
Pittwater Data Services Pty Ltd
ABN 36098815537
27 Ashby Street Dudley, 2290
Mobile: 0422088032
Email: pittwaterdataservices@live.com.au
Our Reference: PDS09032023.895BARR.PALMB

Mr Simon and Lisa Causley
895 Barrenjoey Road
Palm Beach, 2107

9th March 2023

Estuarine and Flood Risk Management Report for 865 Barrenjoey Road, Palm Beach

Dear Simon and Lisa,

1.0 INTRODUCTION

I refer to your Development Application (DA) at 865 Barrenjoey Road, Palm Beach (Lot 7 DP 17191) as discussed with JD Evans Company and yourselves. The proposed development is detailed in Figures 7,8,9 and 10. Northern Beaches Council (NBC) has identified the property as subject to inundation. Therefore an Estuarine Risk Management Report (ERMP) of the design, potential inundation as detailed in Development Control Plan 2010 (DCP Appendix 7) is required. The *site* is also within the Flood Planning Area and subject to DCP Section B3.11.

The following ERMP was undertaken and submitted for both your and Council consideration as part of the DA process. Note that 865 Barrenjoey Road, Palm Beach will be referred to as the *site*.

2.0 SITE INSPECTION

A *site* inspection was undertaken with Simon Causley (owner of the *site*) and Mr Stephen Wyllie. The *site* is located as shown in Figure 1. There are several features of the topography of the *site* and its location in Pittwater that are important to the potential inundation of the *site*. These are:

1. The *site* is located on the northern foreshore of Careel Bay as shown in Figures 1 and 3.
2. The foreshore on this side of the Bay is a relatively flat and with a wide intertidal zone as shown in Figures 1 and 3.
3. The foreshore is protected with a stepped stone sloping wall as shown in Figure 1.
4. There is reserve approximately 25 metres wide bounded by the seawall and the western boundary of the *site*.
5. The *site* varies in level from 1.4 metres AHD to 3 metres AHD from the western to eastern boundaries as shown in Figure 5.

6. The *site* is exposed to wind generated waves from the north western sector as shown in Figure 3.
7. Large long period ocean waves may refract/diffract into the *site* however would be of low energy.
8. The foreshore appears stable as there is no evidence of seawall instability or sediment erosion/accretion processes as shown in Figure 3. This stability, suggests low wave energies: locally fetched waves and attenuated ocean swells.
9. In relation to flooding the *site* catchment is approximately 3.8 Ha bounded by Whale Beach Road
10. Overland flows to the *site* are minor as flows from the catchment are intercepted by Barrenjoey Road and exit through the pipeline as shown in Figures 1 and 4.

3.0 REVIEW OF EXISTING DATA

The *site* was surveyed by Total Surveying Solutions Ref 170687 dated 13th March July 2017. (Figure 5).

The Pittwater estuary processes has been extensively studied by a number of investigations commissioned by the then Pittwater Councils and Manly Hydraulics Laboratory. These are:

1. Australian Water Coastal Studies (1990) Extreme Water Levels in Pittwater by D.Harradasa, E.Couriel and S. Wyllie (Ref 1).
2. Manly Hydraulics Laboratory (1992) Mid NSW Coastal Region Tide –Storm Surge Analysis Report MHL 621 by S. Wyllie and D. Gorham (Ref 2).
3. Pittwater Estuary Mapping of Sea Level Rise Impacts LJ2882/R2658v8 May 2015 Cardno (Ref 3).

The ocean conditions experienced on the weekend of the 4 to 5th June 2016 was conducive to developing high energies in Careel Bay and at the *site*. Manly Hydraulics Laboratory (MHL) wave rider buoy located offshore of Long Reef, measured wave from the East with a maximum wave height of approximately 10 metres and a wave period of 11 seconds. These waves, particularly the wave direction and period, penetrated into Pittwater and Careel Bay. No official records were made of the wave climate in Careel Bay only observations. Wave studies has shown that ocean wave can penetrate to Stokes Point and Careel Bay (Ref 1).

Associated with this wave climate was a predicted high astronomical tide (2.05 ISLW) and a storm surge. The storm surge was measured by MHL tide gauge located at Patonga Wharf. At the time of the peak predicted tide (2030Hrs 5th June 2016) the storm surge was 0.2 metres producing a combined recorded water level of 2.24m ISLW or 1.31mAHD. Note that 2.24m tide has only occurred several times over the last 100 years (Ref 2).

It was observed by Mr Causley on the 5th June 2016 from evidence of debris, that the sea wall had been overtopped and wave run-up had possible occurred. The debris line was approximately 2 metres from the top of the wall as shown in Figure 3.

4.0 RESULTS OF INVESTIGATION

The study which is relevant to this report is the Cardno 2015 study (Ref 3). The key findings for the *site* Estuary Planning Level (EPL) are specifically:

1. The foreshore and offshore intertidal zone is classified as a Foreshore Type 2: Sea wall with a crest level of 1.4 metres AHD.
2. The 1% ARI still water level is 1.5metres AHD. This water level was experienced in June 1974 with a combination of a 0.9 AHD astronomical tide and 0.6m ocean storm surge. (Ref 2). Note that the June 1974 ocean level (1.5m AHD) is in excess of the 1%ARI (Ref4).
3. The significant wave height (Hs) was hindcasted to be 0.78 metres. Zero Crossing period (Tz) of 2.1seconds. This is a local sea from the north-west sector for a 1%ARI wind.
4. The wind set- up near the *site* is 0.06 metres from wind stress across the Bay. In essence pushing water onto the foreshore.
5. The EPL is predicted to be 2.20metres AHD. This level is a combination of 1.5 (Astronomical Tide and surge) +0.3 (freeboard) + 0.06 (wind set up) + 0.34 (wave set- up and run- up).
6. The sea level rise predictions do not increase the area of inundation for the *site* as detailed in Figure 4.2E Ref 3. It is also understood that sea level predictions for small developments do not apply. However sea rise is being monitored in Australia and the trend based on Fort Denison records of approximately 1.3 mm/year (Ref 4). IPCC revised predictions in 2019 are 0.71metres in year 2100. Note this estimate is from the year 2020.

