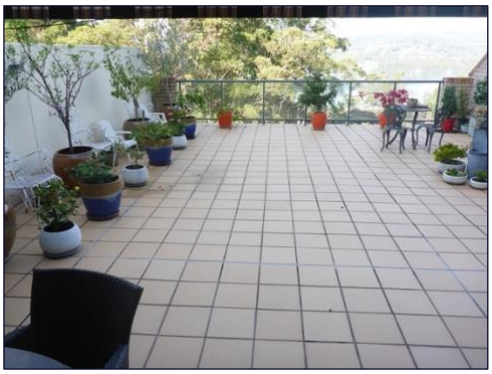
	UNIT 14 (INTERCOM 2, LEVEL 5)	
14	Living room	1. Complaint received from the lot occupant at the time of inspection regarding previous water penetration from around the south-facing glass sliding door assembly. 2. Evidence of minor water penetration in the form of blistering and flaking paint to the western reveal of the south-facing glass sliding door assembly. 3. Low-level (normal) moisture meter readings ranging from 14.5% to 14.8% were recorded in the skirting board and rendered masonry sill at the time of inspection.   

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		 
15	Dining room	1. Evidence of water penetration in the form of blistering and flaking paint at the base of the southern wall and adjoining glass sliding door hob. 2. Evidence of water penetration in the form of blistering and bubbling paint and delaminating set plaster above the skirting board in the south-eastern corner. 3. High-level moisture meter readings ranging from 20.8% to 26.8% were recorded in the rendered masonry hob and southern wall in the south-eastern corner. 4. The southern terrace is located immediately adjacent. Instructed by the lot occupant at the time of inspection that it was re-waterproofed approximately seven years ago. 5. A reinforced concrete column is located in the north-eastern corner of the terrace adjacent to the water penetration damage in the south-eastern corner of the dining room suggesting a possible cavity flashing deficiency or sliding door aperture defect.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
16	Bathroom	1. Evidence of water penetration in the form of staining to the suspended plasterboard ceiling lining. 2. Elevated moisture meter readings in the vicinity of 18.8% were recorded in the ceiling lining. 3. The water penetration issue is likely related to a wet area waterproofing deficiency within the bathroom or laundry located directly above.   
17	Southern terrace	1. *Pinnacle* understands the terrace was re-waterproofed and retiled approximately seven years ago. 2. The recent nature of these works may warrant further investigation in the form of flood/spray-testing in the areas adjacent to the internal water penetration damage. 

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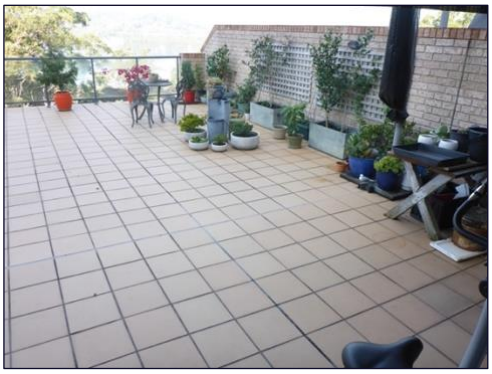
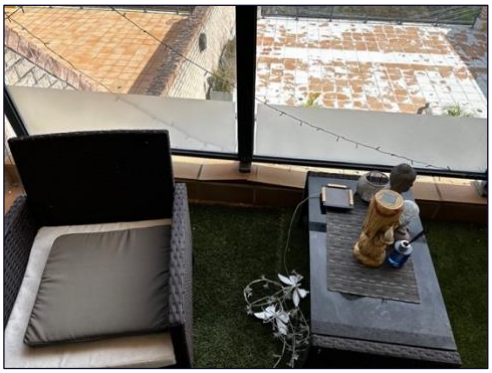
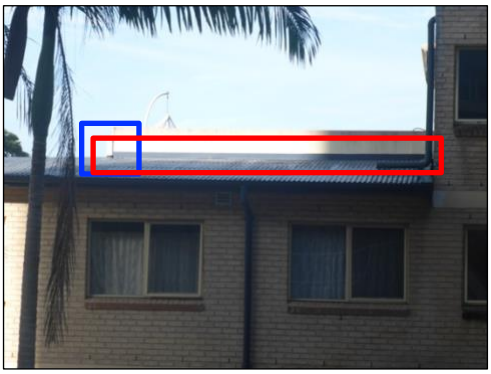
		 
	UNIT 15 (INTERCOM 1, LEVEL 5)	
18	Living room	1. A hole has been cut into the suspended plasterboard-lined ceiling to expose a leaking stormwater pipe. 2. The stormwater pipework services *Unit 22* southern balcony located directly above. 
19	Dining room	1. Evidence of water penetration in the form of staining to the suspended plasterboard ceiling lining adjacent to the living room. 2. The water penetration is likely related to defective waterproofing to *Unit 22* southern balcony located directly above. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
20	Southern terrace	1. The terracotta tiled terrace has been painted, however the coatings have failed and are blistering and flaking throughout. 2. Tenting/hogged balcony tiles surrounding the balustrade posts are evident on *Unit 22* southern balcony (above) as viewed from *Unit 15* southern terrace.   
	UNIT 16 (INTERCOM 1, LEVEL 5)	
21	Living room	1. Evidence of water penetration in the form of blistering and flaking paint at the lower left-hand and right-hand sides of the south-facing glass sliding door assembly. 2. High-level moisture meter readings in the vicinity of 23.6% were recorded in the rendered masonry hob. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		 
22	Southern terrace	1. Tenting/hogged terracotta tiles adjacent to the east-west intermediate movement joints (northern and southern east-west joints). 2. The terracotta floor tiles are drummy and delaminating adjacent to the north-south intermediate movement joint, and delaminating skirting tiles exist in various locations around the perimeter of the terrace. 3. The dimensions of a typical Level 5 southern terrace are 11.1m x 7.5m (83.25m^2).  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
		
		
		

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
23	Southern façade	1. Minor concrete spalling to the reinforced concrete soffit at the south-eastern external corner outside the dining room. 2. Rot-affected beading to the reinforced concrete soffit at the interface of the south-facing glass sliding door assembly.  
24	Main bedroom	1. Evidence of minor water penetration to the southern wall in the form of a swollen length of medium-density fibreboard (MDF) skirting board at the lower left-hand side of the glass sliding door assembly. 2. Low-level (normal) moisture meter readings in the vicinity of 10.9% were recorded in the skirting board. 3. The damage appears to be related to condensation formation only. 
	UNIT 22 (INTERCOM 1, LEVEL 6)	
25	Southern balcony	1. Tenting/hogged terracotta floor tiles on the upper surface of the balcony hob adjacent to the balustrade baluster at the western end. 2. *Unit 22* southern balcony is leaking into *Unit 15* living room immediately below. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		NOTE ONLY: Advised by the lot occupant at the time of inspection of previous water penetration issues relating to the suspended plasterboard ceiling lining within the adjoining living room; however, we understand this issue has since been rectified. There was no internal water penetration damage apparent at the time of inspection. 
	UNIT 23 (INTERCOM 1, LEVEL 6)	
26	Main bedroom	1. Evidence of significant water penetration in the form of staining and mould growth to the suspended plasterboard ceiling lining. 2. Low-level (normal) moisture meter readings in the vicinity of 8.5% were recorded in this location. 3. *Unit 29* eastern terrace and the northern section of the curved-sprung metal-deck roof are located above. 4. The curved-sprung metal-deck roof is located above the damage. 5. The damage appears to be caused by a defective *Dek-Tite* vent stack penetration (outlined in blue) or apron flashing (outlined in red) servicing the curved-sprung metal-deck roof.   

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
	UNIT 24 (INTERCOM 1, LEVEL 6)	
27	Entry hallway	1. Evidence of water penetration in the form of blistering and flaking paint, staining and mould growth to the cornice along the eastern wall. The cornice is also separating in this location. 2. Instructed by the lot owner at the time of inspection that the water penetration damage first became apparent during early 2020, and during the various east-coast low-pressure system (ECLPS) storm events throughout 2022.   
28	Third bedroom	1. Evidence of water penetration in the form of blistering and flaking paint and disturbed set plaster to the cornice along the western wall. 2. Stepped cracking to the northern wall at the upper left-hand side of the window aperture, extending upwards towards the cornice. 3. 2.5mm wide vertical cracking at the junction of walls in the north-eastern corner extending from floor-to-ceiling. 4. 0.75mm wide vertical cracking to the southern wall within the built-in-robe (BIR). 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		5. Various other horizontal and stepped cracking to the northern, southern, eastern and western walls.

