Coastal and Estuarine Hazard Assessment

52 Iluka Road

59919032

Prepared for

Jane Cole

1 November 2018

Cardno®

Contact Information

Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Level 9 - The Forum
203 Pacific Highway
St Leonards NSW 2065
Australia

www.cardno.com
Phone +61 2 9496 7700
Fax +61 2 9496 7748

Author(s):

Toby Johnson
Coastal Engineer

Approved By:

Doug Treloar
Senior Principal Coastal Engineer

Document Information

Prepared for	Jane Cole
Project Name	52 Iluka Road
File Reference	59919032_R001_Rev_B.docx
Job Reference	59919032
Date	1 November 2018
Version Number	B
Effective Date	3/10/2018
Date Approved	3/10/2018

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
A	28.09.2018	First Draft	Toby Johnson	Doug Treloar
B	1.11.2018	Issued to Client	Toby Johnson	Doug Treloar

Table of Contents

Appendices

Tables

Figures

1 Introduction

Cardno (NSW/ACT) Pty Ltd, herein referred to as “Cardno”, has been engaged by Jane Cole (through Rachel Hudson Architecture), to prepare an Estuarine Risk Management Report as part of the development application (DA) for their proposed development/alterations at 52 Iluka Road, Palm Beach.

The report has been commissioned in accordance with Northern Beaches Council’s Estuarine Risk Management Policy for Development in Pittwater (NBC, 2017), herein referred to as “the Policy”, which establishes the estuarine risk management approach for development on land affected by wave action and tidal inundation around the Pittwater estuary within the Northern Beaches LGA.

Section 3 of the Policy requires that wave action and tidal inundation processes (affecting development, or likely to be affected by development), are adequately investigated, addressed in design and documented by applicants or proponents of activities prior to the lodgement of any development application.

The purpose of this report, therefore, is to investigate the relevant coastal and estuarine processes at the study area and provide information regarding how they relate to the proposed development.

2 The Property and Proposed Development

The property at 52 Iluka Road is situated along the eastern foreshore of the Pittwater estuary, approximately 150 m south of Sand Point. The property's grassed backyard (elevated at approximately +2.0 to +2.2 m AHD), is partially located within a small portion of Crown Land, after which a sandy escarpment, approximately 0.6 m in height drops down to a natural sandy beachfront (**Figure 2-1**).

The property's plot is approximately 42 m long by 12 m wide and slopes down from Iluka Road with a gradual seaward gradient. The plot gradually slopes from approximately +2.8 m AHD at the landward (roadside) extent to +2.1 m AHD at the edge of the 'dry-land', which is delineated by the steep, vertical beach escarpment and commencement of the beach foreshore. Based on visual inspection, the upper beach slope is approximately 1V:10H with an estimated width between the water line and the berm escarpment of 15 m at the time of the inspection. Tidal level at the time of the inspection (1430 on 21 September 2018) was approximately 0.1 m AHD (~ MSL).

Figure 2-1 Overview of 52 Iluka Road and natural beach front

A detailed survey and plans of the proposed development, provided by Rachel Hudson Architecture, are presented in **Appendix A**. The proposed scope of the development comprises renovations and extensions of the existing dwelling. These renovations include the demolition and construction of internal walls, modifications to the building facade/roofing, addition of an in-ground swimming pool including a cabana/ bar area amongst other minor alterations (**Figure 2-2**).

No redevelopment has been proposed that will result in the footprint of the dwelling extending further seaward than it is currently located. Hence, the dwelling setback will remain the same as present. The existing finished floor level (FFL) of the dwelling (excluding the garage) is +2.63 m AHD at the lowest point. The existing flooring will remain in place with no modifications. The 2050 EPL for the property is +2.81 m AHD, approximately 0.18 m above the existing FFL. However, as discussed in **Section 3.6**, with consideration of reduction in EPL with distance landward from the foreshore limit, the 'effective' EPL at the building setback is +2.65 m AHD.

Due to the residential nature of the property (i.e. non-vulnerable land use), a 2050 EPL is deemed appropriate for the assessment herein.

All other renovations, which include the addition of new flooring, such as the cabana, bar and pool coping, albeit non-habitable, feature a minimum FFL of +2.43 m AHD. Given that these modifications are setback at least 35 m from the foreshore limit, it is not expected that the proposed redevelopment will be exposed to coastal or estuarine hazards, outlined in **Section 3**.