The predicted combined level may inundate the eastern area of the reserve to a depth of approximately 0.8 metres for approximately 30 minutes. The attenuation of that combined water level to the *site* boundary is a complex process. However from my experience with wave flume testing of seawalls considering the relatively small significant wave heights (0.78m) and short period (2.1) that these waves will dissipate high percentage of its energy on the sea wall in the plunging break manner as shown in Figure 6.

Therefore the predicted EPL for the *site* of 2.30 metres AHD is considered conservative in applying this depth to the western area of the *site*. The 25 metres reserve between the sea wall and western boundary of the *site* will also substantially reduce the wave energy. It has been estimated that the run-up at the *site* western boundary, 25 metres from the breaking wave point, will be reduced to approximately 1.6 metres AHD. The estimated breaking and run- up process is shown in Figure 6.

As discussed in Section the local *site* catchment is only 3.8Ha and overland flows will be intercepted by Barrancjoey Road to the drainage pipeline as shown in Figures 2 and 4. Overland flows through the *site* in the vicinity of the proposed development only occur during a PMF event which is low risk (Figure 4). In essence the Pittwater ocean inundation is the worst case in relation the potential flooding of the proposed lower floor levels of 2.29m AHD.

5.0 IMPACT OF THE ADDITIONS

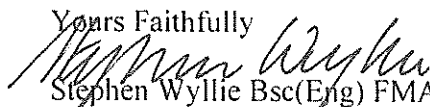
The proposed Alterations and Additions are shown in Figures 7.8.9 and 10, include the living room, dining room and kitchen at a floor level of 2.29m AHD, bedrooms and bathroom at floor level of 3.13m AHD and a first floor level. A swimming pool with coping at ground level is also proposed. Considering the EPL of 2.3metres AHD, the Alterations and Additions will experience no impact from the inundation processes, as the proposed floor levels are above the EPL as shown in Figures 8,9 and 10. It should be noted that the existing Dwelling floor level of 3.13 m AHD is above the EPL of 2.3 m AHD and the predicted 2100 0.72metres for sea level rise (Ref 4).

Debris will transported across the reserve and into the western *site* area. The proposed swimming pool may act as a sink for this debris. It is important that loose items be stored above the EPL and preparations for this action can be planned based on the times of predicted high spring tides associated with extreme storms: strong winds and low barometric pressure.

6.0 RECOMENDATIONS

The proposed additions as detailed in Figures 7,8,9 and 10 will satisfy NBC DCP appendix 7 considering that the estimated EPL is 2.3metres AHD. During a major event as discussed in Section 5 preparations to raise loose item above the EPL should actioned. During a major event it is also recommended that occupants of the *site* are briefed about the potential inundation and they remain in the Dwelling or at higher levels above the EPL. That is to restrict access to the western end of the *site* during a major storm event when combined with a spring tide.