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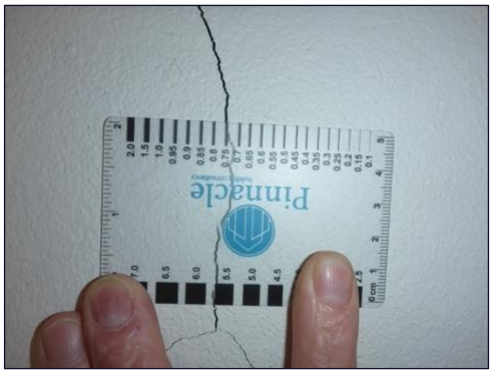
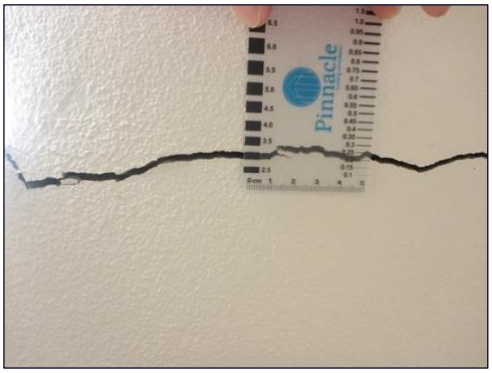
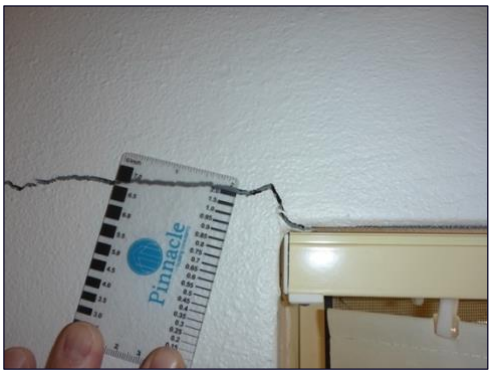
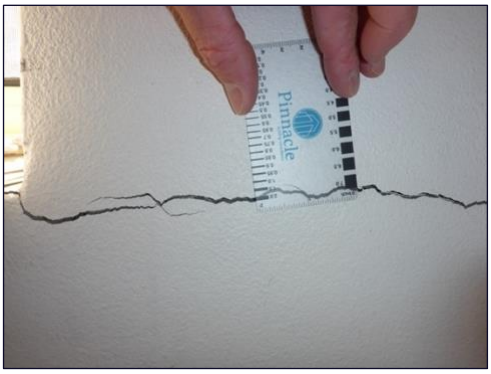
		
		

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
29	Second bedroom	1. 3.0mm wide horizontal cracking to the northern and eastern rendered masonry walls in the north-eastern corner at the lower right-hand side of the north-facing window aperture. 2. 2.0mm wide stepped cracking to the northern wall at the top left-hand side of the north-facing window aperture.





ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
30	Main bedroom	1. 2.0mm wide horizontal cracking to the northern and eastern rendered masonry walls in the north-eastern corner at the lower right-hand side of the north-facing window aperture.  
31	Ensuite	1. Evidence of water penetration in the form of staining and mould growth to the suspended plasterboard ceiling lining and cornice along the northern wall. 2. The curved-sprung metal-deck roof is located immediately above.  

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		 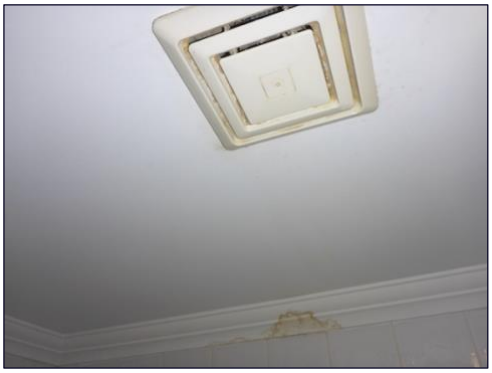
32	External common foyer landing servicing *Units 24* & *25*	1. Evidence of water penetration in the form of water damaged and displaced fibre-cement (FC) sheet soffit lining and exposed and rot-affected timber framing. 2. Staining to the eastern brickwork façade beneath the displaced FC sheet soffit lining indicates long-term water penetration. 3. This damage is reflected within the entry hallway of *Unit 24*, immediately adjacent. 4. The water penetration damage is possibly related to a defective or poorly detailed barge capping, or wind-driven rainwater penetrating beneath the sheet laps in the curved-sprung metal-deck roof. 5. May require further destructive and non-destructive investigation.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
	UNIT 27 (INTERCOM 3, LEVELS 7 & 8)	
33	Level 8 rooftop terrace	1. Large areas of tenting/hogged, drummy, and delaminating terracotta tiles in the vicinity of the proprietary movement joints. 2. The skirting tiles conceal any weepholes in face cavity brickwork walls of the southern and western building facades. 3. There is an approximate 80mm set-down from the rear of the glass sliding door to the finished floor level (FFL) of the rooftop terrace. 4. The hob-mounted balustrades were measured at 1060mm above the FFL (compliant with the current requirements of the Building Code of Australia (BCA) 2022 Volume 1). 5. There are several floor wastes throughout the terrace, with positive fall provided in the terracotta floor tiling. 6. There are at least three overflows provided throughout the terracotta tiled perimeter hob.    

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34	Level 8 rooftop terrace alfresco area	1. Several holes have been cut in the fibre-cement (FC) sheet lining to the curved-sprung roof over the alfresco area. 2. Instructed by the lot owner at the time of inspection that this was necessary to repair a burst pipe within the ceiling cavity. 3. The FC sheet linings require short-term repair. 
35	Glass sliding door assemblies	1. The glass sliding door assemblies were manufactured by *Hanlon Windows* with a 300Pa water rating and 1500Pa wind rating. 2. Instructed by the lot owner at the time of inspection that there have been no instances of internal water penetration. 3. *Unit 26* (Level 7) is located beneath *Unit 27* Level 8 rooftop terrace. 4. *Unit 19* (Level 6) is located beneath the Level 7 part of *Unit 27*. 
	UNIT 28 (INTERCOM 2, LEVEL 7)	
36	Living room	1. Evidence of water penetration in the form of blistering and bubbling paint at the lower left-hand and right-hand side of the south-facing glass sliding door assemblies. 2. Low-level (normal) moisture meter readings ranging between 8.9% and 14.8% were recorded in this location at the time of inspection. 3. Instructed by the lot owner at the time of inspection that the south-facing glass sliding door assemblies have been spray-tested and found to leak. 

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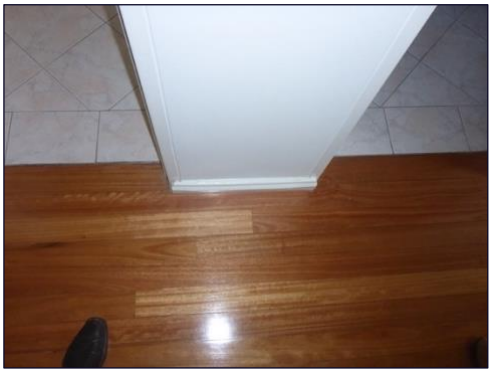
ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
37	Southern terrace	1. Evidence of surface water runoff from *Unit 30* southern balcony, above, in the form of efflorescence to the southern face brickwork façade at the western end. 2. *Unit 30* southern balcony and the adjoining narrow southern return of *Unit 30* eastern terrace are located above. 3. The eastern terrace has been provided with what appears to be a painted bituminous sheet apron that has been loosely dressed down over the slab edge and onto the face brickwork façade. Surface water runoff is/or has possibly charged the wall cavity during extended periods of heavy, wind-driven rainfall (for example, an east-coast low-pressure system (ECLPS) storm event). 4. One weephole exists at the western side of the south-facing glass sliding door servicing the living room, and generally throughout the southern façade.

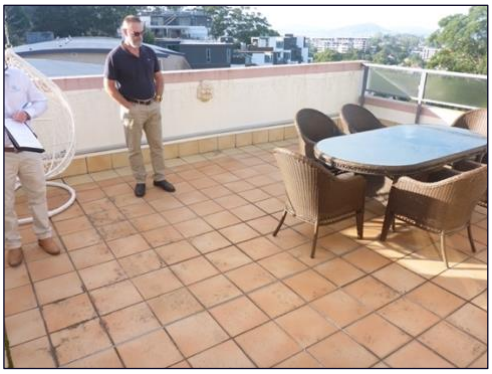
ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
38	Walk-in-robe (WIR)	1. Evidence of water penetration in the form of blistering and bubbling paint to the southern and eastern walls. 2. High-level moisture meter readings in the vicinity of 17.2% were recorded in this location at the time of inspection. 3. Instructed by the lot owner at the time of inspection that he had recently repainted and laid new carpet due to previous unresolved water penetration issues. 4. The southern balcony extends along the full width of the southern façade and requires re-waterproofing.   