Yours Faithfully


Stephen Wyllie Bsc(Eng) FMA Member

Director

9/03/2023

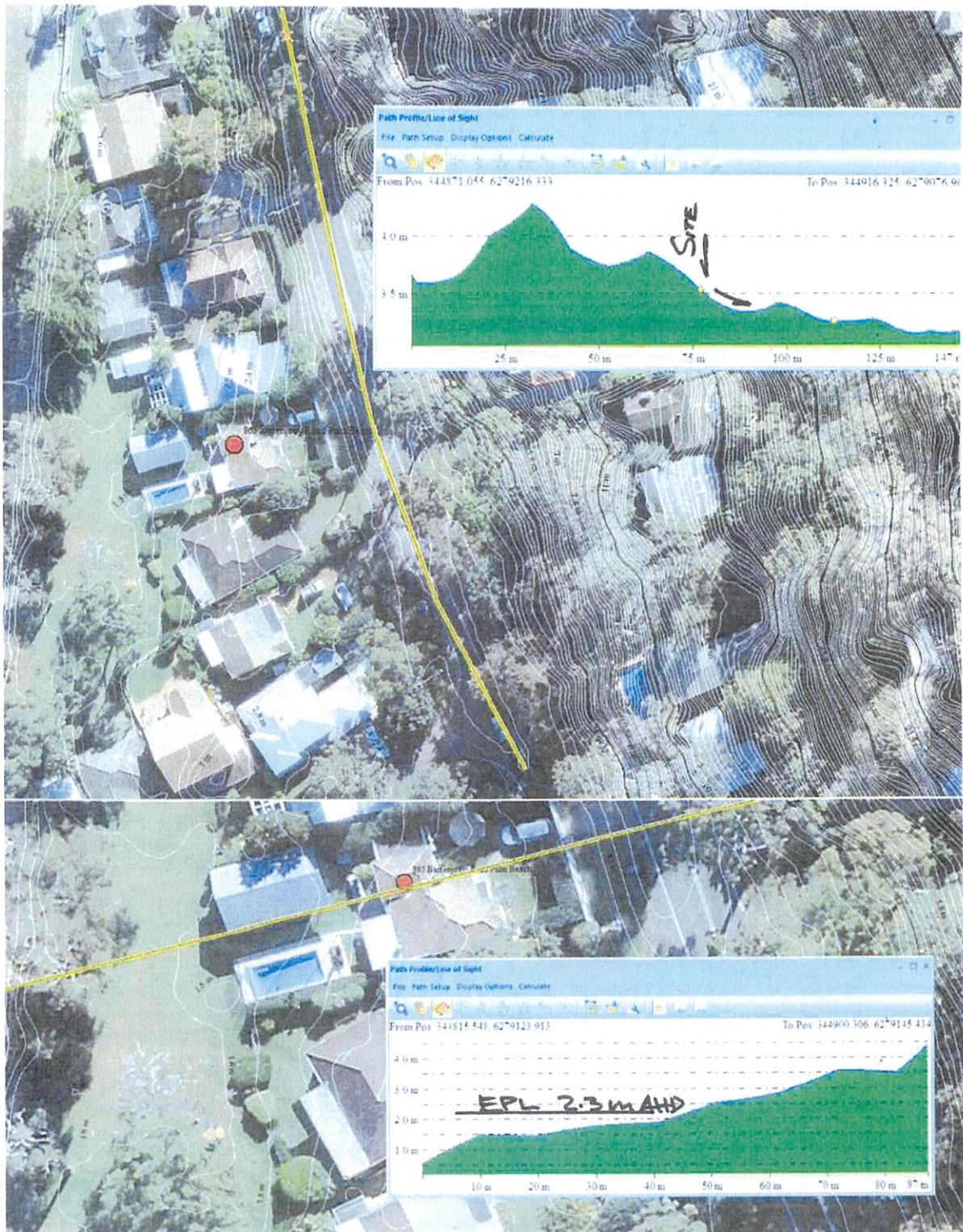
7.0 REFERENCES

1. Australian Water Coastal Studies (1990) Extreme Water Levels in Pittwater by D.Harradasa, E.Couriel and S. Wyllie.
2. Manly Hydraulics Laboratory (1992) Mid NSW Coastal Region Tide –Storm Surge Analysis Report MHL 621 by S. Wyllie and D. Gorham.
3. Pittwater Estuary Mapping of Sea Level Rise Impacts LJ2882/R2658v8 May 2015 Cardno.
4. Updated Mean Sea-Level Analysis: Australia, Journal of Coastal Research Watson. P.J March 2020
5. IPCC (International Panel on Climate Change), 2020.



LEGEND
● SITE.
--- SITE CATCHMENT

FIGURE 1



LEGEND



TRANSECT

OVERLAND FLOWS

FIGURE 2

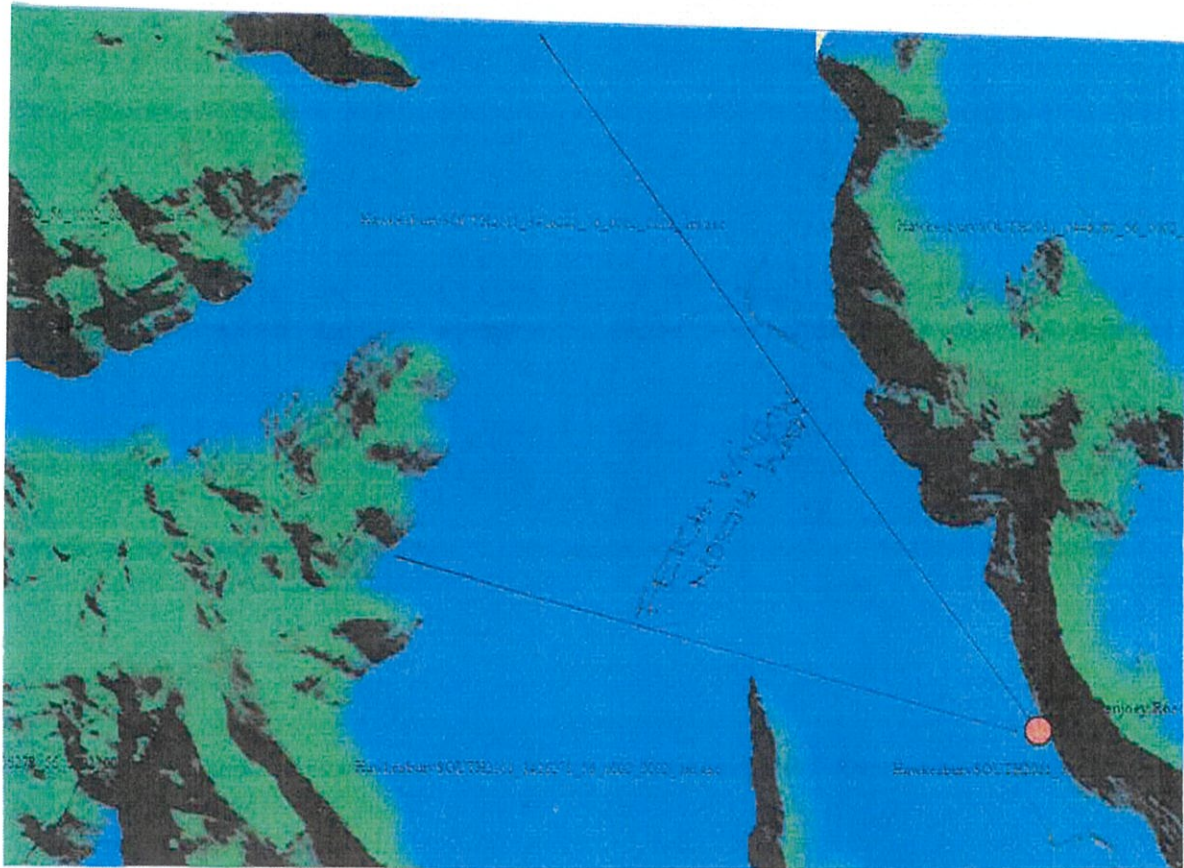


FIGURE 3

Northern Beaches Mapping

Stormwater

90

Enter address...

PETTERA RIVER

Aerial Photo

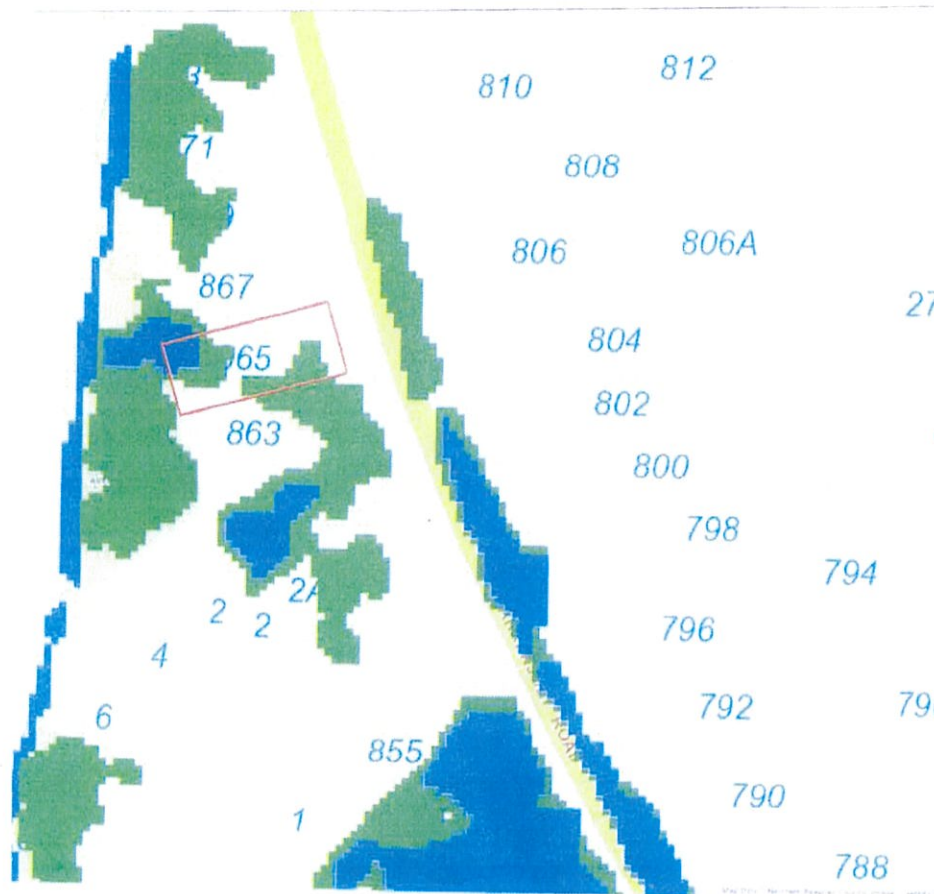
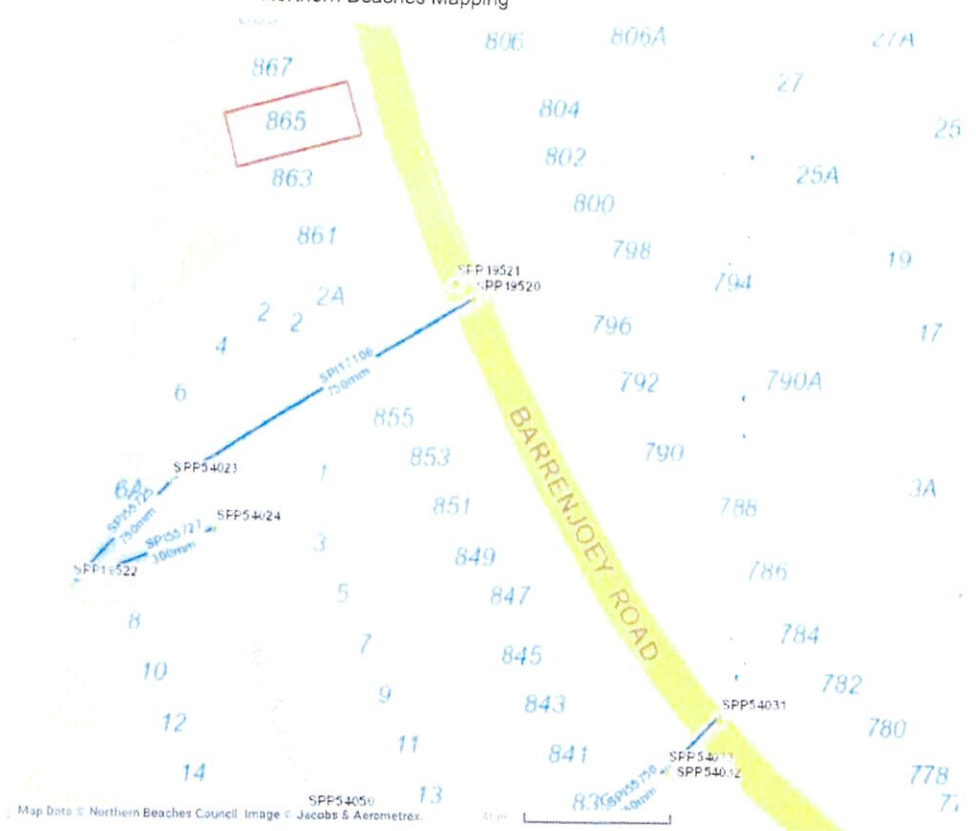