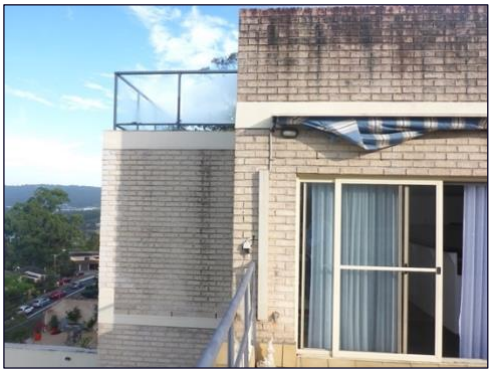
ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
39	Second bedroom	1. Instructed by the lot owner at the time of inspection of previous water penetration and staining adjacent to the eastern wall during extended periods of heavy rainfall. 2. The eastern wall was dry at the time of inspection. 3. A full-height construction joint exists in the building façade immediately adjacent, and it is likely the weatherproofing provisions associated with this joint have failed. 4. Rainwater penetrates into the Level 4 carpark in the vicinity of the full-height construction joint. 
40	Ensuite	1. Cracked grout and drummy tiles to the eastern and southern walls within the shower recess. 2. Instructed by the lot owner at the time of inspection that water leaks from the base of the shower recess.   

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
	UNIT 29 (INTERCOM 1, LEVEL 7)	
41	Living room	1. Evidence of water penetration in the form of buckled solid tongue-and-groove Blackbutt flooring adjacent to the southern wall. 2. Instructed by the lot occupant at the time of inspection that the buckling timber floorboards occurred within the past month. 3. Low-level (normal) moisture meter readings in the vicinity of 10.4% were recorded in the floorboards.   
42	Southern balcony	1. Instructed by the lot occupant at the time of inspection that significant remedial work was completed approximately 2 years ago involving: a. Installation of new windows and masonry to the southern façade of the living room; b. Re-waterproofing and retiling the southern balcony; c. Provision of a new glass sliding door assembly to the southern façade. 

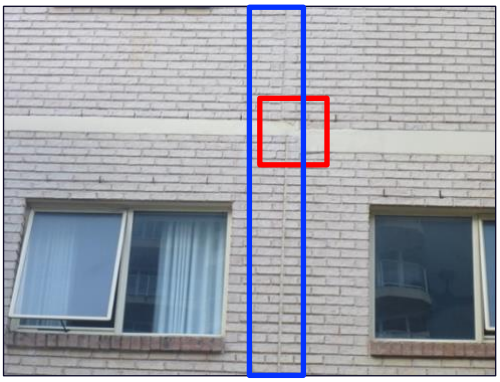
ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
43	Ensuite	1. Instructed by the lot occupant at the time of inspection that water leaks from the shower tray into the walk-in robe (WIR). 2. Evidence of previous repair attempts in the form of sealant application at the wall-floor junction adjoining the WIR. 
44	Walk-in-robe	1. Evidence of water penetration in the form of moist and damp carpet, and staining to the skirting board along the wall adjoining the ensuite shower recess. 2. High-level moisture meter readings in the vicinity of 33.4% were recorded in the skirting board.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
45	Bathroom	1. Instructed by the lot occupant at the time of inspection that the shower tray was re-waterproofed and retiled; however, water leaks from both sides of the shower screen. 
46	Hallway	1. Evidence of water penetration in the form of blistering and bubbling paint, and swollen medium density fibreboard (MDF) skirting boards extending along the hallway between the wet areas. 2. High-level moisture meter readings in the vicinity of 41.3% were recorded in the affected length of skirting.  
47	Aluminium windows	1. The new windows provided within the southern façade were manufactured by *G James Glass & Aluminium* and provided with a 350Pa water rating and an 1140Pa wind rating. 2. A reinforced concrete upstand extends along the base of the southern façade. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
48	Eastern terrace	1. Tenting/hogged tiles in the vicinity of the central movement joint. 2. Instructed by the lot occupant that water is penetrating into *Unit 23* main bedroom immediately below. 3. The position of the terrace does not align directly with the main bedroom of *Unit 23*, and the northern curved-sprung metal-deck roof weatherproofing provisions are the likely cause of the water ingress. 4. The skirting tiles conceal any weepholes in the eastern façade.    

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
49	Eastern and southern façades	1. A large section of brickwork has been rebuilt on the southern elevation over the reinforced concrete upstand. 2. New cavity flashings have been built into the new sections of masonry, and weepholes provided every third brick. 3. New windows have been installed in this section of the southern façade.    

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
50	Kitchen, living room and entry	1. Evidence of water penetration in the form of blistering and bubbling paint to the southern and eastern walls in the south-eastern corner. 2. High-level moisture meter readings in the vicinity of 49.9% were recorded in the skirting boards. 3. The eastern terrace is located immediately adjacent.  
51	Living room	1. Evidence of water penetration in the form of blistering and bubbling paintwork to the cornice along the northern and eastern walls. 2. *Unit 30* eastern tiled terrace is located directly above. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
52	Second bedroom	1. Evidence of water penetration in the form of bubbling/disturbed paintwork to the cornice along the western wall in the north-western corner. 2. A step in the floor slab above (red box) exists externally. 3. A full-height construction joint (blue box) exists in the face cavity brickwork façade in this location. 4. Likely defective weatherproofing provisions in the vicinity of the construction joint within the rainscreen façade. 5. The disturbed section of cornice within the second bedroom may also be movement-related.  
	UNIT 30 (INTERCOM 2, LEVEL 8)	
53	Dining room	1. Evidence of water penetration in the form of minor blistering and bubbling of the paintwork at the lower left-hand side of the south-facing glass sliding door. 2. Low-level (normal) moisture meter readings in the vicinity of 11.8% were recorded in the LHS reveal. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
54	Living room	1. Evidence of previous "patch painting" to the suspended plasterboard ceiling. 
55	South-eastern terrace	1. Tenting/hogged tiles adjacent to the movement joint and overflow along the narrow southern return.   

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
		
		
		

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
56	Southern narrow return of south-eastern terrace	1. A loose-laid painted bitumen sheet membrane has been dressed down over the slab edge to *Unit 28*, below. 2. It is not clear what the purpose of this highly unusual and unsightly work is. 3. *Unit 28*, however, is affected by significant water penetration.  
57	Southern narrow return of south-eastern terrace	1. The balustrade hob tiles are stained. 2. Rainwater is dripping from the half-round eaves-mounted gutter above, and onto the hob tiles below.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)	
	UNIT 32 (EASTERN BUILDING, LEVELS 1 & 2)		
58	General	1. Access to *Unit 32* was not provided at the time of inspection.	N/A
	UNIT 33 (EASTERN BUILDING, LEVELS 1 & 2)		
59	Kitchen	1. Tenting/hogged splashback tiles along the northern and eastern rendered masonry walls. 2. The delaminating splashback tiles present a personal injury hazard to the lot occupants. 3. These walls are common property walls.	  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
60	Bathroom	1. Tenting/hogged tiles to the northern wall above the bathtub, and drummy tiles along the eastern wall. 2. The delaminating wall tiles present a personal injury hazard to the lot occupants. 3. These walls are common property walls. 4. Instructed by the lot occupant at the time of inspection that this issue was reported to the Strata Committee approximately two years prior to our inspection.

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
	UNIT 34 (EASTERN BUILDING, LEVELS 1 & 2)	
61	Main bedroom	1. Evidence of water penetration in the form of mould growth and general dampness, discolouration and staining of the carpet at the base of the curved south-eastern rendered masonry wall and northern rendered masonry wall. 2. High-level moisture meter readings ranging from 24.8% to 30.2% were recorded in the carpet at the time of inspection. 3. Minor horizontal and vertical cracking to the northern, and curved south-eastern walls. 4. This room is positioned on the building's lowest floor (Level 1) adjoining the heavily shaded, benched side of the site. 5. Leaf litter and debris adjoins the curved south-eastern face brickwork façade, however, it is possible that a step in the floor slab exists, and that the concrete protrusion at the base of the façade indicates the lower courses are "wet courses". 6. Instructed by the lot occupant at the time of inspection that the dining room has been previously flooded, however the adjoining building façade was "damp-proofed". The exact scope of these works was not disclosed. 7. Possible ground water issue. 8. Possible bridging of the cavity flashings in the external face cavity brick façade. 9. The following photographs depict the site conditions to the north and east of *Unit 34:*   

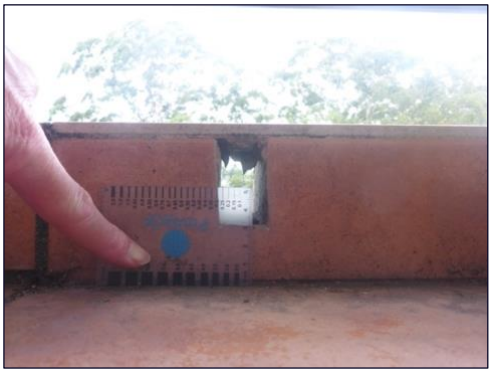
ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)

Northern elevation with view to the west.