FIGURE 4

2000-2001, 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013, 2014-2015, 2016-2017, 2018-2019, 2020-2021, 2022-2023, 2024-2025, 2026-2027, 2028-2029, 2030-2031, 2032-2033, 2034-2035, 2036-2037, 2038-2039, 2040-2041, 2042-2043, 2044-2045, 2046-2047, 2048-2049, 2050-2051, 2052-2053, 2054-2055, 2056-2057, 2058-2059, 2060-2061, 2062-2063, 2064-2065, 2066-2067, 2068-2069, 2070-2071, 2072-2073, 2074-2075, 2076-2077, 2078-2079, 2080-2081, 2082-2083, 2084-2085, 2086-2087, 2088-2089, 2090-2091, 2092-2093, 2094-2095, 2096-2097, 2098-2099, 2100-2101, 2102-2103, 2104-2105, 2106-2107, 2108-2109, 2110-2111, 2112-2113, 2114-2115, 2116-2117, 2118-2119, 2120-2121, 2122-2123, 2124-2125, 2126-2127, 2128-2129, 2130-2131, 2132-2133, 2134-2135, 2136-2137, 2138-2139, 2140-2141, 2142-2143, 2144-2145, 2146-2147, 2148-2149, 2150-2151, 2152-2153, 2154-2155, 2156-2157, 2158-2159, 2160-2161, 2162-2163, 2164-2165, 2166-2167, 2168-2169, 2170-2171, 2172-2173, 2174-2175, 2176-2177, 2178-2179, 2180-2181, 2182-2183, 2184-2185, 2186-2187, 2188-2189, 2190-2191, 2192-2193, 2194-2195, 2196-2197, 2198-2199, 2200-2201, 2202-2203, 2204-2205, 2206-2207, 2208-2209, 2210-2211, 2212-2213, 2214-2215, 2216-2217, 2218-2219, 2220-2221, 2222-2223, 2224-2225, 2226-2227, 2228-2229, 2230-2231, 2232-2233, 2234-2235, 2236-2237, 2238-2239, 2240-2241, 2242-2243, 2244-2245, 2246-2247, 2248-2249, 2250-2251, 2252-2253, 2254-2255, 2256-2257, 2258-2259, 2260-2261, 2262-2263, 2264-2265, 2266-2267, 2268-2269, 2270-2271, 2272-2273, 2274-2275, 2276-2277, 2278-2279, 2280-2281, 2282-2283, 2284-2285, 2286-2287, 2288-2289, 2290-2291, 2292-2293, 2294-2295, 2296-2297, 2298-2299, 2300-2301, 2302-2303, 2304-2305, 2306-2307, 2308-2309, 2310-2311, 2312-2313, 2314-2315, 2316-2317, 2318-2319, 2320-2321, 2322-2323, 2324-2325, 2326-2327, 2328-2329, 2330-2331, 2332-2333, 2334-2335, 2336-2337, 2338-2339, 2340-2341, 2342-2343, 2344-2345, 2346-2347, 2348-2349, 2350-2351, 2352-2353, 2354-2355, 2356-2357, 2358-2359, 2360-2361, 2362-2363, 2364-2365, 2366-2367, 2368-2369, 2370-2371, 2372-2373, 2374-2375, 2376-2377, 2378-2379, 2380-2381, 2382-2383, 2384-2385, 2386-2387, 2388-2389, 2390-2391, 2392-2393, 2394-2395, 2396-2397, 2398-2399, 2400-2401, 2402-2403, 2404-2405, 2406-2407, 2408-2409, 2410-2411, 2412-2413, 2414-2415, 2416-2417, 2418-2419, 2420-2421, 2422-2423, 2424-2425, 2426-2427, 2428-2429, 2430-2431, 2432-2433, 2434-2435, 2436-2437, 2438-2439, 2440-2441, 2442-2443, 2444-2445, 2446-2447, 2448-2449, 2450-2451, 2452-2453, 2454-2455, 2456-2457, 2458-2459, 2460-2461, 2462-2463, 2464-2465, 2466-2467, 2468-2469, 2470-2471, 2472-2473, 2474-2475, 2476-2477, 2478-2479, 2480-2481, 2482-2483, 2484-2485, 2486-2487, 2488-2489, 2490-2491, 2492-2493, 2494-2495, 2496-2497, 2498-2499, 2500-2501, 2502-2503, 2504-2505, 2506-2507, 2508-2509, 2510-2511, 2512-2513, 2514-2515, 2516-2517, 2518-2519, 2520-2521, 2522-2523, 2524-2525, 2526-2527, 2528-2529, 2530-2531, 2532-2533, 2534-2535, 2536-2537, 2538-2539, 2540-2541, 2542-2543, 2544-2545, 2546-2547, 2548-2549, 2550-2551, 2552-2553, 2554-2555, 2556-2557, 2558-2559, 2560-2561, 2562-2563, 2564-2565, 2566-2567, 2568-2569, 2570-2571, 2572-2573, 2574-2575, 2576-2577, 2578-2579, 2580-2581, 2582-2583, 2584-2585, 2586-2587, 2588-2589, 2590-2591, 2592-2593, 2594-2595, 2596-2597, 2598-2599, 2600-2601, 2602-2603, 2604-2605, 2606-2607, 2608-2609, 2610-2611, 2612-2613, 2614-2615, 2616-2617, 2618-2619, 2620-2621, 2622-2623, 2624-2625, 2626-2627, 2628-2629, 2630-2631, 2632-2633, 2634-2635, 2636-2637, 2638-2639, 2640-2641, 2642-2643, 2644-2645, 2646-2647, 2648-2649, 2650-2651, 2652-2653, 2654-2655, 2656-2657, 2658-2659, 2660-2661, 2662-2663, 2664-2665, 2666-2667, 2668-2669, 2670-2671, 2672-2673, 2674-2675, 2676-2677, 2678-2679, 2680-2681, 2682-2683, 2684-2685, 2686-2687, 2688-2689, 2690-2691, 2692-2693, 2694-2695, 2696-2697, 2698-2699, 2700-2701, 2702-2703, 2704-2705, 2706-2707, 2708-2709, 2710-2711, 2712-2713, 2714-2715, 2716-2717, 2718-2719, 2720-2721, 2722-2723, 2724-2725, 2726-2727, 2728-2729, 2730-2731, 2732-2733, 2734-2735, 2736-2737, 2738-2739, 2740-2741, 2742-2743, 27

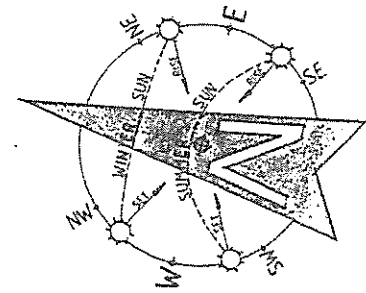


House 5


TSS
 THERMAL SPRAY SYSTEMS
 1400 W. 10TH AVE. SUITE 100
 DENVER, CO 80202
 (303) 733-1111
 FAX (303) 733-1112
 WWW.TSS-USA.COM

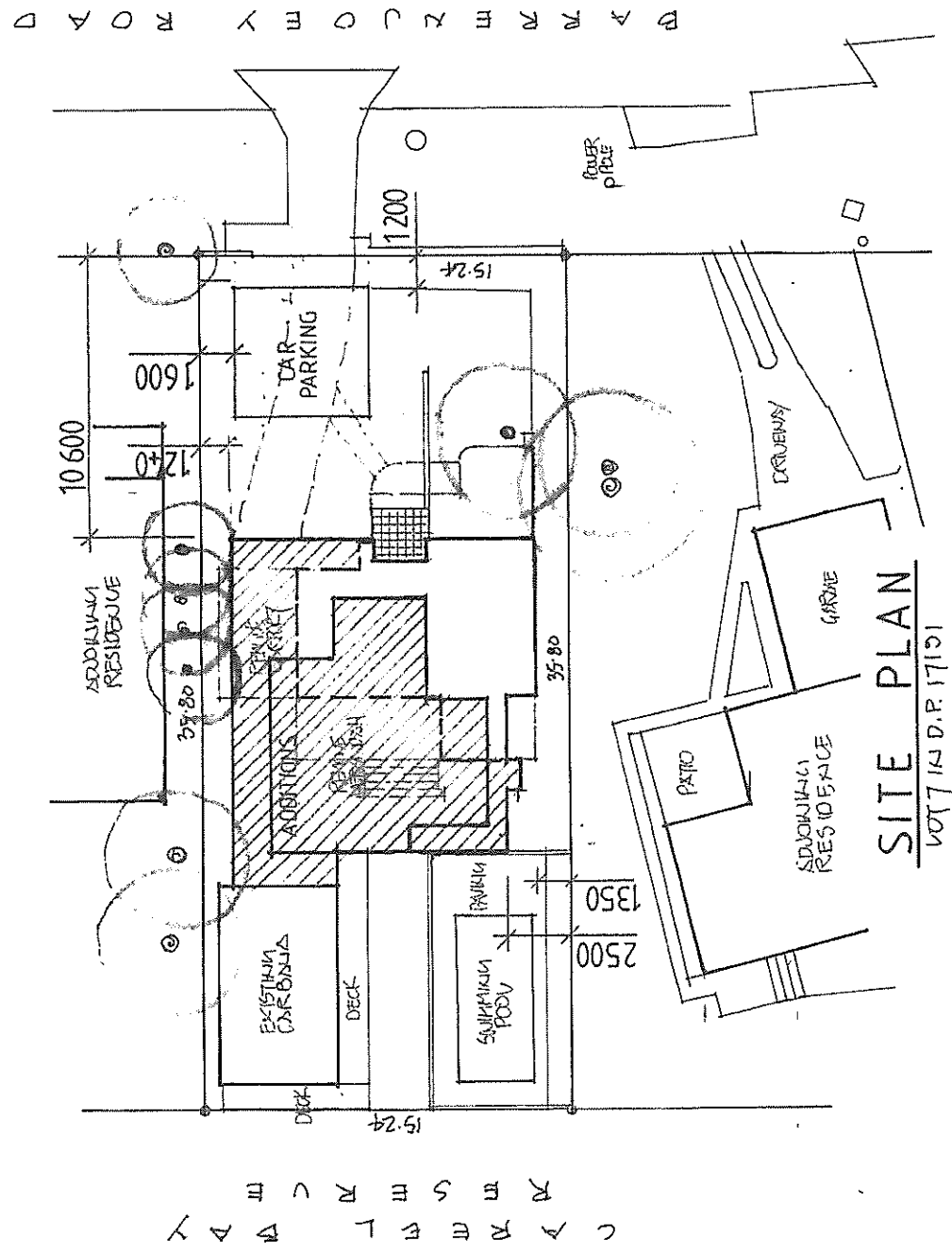
ON-SITE CAR PARKING FACILITIES TO BE IN ACCORDANCE WITH THE CURRENT EDITION OF AUSTRALIAN STANDARD AS/NZS 2890.1-2004; PARKING FACILITIES PART 1

DEVELOPMENT CALCULATIONS			
SITE AREA	545.00	SQUARE METRES	
DESCRIPTION	EXISTING SQM	PROPOSED SQM	
RESIDENCE FLOOR	88.22	194.61	
RESIDENCE ROOF	88.22	194.61	
VERANDAH & STAIRS	21.60	—	
CABANA	41.56	41.56	
DRIVEWAY	15.75	6.50	
CARPORT	17.60	—	
CARPARKING	30.24	30.24	
PORCH	—	8.10	
SWIMMING POOL	22.40	22.40	
TOTAL HARD SURFACE	295.37 (43.14%)	308.95 (56.85%)	
FOR UNCOVERED DECK AREAS (OUTDOOR RECREATIONAL SPACE)			



- NOTES:
- THE BUILDER IS TO CHECK AND CONFIRM ALL NECESSARY DIMENSIONS AND LEVELS ON SITE PRIOR TO ORDERING MATERIALS AND COMMENCING CONSTRUCTION. DO NOT SCALE OFF THE DRAWING.
 - SHOULD ANY DEVELOPMENT OR CONSTRUCTION OCCUR ON OR NEAR BOUNDARIES, THE BOUNDARIES SHOULD BE CLEARLY MARKED ON SITE BY THE REGISTERED LAND SURVEYORS.