Eastern elevation with view to the south.

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
62	Study	1. Evidence of water penetration in the form of mould growth and general dampness to the carpet along the curved south-eastern rendered masonry wall and adjoining northern rendered masonry wall. 2. High-level moisture meter readings in the vicinity of 20.5% were recorded in the carpet at the time of inspection. 
	UNIT 35 (EASTERN BUILDING, LEVEL 3)	
63	Living room	1. Evidence of minor mould growth at the head of the southern wall in the south-western corner adjacent to the casement door servicing the southern balcony. 2. Low-level (normal) moisture meter readings in the vicinity of 10.7% were recorded in this location at the time of inspection. 3. Instructed by the lot occupant at the time of inspection that mould growth regularly occurs on the suspended plasterboard bulkhead, however it is regularly removed. 4. There was no evidence of mould growth on the suspended plasterboard bulkhead at the time of inspection.   

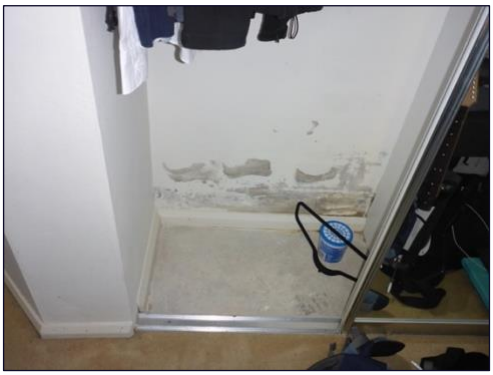
ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		 
64	Southern balcony	1. The weepholes are positioned in the course of masonry above the finished floor level (FFL) of the tiled balcony. 2. *Pinnacle* observed no stormwater floor waste on the balcony. 3. The balcony appears to be drained via a penetration in the concrete hob set approximately 30mm above the FFL.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		 
	UNIT 36 (EASTERN BUILDING, LEVEL 3)	
65	Second bedroom	1. Horizontal cracking, and drummy and delaminating render to the eastern masonry wall at the interface of the slab edge beam and masonry wall. 2. The V-joint provided at this interface between building elements has not been scribed through the full depth of the render, and the predictable building movement in this location has not been sufficiently accommodated. 
66	Main bedroom	1. Horizontal and stepped cracking at the head of the splayed south-eastern wall extending from the top left-hand and right-hand sides of the window aperture. 2. The V-joint provided at this interface between building elements has not been scribed through the full depth of the render, and the predictable building movement in this location has not been sufficiently accommodated. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		 
67	Ensuite	1. Minor vertical cracking to the wall tiles at the head of the wall in the south-eastern corner.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
68	Kitchen	1. Evidence of water penetration in the form of staining and mould growth to the suspended plasterboard ceiling lining in the north-western and south-western corners. 2. Low-level moisture meter readings ranging between 8.2% (south-western corner) and 9.7% (north-western corner) were recorded in these locations.   
	UNIT 37 (EASTERN BUILDING, LEVEL 4)	
69	Southern balcony	1. Evidence of water penetration in the form of staining to the floor waste penetration through the soffit of the reinforced concrete balcony slab above (*Unit 41* southern balcony). 2. Delaminating skirting tiles at the eastern end of the balcony. 3. The skirting tiles conceal any weepholes in the façade. 4. There are no overflow provisions throughout the perimeter balcony hob.  (cont'd)

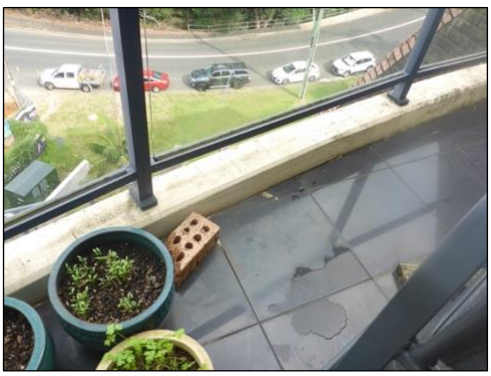
ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		5. The cavity flashings have been laid visibly short of the outer face of the external skin of masonry. This action risks any rainwater entering the wall cavity being directed into the extrusions of the course(s) of brickwork beneath the cavity flashing, and bypassing the balcony waterproofing provisions. 6. A liquid-applied black polyurethane or bitumen waterproofing membrane exists beneath the retrofitted (peach-coloured) ceramic floor tiles. 7. Instructed by the lot occupant at the time of inspection that there is no internal water penetration.    

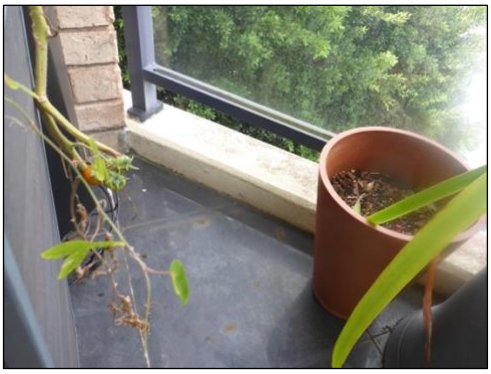
ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
70	Bathroom	1. The mechanical ventilation is inoperable. 2. This was tested using a sheet of A4 paper, which failed to be drawn to the register. 3. Water ponds on the surface of the floor tiles within the shower recess due to inadequate falls, resulting in a loss of amenity, a potential slip hazard and unnecessarily elevated humidity.  
71	Second bedroom	1. Evidence of water penetration in the form of blistering, flaking and bubbling paint to the southern wall of the built-in-robe (BIR). 2. High-level moisture meter readings in the vicinity of 46.8% were recorded in this location at the time of inspection. 3. The carpet has been removed from within the BIR, and the carpet outside the BIR is stained. 4. The lot occupant is attempting to mitigate against dampness and mould growth with the use of desiccant crystals. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		 
	UNIT 39 (EASTERN BUILDING, LEVEL 4)	
72	Southern balcony	1. The southern balcony appears to have been retiled approximately 20 years ago as indicated by the (peach-coloured) ceramic tiles. 2. Sound fall has been provided to the ceramic floor tiling. 3. There are no overflow provisions throughout the perimeter balcony hob. 4. There were no visible internal water penetration issues apparent at the time of inspection.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		  
	UNIT 42 (EASTERN BUILDING, LEVEL 5)	
73	Ensuite	1. Evidence of significant water penetration in the form of mould growth, staining and rot-affected plasterboard to the ceiling above the shower recess. 2. Low-level (normal) moisture meter readings in the vicinity of 10.3% were recorded in the ceiling linings. 3. Instructed by the lot occupant at the time of inspection that previous remedial work was undertaken, however the damage has since reoccurred. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
74	Southern balcony	1. The southern balcony appears to have been retiled approximately 20 years ago as indicated by the (peach-coloured) ceramic tiles. 2. There are no overflow provisions throughout the perimeter balcony hob. 
75	Living/dining room	1. Evidence of previous repairs to the southern and western rendered masonry walls bounding the adjoining bathroom. 2. The bathroom has been fully renovated. N/A
	UNIT 45 (EASTERN BUILDING, LEVEL 6)	
76	Main bedroom	1. Evidence of previous water penetration in the form of blistering and flaking paint and staining to the suspended plasterboard ceiling lining. 2. Low-level (normal) moisture meter readings in the vicinity of 0.0% were recorded in this location at the time of inspection. 3. This damage appears to be consequential only, however the curved-sprung metal-deck roof is located above. 

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
77	Bathroom	1. Vertical cracking and drummy and delaminating tiles at the junction of walls in the north-eastern corner. 2. The cracking is reflected in the south-eastern corner of the adjoining living room. 
78	Living room	1. Cracked, drummy and delaminating render at the junction of walls in the south-eastern corner. 2. Evidence of previous repairs to the rendered masonry walls in this location. 3. The cracking is reflected in the north-eastern corner of the adjoining bathroom. 
	UNIT 48 (EASTERN BUILDING, LEVEL 6)	
79	Southern balcony	1. There are no overflow provisions throughout the perimeter balcony hob.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
80	Living room	1. Evidence of previous water penetration in the form of blistering and flaking paint and corroding metal angle beading to the rendered masonry hob at the base of the western, south-facing glass sliding door assembly. 2. Low-level (normal) moisture meter readings in the vicinity of 8.7% were recorded in the rendered masonry hob.   

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		 
	CARPARK	
81	Level 4	1. Evidence of significant water penetration in the form of water actively dripping from the construction joint extending through the Level 5 reinforced concrete slab and load-bearing core-filled reinforced blockwork and speed (schooner) brick walls. 2. Water is penetrating through the construction joint between the reinforced concrete beams and dripping onto the Level 4 floor slab before running down the driveway ramp to the Level 3 carpark. 3. Shrinkage/deflection cracking to the soffit of the Level 5 reinforced concrete slab adjacent to the northern masonry wall at the head of the driveway/ramp slab. 4. Water is actively dripping from the shrinkage/deflection cracking onto the Level 4 floor slab in this location. 5. Stalactite formation, calcification and efflorescence staining in the vicinity of the shrinkage/deflection cracking and stormwater pipe penetrations adjacent to the northern masonry wall at the top of the driveway/ramp.  

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		  
	COMMON AREAS	
82	Intercom 4, Level 5 eastern terrace, walkway and stairwell	1. Significant efflorescence and calcification staining to the terracotta tiled surfaces adjoining *Unit 17* southern balcony, which we understand has been recently re-waterproofed and retiled. 2. Water appears to be seeping beneath the 230mm face brickwork boundary wall and causing or contributing to the leak adjacent to the eastern wall in *Unit 10* living room.  (cont'd)

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		3. The vertical movement joints in the 230mm brickwork boundary wall have split and separated, which may also be compromising the waterproofing system on *Unit 17* southern balcony. 4. Evidence of water penetration in the form of stalactite formation and efflorescence staining to the southern stormwater pipe penetration through the Level 5 common area slab, and water actively dripping onto the Level 4 floor tiles below. 5. The terracotta floor tiles are tenting/hogged along the movement joints at the northern end of the Level 5 walkway. These movement joints have perished due to long-term compression, exposure and age-related deterioration.

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
		
		
		

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
		
		
		
		

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
83	Level 4 foyer	1. Evidence of water penetration in the form of staining, mould growth, blistering and flaking paint and staining to the northern and southern walls, cornice and suspended plasterboard ceiling lining. 2. The carpet is also stained in this location. 3. The southern wall of the Level 4 foyer forms the northern wall of *Unit 9* immediately adjacent. 4. The units featuring the large southern terraces are located immediately above, and it would appear the waterproofing provisions have failed in the vicinity of the construction joint.

ITEM	LOCATION	DESCRIPTION & PHOTOGRAPH(S)
84	Intercom 4, Level 4 Internal common foyer	1. Evidence of water penetration in the form of staining, mould growth and rot-affected carpet approximately midway along the corridor outside *Unit 10*. 2. Previous dye-testing (red) staining affects the carpet immediately adjacent to *Unit 10* ensuite. 3. High-level moisture meter readings in the vicinity of 44.8% were recorded in the carpet at the time of inspection. 4. *Unit 10* ensuite requires re-waterproofing.   

Comments and recommendations

Water penetration damage

Generally

Pinnacle attended site to investigate reported water penetration damage affecting the internal habitable areas of the nominated lots within the complex known as *Quay North Apartments* at *92 John Whiteway Drive, Gosford*, and provide professional advice on appropriate remediation strategies. During our inspections, we identified internal water penetration damage that is the result of external waterproofing deficiencies, and failed waterproofing within the wet areas. No access was provided to *Units 1, 4* and *32*.

Based on the information available during our inspections, we are of the opinion that the water ingress is likely related to a number of separate issues including, but not necessarily limited to:

1. Poorly detailed/failed weatherproofing provisions to the window and door assemblies (or apertures);
2. Poorly detailed/failed cavity flashings and head/sill flashings;
3. Absence of, or failure/poor detailing of the external waterproofing provisions throughout the balconies/courtyards/terraces; and
4. Failed/poorly detailed waterproofing provisions within the internal wet areas.

Water entering the *habitable* areas of a *Class 2* building from the building enclosure is a breach of *Performance Requirement* F3P1 (formerly *Performance Requirement* FP1.4) of the Building Code of Australia (BCA) which states:

Performance Requirements

F3P1 Weatherproofing

[2019: FP1.4]

A roof and *external wall* (including openings around *windows* and doors) must prevent the penetration of water that could cause—

(a) unhealthy or dangerous conditions, or loss of *amenity* for occupants; and

(b) undue dampness or deterioration of building elements.

Limitations

F3P1 does not apply to—

(a) a Class 7 or 8 building where in the particular case there is no necessity for compliance; or

(b) a garage, tool shed, *sanitary compartment*, or the like, forming part of a building used for other purposes; or

(c) an *open spectator stand* or *open-deck carpark*.

Unfortunately, in these circumstances, all parts of F3P1 have been breached, and *Pinnacle* is therefore of the view that action must be taken to eliminate the water penetration.

It is noted that Class 7a carparks do not fall under this Performance Requirement, as set out within the *Limitation* on F3P1, hence we do not advocate significant expenditure on eliminating such leaks, except where there is a substantial loss of amenity. The matter of basement carpark water penetration is addressed in later sections of this report.

Balcony/courtyard/terrace waterproofing

Our investigations revealed water penetration in the form of calcification and efflorescence staining, internal and external blistering and flaking paint, mould growth and dampness affecting the internal and external areas of the nominated lots.

Based on the information available at the time of our inspections, *Pinnacle* is of the opinion that the source of the water penetration is related to failed and/or poorly detailed waterproofing and/or weatherproofing provisions to the reinforced concrete balconies, terraces and/or courtyards.

The affected balconies, terraces and/or courtyards that require waterproofing membrane replacement are identified throughout the *Observations* schedule of this report.

Cracked, drummy, delaminating, tenting and hogged terracotta floor and skirting tiles exist throughout numerous balconies, terraces and/or courtyards, and this defect is related to poor workmanship during preparation and installation of the tiles. Insufficient provisions to accommodate predictable differential movement, thermal movement and "tile growth" within the predominantly terracotta tiling is the cause of this issue. Terracotta tiles are very porous, and absorb moisture at a high rate. The moisture absorption results in minute swelling of each tile, which over large areas causes the movement joints to compress, and over time, the joints fail and the tiles debond from the substrate under compression.

It is likely that the terraces with tenting/hogged tiles will also require re-waterproofing, and many of the Level 5 southern terraces appear to be the source of water ingress both laterally and to the Level 4 apartments below. Whilst some of these terraces have been (presumably re-waterproofed and) retiled, the detailing is questionable in some cases, and there are several opportunities for bypass.

Recommended remedial work

Waterproofing membranes

Liquid-applied waterproofing membranes are often used with tiles because they are cost effective and easily applied. Ordinarily, a liquid-applied waterproofing membrane would be topped with a sand-and-cement screed in order to achieve falls of not less than 10mm in 1000mm to the stormwater drainage provisions. These are the minimum falls recommended to ensure surface water is able to drain to the floor wastes without ponding, causing a loss of amenity to the occupants, and the possibility of damaging adjoining building elements.

A sheet waterproofing membrane may be used as a substitute to a liquid-applied membrane where project conditions permit. Sheet waterproofing membranes are advantageous because they provide a higher level of performance and increased

longevity, and can be welded onto and extended at later dates. However, they are often more expensive to supply and install due to their inherent quality, and the requirement for specialist installation techniques.

Despite this, we are of the opinion that a sheet waterproofing membrane system is most appropriate for the site conditions. The waterproofing membrane should be installed to achieve compliance with AS 4654-2012 *Waterproofing membranes for external above-ground use* Part 2: *Design and installation*.

Glass sliding door assemblies, hobs and water-stop angles

Compliance with AS 4654.2-2012 requires that the new waterproofing membrane meets minimum vertical upturn requirements. The waterproofing membrane must be carried a specific distance vertically up the building façade to mitigate against water penetrating the system. The difficulty in achieving minimum vertical upturns in remedial building work lies with the sill height of the existing glass sliding door assemblies, and the height of the existing cavity flashings, which may require raising (discussed in more detailed later in this report).