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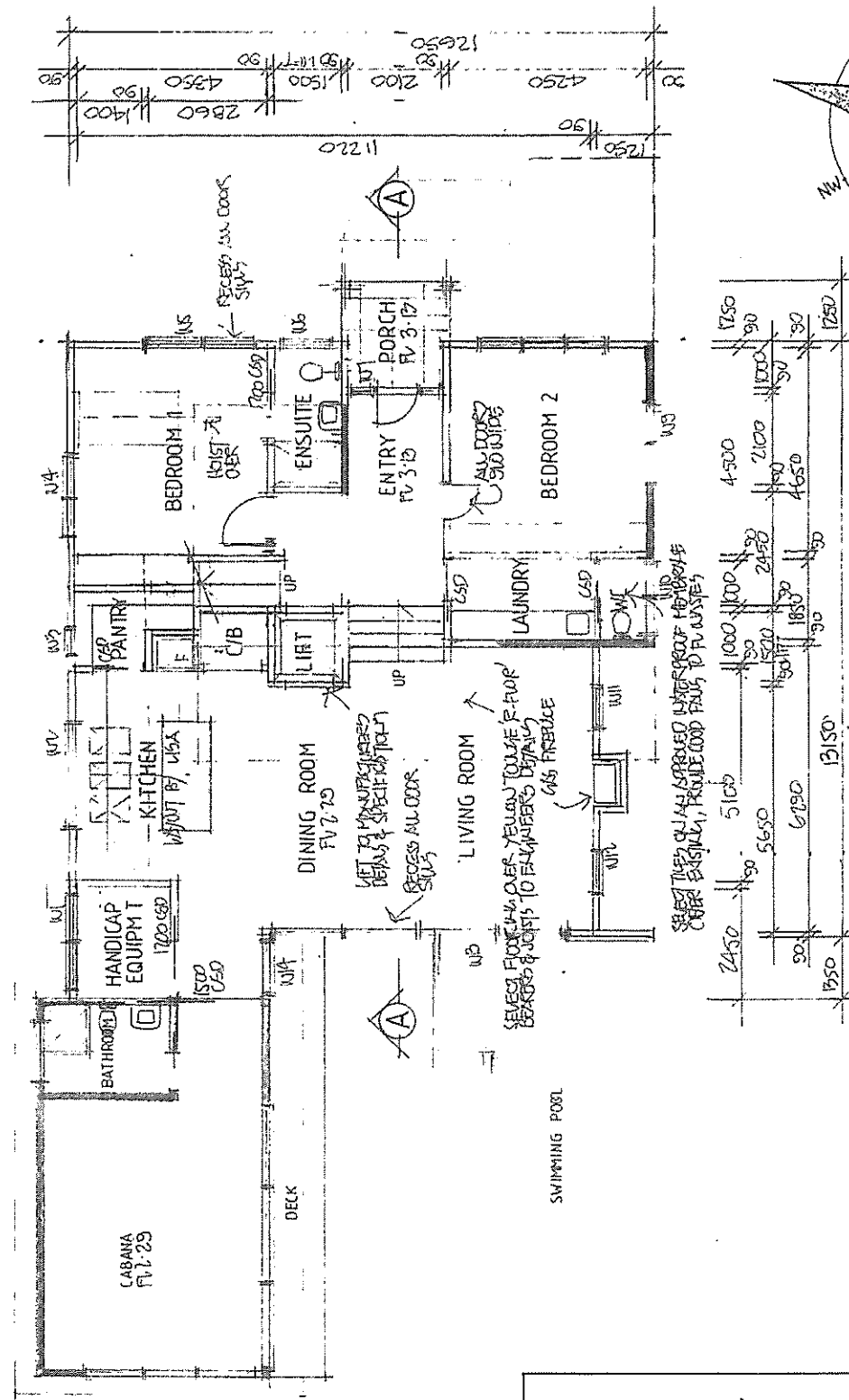
SITE PLAN
 10/7/12 D.P. 17101

Figure 7

PROJECT: PROPOSED ALTERATIONS/ADDITION
 NO. 885 BARRELUDEY ROAD
 PALM BEACH N.S.W. 2108
 DRAWN BY: J.D.E.
 CHECKED BY: J.D.E.
 DATE: 10/11/2012
 SCALE: 1:200
 PROJECT NO.: 1928-1

J.D. EVANS and COMPANY
 DESIGN AND BUILDING CONSULTANTS
 NO. 5 ELANE AVENUE, AVALON BEACH 2107
 EMAIL: JDE@AVALONCHINA.COM
 MOBILE: 0418 976 595

NO.	REVISION	DATE
1	ISSUED FOR PERMIT	10/11/2012



GROUND FLOOR PLAN

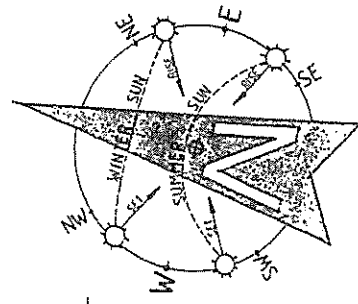
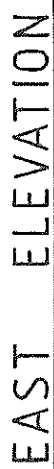