Where the minimum vertical waterproofing upturn cannot be achieved on an external area to be re-waterproofed, a new hob must be constructed beneath the affected door (involving removal and replacement of the door). The minimum vertical upturn is 50mm for a Class N2 site, 70mm for a Class N3 site, and 100mm for a Class N4 site. Should the height of the concrete hobs require raising, the existing glass sliding door (GSD) assemblies bounding external waterproofing replacement will also require replacement with new doors achieving appropriate wind and water ratings to suit the site conditions and compliance with AS 2047-2014 *Windows and external glazed doors in buildings*.

A water-stop angle is required at the rear of the new GSD assemblies to achieve compliance with AS 4654-2012 *Waterproofing membranes for external above-ground use* Part 2 *Design and installation*. New aluminium water-stop angles must be installed at the rear of the concrete hobs (or existing set-downs where applicable), with the new GSD assemblies installed outboard of the angle to achieve a water-tight system.

Cavity flashings

Cavity flashing replacement is likely to be necessary on the respective balconies, terraces and courtyards that require waterproofing membrane replacement. Additional cavity flashing replacement is required throughout the cavity brickwork façades not bounded by a balcony, terrace or courtyard, as well as replacement of head and sill flashings surrounding various window assemblies throughout the complex.

A cavity brickwork wall ordinarily contains a cavity flashing at the base of the wall, that is usually laid between the first and second courses of brickwork above the finished floor level (FFL). Traditional cavity flashings prevent water penetration from occurring because they collect water penetrating through "rain screen wall systems" – commonly known as the external skin of brickwork in a cavity brick wall or brick veneer façade – and discharge it via weepholes in the masonry that are set above an impermeable barrier e.g. an *Alcor* flashing.

During our inspections, we observed variations in the cavity flashing detailing. In various locations throughout the complex, cavity flashings (and their associated weepholes) were not visible as they had often been tiled over. In order to operate as intended, weepholes must be clear and allowed to discharge rainwater entering the cavity. This prevents water from charging the cavity and penetrating into the internal habitable areas of the apartments.

The cavities are likely continuous throughout the building façades, meaning that any water in the cavity can migrate laterally until it finds an entry point. Performing cavity flashing replacement in one isolated section of brickwork may not necessarily rectify a water penetration matter, because water already in the adjoining cavity can bypass the new cavity flashings.

It is our view that significant lengths of cavity flashing will require replacement, and this would be undertaken using the hit-and-miss method, which allows cavity flashing replacement whilst maintaining the structural integrity of the masonry wall. The flashing material must extend the full width of the outer skin of masonry to prevent water entering the wall cavity being directed into the extrusions of extruded bricks, and

thereby bypassing the flashings. It is also prudent to ensure that each end is boxed at the sliding door apertures to ensure water is directed externally via the weepholes.

Insulation and thermal efficiency

Pinnacle is of the view that thermal insulation can be incorporated into the new waterproofing membrane system designs in the form of an Inverted Roof Membrane Assembly (IRMA) or reverse IRMA.

In almost all construction, there is an obligation under the *State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 (BASIX SEPP)* to comply with energy efficiency requirements. Energy efficiency requirements in design are becoming more thorough to reduce the adverse effect on the environment caused by artificial heating and cooling across the design-life of a building.

For new residential construction, or alterations on residential buildings where the proposal cannot be labelled maintenance, a design must be sustainable as defined by the *BASIX Scheme*.

Insulation is required where a balcony, terrace, roof slab or podium is located over a habitable area and where insulation has not been provided in the suspended ceiling cavity in the lot below. Based on our experience with similar buildings in similar locations, we are of the view that insulation boards achieving an R-Value of 2.5 will achieve compliance, however confirmation is required from a qualified Energy Consultant prior to commencing construction. This confirmation will be set out on the aforementioned *BASIX* certificate.

Suspended pavers

Suspended paving can be provided as a modern approach to waterproofing and tiling. A proprietary suspended paving system consists of high-strength plastic paver stands that are adjustable to create workability, and the benefit of achieving an essentially level finished floor surface. For suspended paving systems, we often specify *Elmich VersiPave® GP* with 20mm thick porcelain pavers, although note the existence of the more highly adjustable *Elmich VersiJack®* stands.

Part of the suspended paving system includes providing a workable self-levelling topper to the surface of the reinforced concrete floor slab prior to sheet membrane installation. This encourages drainage of surface water beneath the FFL of the pavers, and extends the serviceable lifespan of the sheet waterproofing membrane system. We have had success with a combination of *bluey® BluCem RF20* and floor grinding in the past.

Balustrades

Compliance with the Building Code of Australia (BCA) Section D *Access and egress* Part D3D18 *Height of barriers* (formerly D2.16 *Barriers to prevent falls*) will almost certainly necessitate adjustments to the height of the balustrades and/or 230mm face brickwork balustrade walls. For balconies one metre or higher above the surface below, balustrades are required to be at least one metre high. Openings between balustrade members must not exceed 125mm as set out within BCA 2022 Volume 1.

Accordingly, balustrade alterations are likely to be necessary because the FFL will be altered with the use of rigid insulation boards (where balconies or terraces are located over habitable areas) and suspended paver system, which is necessary to achieve compliance with other legislation outlined in earlier sections of this report. Unfortunately, such work will involve replacing or modifying the existing balustrades.

Head and sill flashings

Based on our inspections, water penetration damage in the vicinity of window assemblies suggests the head/sill flashings may be defective and/or deficient, and are unable to drain water that has already entered the wall cavities.

Traditional head and sill flashings should be placed in the course above door and window lintels, and one or two courses below window apertures. Similarly to cavity flashings, the flashing material must extend the full width of the outer skin of masonry to prevent water entering the wall cavity being directed into the extrusions of extruded bricks, and thereby bypassing the flashings.

Internal waterproofing provisions

Internal waterproofing membranes

Water penetration emanating from the wet areas affects the internal habitable areas of several lots at *92 John Whiteway Drive, Gosford.* Water penetration presents in the form of staining, corrosion of door jambs and/or water stop angles, mould growth and blistering and flaking paint. High-level moisture meter readings were also recorded in the internal surfaces surrounding and adjoining the bathrooms and ensuites.

Water penetrating from a wet area threshold that causes damage to internal linings and finishes breaches Section 4.8 *Waterstops* of AS 3740-2021 *Waterproofing of domestic wet areas* which states:

> **4.8 Waterstops**
>
> **4.8.1 General**
>
> Waterstops shall be installed to retain water within the shower area or wet area. Waterstops are an integral part of the waterproofing system and shall conform with Clauses 4.8 and 4.9.

In this instance, Section 4.9 *Door openings*, Parts 4.9.1 *Perimeter flashing at floor level openings* and 4.9.2 *Protection of door frames and architraves* of AS 3740-2021 *Waterproofing of domestic wet areas* have also been breached, which state:

4.9 Door openings

4.9.1 Perimeter flashing at floor level openings

The following requirements apply to perimeter flashing at floor level openings:

(a) Whole wet area floor waterproofing shall incorporate —

  (i) a waterstop that has a vertical leg finishing flush with the top of the finished floor level shall be installed at floor level openings; and

  (ii) a floor membrane terminated to create a waterproof seal to the waterstop and to the perimeter flashing.

(b) Waterproofing other than whole wet area floor waterproofing shall incorporate a waterstop that —

  (i) has a vertical leg finishing flush with the top of the finished floor level installed at floor level openings; and

  (ii) is integral with the perimeter flashing.

(c) Perimeter flashing to wall, floor surfaces, and door openings shall —

  (i) be continuously sealed to the horizontal surface;

  (ii) have a vertical leg of a minimum of 25 mm above the finished floor level, except across doorways; and

  (iii) have a horizontal leg with a minimum width of 50 mm.

(d) Waterstops at cavity sliders shall —

  (i) be returned across the cavity opening; and

  (ii) have a membrane applied to form a continuous perimeter flashing.

NOTE For an example of waterproofing installation, see Figure 4.9.1(B).

4.9.2 Protection of door frames and architraves

The requirements for protection of door frames and architraves are as follows:

(a) Timber door frames shall not be embedded into the tiles.

(b) There shall be a sealed gap of a minimum of 2 mm between the door architrave and the floor.

(c) The underside of the door jamb and architrave shall be treated to resist moisture.

NOTE Some examples of moisture resistant treatments include paint, sealant, etc.

See examples of waterproofing installations in Figure 4.9.1(A), Figure 4.9.1(B), and Figure 4.9.1(C).

Compliance with AS 3740-2021 is compulsory because it is a listed Australian Standard within Volume 1 of the BCA, which is applicable to Class 2 buildings. This is because Deemed-to-Satisfy (DtS) Provision F2D2 *Wet area construction* (formerly DtS Provision F1.7) of the BCA states:

F2D2 Wet area construction

[2019: F1.7(a) and (b)]

SA F2D2(1)

(1) In a Class 2 and 3 building and a Class 4 part of a building, building elements in *wet areas* must—

(a) be *water resistant* or *waterproof* in accordance with Specification 26; and

(b) comply with AS 3740.

Unfortunately, in these circumstances, F2D2 has been breached due to the manifestation of damage resulting from wet area waterproofing defects, and *Pinnacle* is therefore of the view that action must be taken to eliminate the water penetration.

We consider the subject internal wet area waterproofing provisions deficient in that water is exiting the internal wet areas and damaging the adjoining building elements. An internal wet area containing a shower must be trayed in two sections: the shower recess and the main wet area. Both trays must be waterproofed to prevent water and moisture adversely affecting the adjoining habitable areas.

Recommended remedial work

Waterproofing membrane replacement is required to address failed waterproofing provisions within the nominated lots. A basic scope of works for remediation, including incorporation of aluminium water-stop angles, would be likely to include:

1. Set up work areas and protect all adjoining surfaces around the work areas.
2. Temporarily disconnect and remove the shower screens. Store safely for reinstatement.
3. Temporarily disconnect and remove the vanity units. Store safely for reinstatement.
4. Temporarily disconnect and remove all other fittings and fixtures (vanity mirror, towel rails, toilet paper holder, soap holder, tapware, shower rose, etc).
5. Water pressure clean and flush the waste/sanitary plumbing systems at the main floor areas and shower recess floor waste drains to clear all blockages.
6. Install plumber's plugs down floor waste drains to prevent debris from entering the drainage system. Remove upon completion of works.
7. Disconnect and demolish the toilet bowls. Demolish the cement base of the toilet bowls.

8. Demolish wall tiling throughout the entire shower recess' and adjoining wet areas.
9. Strip and remove the existing waterproofing membrane from the shower recess walls.
10. Demolish floor tiling throughout the entire shower recess' and entire adjoining wet areas including all bedding screed material.
11. Engage a plumber to pressure test all water supply pipework to identify if there are any leakages. Allow to rectify all leakages as required.
12. Carry out any necessary repairs to sections of cracked, drummy and delaminating render throughout the wet areas.
13. Suitably treat and coat the steel door frames to remove and prevent corrosion.
14. Suitably prepare the substrate throughout the wet areas in a manner conducive to the application of an appropriate, under-tile waterproofing membrane.
15. Install new water-stop angles along the doorway thresholds. Bond appropriately against the reinforced concrete floor slabs.
16. Apply a suitable waterproofing membrane system to the shower recess', and main wet areas in accordance with AS 3740-2021 *Waterproofing of domestic wet areas*.
17. Re-screed the shower recess floors and main wet area floors with correct falls to drainage waste outlets. Falls to be in accordance with AS 3958.1-2007 *Ceramic tiles – Guide to the installation of ceramic tiles.*
18. Install new wall and floor tiling throughout the shower recess', and main wet area floor areas to match existing. All tiling and finishing of tiling to be undertaken in accordance with AS 3740-2021 and AS 3958.1-2007 *Ceramic tiles – Guide to the installation of ceramic tiles*. Grout tiles.
19. Reconstruct the cement base for the toilet pans.
20. Supply, install and connect new toilet suites to match existing.
21. Install new floor waste drainage grates.
22. Seal all tiled wall/floor junctions with a suitable waterproof flexible construction sealant.
23. Suitably prepare and paint the affected surfaces to match existing using a wet area-grade, multiple-coat paint system in accordance with the manufacturer's recommendations.
24. Reinstate all shower recess and main wet area fittings and fixtures using suitable fasteners in accordance with the manufacturer's recommendations.
25. Reinstate and reconnect the vanity units.

26. Reinstate the shower screens.
27. Caulk and seal all joints and junctions with a suitable, wet-area grade flexible construction sealant in accordance with the manufacturer's recommendations.
28. Clean up and make good.

Should the Owners Corporation proceed with re-waterproofing the affected internal wet areas, these works must capture the entirety of the waterproofing provisions to achieve compliance with the relevant Australian Standards and the BCA. Regulated Designs are required if more than one wet area is waterproofed under the same contract as set out within the Design and Building Practitioners Act 2020 (DBP Act) and Regulation 2021.

Masonry cracking

General

Cracking to load-bearing masonry buildings is typically caused by a combination of factors rather than one specific issue. Contributing factors may include, but are not necessarily limited to:

1. Normal building movement.
2. Differential movement between building elements (including movement induced by long-term deflection of suspended reinforced concrete slabs, and movement induced by different building materials such as masonry, concrete and steel in contact with one another).
3. Brick growth.
4. An absence of appropriate articulation in the structure to accommodate such movement.

In this case, *Pinnacle* is of the opinion that the cracking is likely to be related to a combination of brick growth, normal building movement, differential movement, bearing issues and long-term deflection of the suspended reinforced concrete slabs. Cracking typically occurs at inherent weak points in load-bearing masonry structures with reinforced concrete floor slabs, such as around door and window openings, and often occurs at internal and external corners and at the junction of walls.

Brick growth occurs when masonry absorbs moisture over time causing the kiln-fired clay bricks to “grow”. When the bricks leave the kiln, they are largely free of moisture, and with normal rain and moisture absorption from the atmosphere over time, the clay bricks swell minutely causing vertical cracking to occur at external corners where there is resistance from an adjoining wall.

The cracking may also be related to differential movement between the adjoining lengths of masonry. This could be caused by such factors including thermal expansion and contraction, and the effects of bearing issues associated with the supporting masonry courses adjacent to the reinforced concrete floor slabs.

In almost every case, the cracking is considered hairline to minor in width, and many of the cracks have been previously repaired.

Because we are of the opinion the cracking is minor in nature and of no structural consequence at this point in time, it does not necessarily warrant repair, nor does it prevent periodic painting of the apartments. However, we acknowledge the cracking may be considered unsightly by the lot occupants and it may therefore be repaired at the Owners Corporation’s discretion.

Recommended remedial work

Repairs to the external face brickwork façades would most likely involve replacing isolated cracked bricks if preferred, and/or installing an expansion joint to accommodate any future movement. Further, the Owners Corporation may wish to stiffen sections of the masonry walls using a crack stitching system, such as the *Helifix Helibar* system or the *Thor Helical®* system.

Pinnacle draws the Owners Corporation’s attention to the likelihood that any repairs to face brickwork may be noticeable because it is difficult to perfectly match the colour of the replacement mortar. However, a competent and experienced remedial builder will achieve satisfactory results.

The internal cracking to the rendered masonry walls within the affected lots is considered minor, and the majority of it may be addressed by simply patching with a proprietary flexible gap-filling agent such as *Selleys* "No More Gaps" prior to repainting the affected walls. More significant repairs may involve removing and replacing cracked, drummy and delaminating render in combination with providing metal lathe reinforcing over any cracks in the underlying masonry, and installation of additional movement joints, for example, at the interface of adjoining building elements and masonry walls.

Any future work should be completed by a competent, licenced tradesperson in accordance with an approved scope of works, however there is no guarantee that, over time, the cracking will not reoccur due to factors outside the control of the contractor and building consultant including, but not limited to ongoing building movement.

Carpark water penetration

Our investigations revealed that water penetration is occurring along the Level 5 construction joint and penetrating into the Level 4 carpark at *92 John Whiteway Drive, Gosford*. Water penetration presents in the form of dampness, efflorescence and calcification staining, stalactite and stalagmite formation. Water is also penetrating through the Level 4 construction joint and/or flowing down the driveway ramp into the Level 3 carpark.

Water entering the *habitable* areas of a *Class 2* building is a breach of *Performance Requirement* F3P1 (formerly *Performance Requirement* FP1.4) of the Building Code of Australia (BCA) which states:

Performance Requirements

F3P1 Weatherproofing

[2019: FP1.4]

A roof and *external wall* (including openings around *windows* and doors) must prevent the penetration of water that could cause—

(a) unhealthy or dangerous conditions, or loss of *amenity* for occupants; and

(b) undue dampness or deterioration of building elements.

Limitations

F3P1 does not apply to—

(a) a Class 7 or 8 building where in the particular case there is no necessity for compliance; or

(b) a garage, tool shed, *sanitary compartment*, or the like, forming part of a building used for other purposes; or

(c) an *open spectator stand* or *open-deck carpark*.

Class 7a carparks do not fall under this Performance Requirement, as set out within the *Limitation* on F3P1, hence we do not advocate significant expenditure on eliminating the leak, except where there is a substantial loss of amenity, possible long-term damage to the structure and/or safety hazard.