FIGURE 8

- NOTES:**
1. LIGHTING OF BATHROOM AND WC TO BE IN ACCORDANCE WITH NCC VOL. 2 PART 3.8.4.2 AND AS/NZS 1680.9.1188
 2. VENTILATION OF BATHROOMS, ENSUITES & WCs TO BE IN ACCORDANCE WITH PART 3.8.5.2 OF THE BUILDING CODE OF AUSTRALIA. AS/NZS 1680.2.
 3. THE DOOR TO THE BATHROOM IS REQUIRED TO COMPLY WITH AND IN ACCORDANCE WITH THE BUILDING CODE OF AUSTRALIA. PART 3.8.3.3
 4. (TO EITHER OPEN OUTWARDS, SLIDE OR BE READILY REMOVABLE FROM THE OUTSIDE OF THE COMPARTMENT) FIRE (BONIC) ALARMS TO BE IN ACCORDANCE WITH PART 3.7.2 OF THE NCC VOL. 2 PART 3.7.2. AND AS 3186
 5. TERMINATE RISK MANAGEMENT TO BE IN ACCORDANCE WITH VOL. 2 PART 3.1.4 OR VOL. 1 PART 8.1.4 (A) AND INSTALLED IN ACCORDANCE WITH AS 3098.
 6. SOUND INSULATION TO BE IN ACCORDANCE WITH PART 3.8.2.2 CLAUSES (A) & (G) AND PART 3.8.3.3 OF THE NCC
 7. ALL EXTERNAL GLAZING TO HAVE A MAXIMUM REFLECTIVITY INDEX OF 25%.
 8. ALL GLAZED ALUMINIUMS TO COMPLY WITH AS 2034 AND AS 1563.
 9. ALL GLAZED ALUMINIUMS TO COMPLY WITH NCC VOL. 2 PART 3.1.4 VOL. 2 PART 3.1.6 CONSTRUCTED IN ACCORDANCE WITH AS 1740
 10. AN APPROVED NON-VENTILATED COVER OR SHIELD WHICH ALLOWS FOR THE INSULATION TO BE CLOSELY INSTALLED TO THE SIDES & TOP TO ALL DOWNLIGHTS.
 11. STAIRS, HANGERS, BALUSTRADES & RAMP TO BE CONSTRUCTED IN ACCORDANCE WITH NCC VOL. 2 PART 3.9.1.6. 3.9.2 IN AS 1687
 12. PROTECTION OF OPENABLE WINDOWS MUST COMPLY WITH NCC VOL. 2 PART 3.9.2.5 (A) & (B) AND NCC VOL. 2 PART 3.9.5 (A) & (B)
 13. GLAZING TO ALL BATHROOMS AND ENSUITES TO BE TONGUED GLASS.
 14. SLIP RESISTANCE TO COMPLY WITH NCC AND AS 4586.

- NOTES:**
1. THE BUILDER IS TO CHECK AND CONFIRM ALL NECESSARY DIMENSIONS AND LEVELS ON SITE PRIOR TO ORDERING MATERIALS AND COMMENCING CONSTRUCTION DO NOT SCALE OFF THE DRAWING.
 2. SHOULD ANY DEVELOPMENT OR CONSTRUCTION OCCUR ON OR NEAR BOUNDARIES, THE BOUNDARIES SHOULD BE CLEARLY MARKED ON SITE BY THE REGISTERED LAND SURVEYORS

PROJECT PROPOSED ALTERATIONS/ADDITION NO. 865 BARRENJOEY ROAD PALM BEACH N.S.W. 2108 CLIENT SIMON & LISA CAUSLEY		DATE 10/11/2022 DRAWN BY JDE SCALE 1:100 SHEET 1 OF 1
J.D. EVANS and COMPANY DESIGN AND BUILDING CONSULTANTS NO. 5 ELAINE AVENUE, AVALON BEACH 2107 EMAIL JD@JDECAVALON.COM MOBILE 0418 978 596		1928-2



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[illegible]

RIDGE RV 9.65

CARPORT CUSTOM OCE ROOF SHEETPIYK
FRIED NEW OVER FOR UNED CUSHET

WASHERYK DASHYK WITH
SHEATHYK RLS HUSATION

REMOVE EXISTING STRUCTURE
AS REQUIRED FOR MODIFICATION

GROUND FLOOR FV 3.13

FV 5.64

EXISTING CABANA

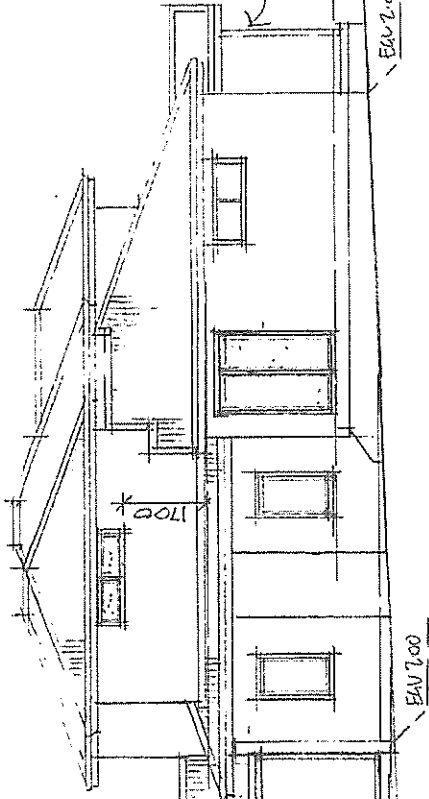
HV220 EPL 23mAHHD

EA 2.27

EA 2.06

EA 1.25

NORTH ELEVATION



FIRST FLOOR FV 5.64

GROUND FLOOR FV 2.13

EXISTING CABANA

EA 2.30mAHHD

EA 1.67

EA 2.00

150x150 TIMBER POSTS ON
119 GALV. SHOE

GROUND FLOOR FV 3.13

EA 2.45

SOUTH ELEVATION

FIGURE 10

DATE	01/17/2022	SCALE	1:100
DRAWN BY	JDE	CHECKED	
ISSUED			
PROJECT NO.	1928-5		

PROJECT
PROPOSED ALTERATIONS/ADDITION
NO. 885 BARRENJOEY ROAD
PALM BEACH N. S. W. 2108
CLIENT
SIMON & LISA CAUSLEY

J.D. EVANS and COMPANY
DESIGN AND BUILDING CONSULTANTS
NO. 5 ELAINE AVENUE, AVALON BEACH 2107
GMAIL: JDE@JDEARCHITECTS.COM
MOBILE: 0410 976 695

NO.	REVISION	DATE
1		
2		
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10		

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1. The owner has provided all necessary information for the preparation of these drawings. The owner warrants that the information provided is true and correct.
2. The drawings are prepared for the owner's use only. They are not to be used for any other purpose without the written consent of J.D. Evans and Company.
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