Recommended remedial work

Water leakage from PVC pipe penetrations and through core-filled reinforced blockwork walls and suspended reinforced concrete slabs require attention, including replacement of defective PVC pipework and/or replacement of the adjoining waterproofing membranes.

Such work is likely to involve costly and disruptive waterproofing of the Level 5 common area walkways, which is also necessary to correct other water penetration defects affecting the Level 4 common area walkways/stairwell. There may also be a requirement to attend to the waterproofing provisions within the adjoining masonry planterboxes and courtyards.

The building's existing stormwater drainage system may also require review by a qualified Hydraulics Consultant as part of any long-term approach to managing

groundwater entering the basement carpark. We are able to provide contact details for our trusted third-party consultants upon request.

Under the circumstances, we suggest the water penetration can be temporarily controlled by "catching, collecting, and discharging" water seeping through the construction joint via the use of a series of corrosion-resistant drip trays.

We acknowledge and draw the Owners Corporation's attention to the fact that this work will not resolve the water penetration issue, and merely prevents water from dripping onto the Level 4 driveway/ramp and flowing down the ramp into the Level 3 carpark. The drip trays can be extended as required by the Owners Corporation to manage water dripping onto the floor slabs below, and where possible, the drip trays should be connected to the carpark's existing stormwater drainage system. Where this is not possible, the waste pipes should discharge onto the floor slab in a suitable location, and so as to allow water to flow across the surface of the slab to the nearest stormwater drainage pit.

Design and Building Practitioners Act 2020 and Regulation 2021

The Owners Corporation may be aware of the significant changes to the Construction Industry that have taken place since the appointment of the Building Commissioner, and more importantly, the introduction of the Design and Building Practitioners Act 2020 (DBP Act) and Regulation 2021. These changes were pushed through Parliament to address widespread building defect issues that are rife throughout the industry, and that were brought into the public arena with the high-profile cases of the *Opal Tower* and *Mascot Towers* buildings, amongst many others. The Act came into effect on 1 July 2021.

How this affects *92 John Whiteway Drive, Gosford NSW 2250*

In simple terms, under the DBP Act, "Regulated Designs" must be provided for various construction activities, which includes work to "waterproofing" and "the building enclosure". Regulated Designs must be submitted to the *NSW Government* through its *Planning Portal*, and can only be prepared by essentially a Registered Architect, although certain Structural Engineers can prepare Regulated Designs for waterproofing, and there are several other categories for professions such as hydraulic engineering, fire

engineering and most other fields of engineering. Further, the Regulated Designs must be submitted in the form of a drawing (or a series of drawings), and on the *NSW Government* template. A "Principal Design Practitioner" can collate designs from the various "Design Practitioners" where this is necessary.

Any parts of a Specification relating to waterproofing and/or building enclosure work must be converted to a drawing on the *NSW Government* template, and entered into the *NSW Planning Portal* (including projects not requiring Development Consent and a Construction Certificate) before Work Under Contract (WUC) can commence.

In almost all cases, we strongly recommend that any Specification(s) be converted by a Registered Architect because the quality of the drawing is crucial, particularly when viewed by the *NSW Government*, and eventually the builder. The end-user (the Owners Corporation) will benefit from this process in knowing the design is compliant with the relevant Australian Standards, the Building Code of Australia (BCA), and has been peer-reviewed before being built to the specified design by a qualified and licenced builder (a "Building Practitioner"). Whilst the additional preparation required prior to commencement of WUC will incur further professional fees, this collaborative process is the *NSW Government's* intention.

Accordingly, we note that should the Owners Corporation wish to proceed with a Specification and subsequent construction, additional cost will be incurred for all other building consultancy and construction management services, including but not limited to arranging design approvals, arranging and obtaining certification from third-party professionals and certifiers, and all services, declarations and actions related to the Design and Building Practitioners Act 2020 and Regulation 2021. *Pinnacle* currently engages the services of trusted third-party Design Practitioners to convert its Specifications to the Declared Regulated Design(s). Early involvement from the Design Practitioner can reduce project timeframes and progress the necessary remedial work in a timely manner.

Albeit a brief explanation of a complicated scenario, we trust the above is clear. *Pinnacle* would be pleased to assist the Owners Corporation with progressing this matter in the future.

Building Work Levy

On 4 July 2022, the *NSW Government* introduced a "Building Work Levy" for certain construction work on Class 2 buildings. The Building Work Levy is intended to fund the NSW building reforms that are currently governed by the *Office of the NSW Building Commissioner* and *Fair Trading*.

Further information on the Building Work Levy can be found here: https://www.fairtrading.nsw.gov.au/trades-and-businesses/construction-and-trade-essentials/DBP-regulated-buildings/developers-working-on-regulated-buildings/building-work-levy#what-projects-bwl.

Approvals pathway process

Past actions by the *Office of the NSW Building Commissioner* prompted developments in the remedial building industry surrounding the necessity for Development Consent for remedial building projects. The classification of "building work" under the Act and its assessment as "Exempt Development" has been the recent focus of the Building Commissioner.

Pinnacle is not a Town Planning consultancy, however based on our review of the *State Environmental Planning Policy (SEPP) 2008* Section 1.16 *General requirements for exempt development* (https://legislation.nsw.gov.au/view/html/inforce/current/epi-2008-0572#sec.1.16), we are of the view Development Consent is not required for the proposed remediation. Despite this, we draw the Owners Corporation's attention to the likelihood that a demonstration of, and reasoning for this position may be requested by the *NSW Government* in the future. The Owners Corporation should therefore obtain an Exempt Development Assessment/Approvals Pathway Report from a qualified town planner prior to commencement of any future building work.

Similarly, we are able to make all necessary arrangements with our trusted third-party consultants upon request.

Conclusion

Summary

Water penetration affects the internal habitable areas of various lots within *Quay North Apartments* at *92 John Whiteway Drive, Gosford NSW 2250*. Water penetration presents in the form of staining, mould growth, blistering and flaking paintwork and high-level moisture meter readings depending on the location.

Water entering the *habitable* areas of a *Class 2* building is a breach of *Performance Requirement* F3P1 (formerly *Performance Requirement* FP1.4) of the Building Code of Australia (BCA). In these circumstances, all parts of F3P1 have been breached, and *Pinnacle* is therefore of the view that action must be taken to eliminate the water penetration.

Based on the information available during our inspections, we are of the opinion that remediation will involve application of new waterproofing membranes to various balconies, courtyards, terraces and common areas. These works are likely to prove costly and disruptive, and will also involve several other associated construction activities including, but not limited to cavity flashing replacement, replacing various sliding door and window assemblies, construction of new concrete hobs, stormwater drainage upgrades and balustrade replacement.

During the course of our inspections, we also identified various instances of water penetration positioned immediately below or adjacent to the internal wet areas. The damage presents in the form of staining, mould growth and water damaged suspended plasterboard ceiling linings, and swollen or stained skirting boards. Active water penetration was confirmed via high-level moisture meter readings. *Pinnacle* is of the view the damage is attributable to failure and/or deterioration of the waterproofing membranes within the adjoining wet areas.

The leaking bathrooms/ensuites and laundries must be re-waterproofed to restore amenity to the lot occupants and mitigate against ongoing damage to the building elements.

We draw the Owners Corporation's attention to the Design and Building Practitioners Act 2020 (DBP Act) and Regulation 2021, and the subsequent requirement to obtain Regulated Designs for certain building work prior to commencement. Consideration should also be given to obtaining an Exempt Development Assessment from a qualified town planner prior to commencement of any future building work.

Finally, all repairs should be undertaken by a competent and licenced contractor in accordance with the relevant Australian Standards and the Building Code of Australia (BCA).

Pinnacle would be pleased to assist the Owners Corporation with progressing this matter, and welcomes the opportunity to specify the work and obtain tenders from the competitive marketplace.

Disclaimers

The causes of the defects outlined in this report are provided based on our visual observations (without destructive investigations) and experience with similar issues in the past.

We have not been privy to the structural design drawings for the complex or geotechnical information for the site. *Pinnacle* is not in receipt of any other documentation, for example, details of previous work carried out on the complex that may have aided us in our diagnosis or considered recommendations unless stated otherwise.

Whilst the suggested causes of the defects are in all likelihood the actual causes, *Pinnacle Building Consultancy Pty Ltd* is not liable for unsupervised repairs undertaken by others that are based on the information provided within this report.

We trust this report is clear and addresses the Owners Corporation's requirements. Should you require clarification or wish to progress this matter with *Pinnacle's* assistance, we would welcome the opportunity to remain involved.

Yours sincerely,

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