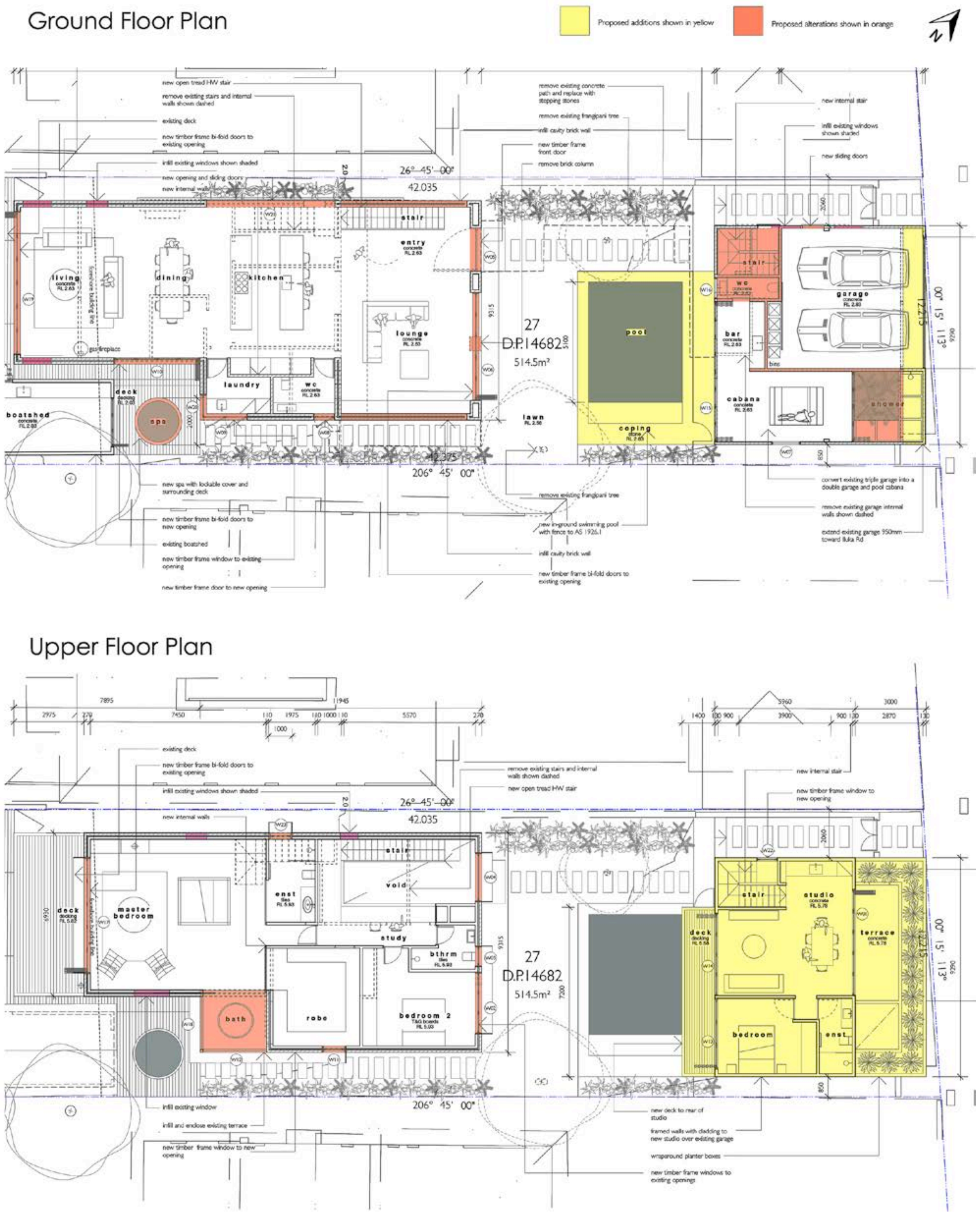


Figure 2-2 Proposed properly modifications/additions for the ground floor (upper) and upper floor (lower) (Hudson, 2018)

3 Coastal and Estuarine Processes

Cardno's Coastal Engineer attended the site on the 21st September 2018 to assess the dwelling and its potential to affect the local coastal processes. Specifically, the task was to determine what, if any, impact the redeveloped site structures may have on the waves, currents and sediment transport mechanisms in the immediate vicinity – including neighbouring properties. The important physical processes are discussed below.

3.1 Tides

The astronomical tide is caused by the gravitational effect of the Earth and Moon, and to a lesser extent, the Sun and other planets on the water mass of the oceans. Along the NSW coast, tides are semi-diurnal, i.e. two high tides and two low tides per day. Tidal ranges (the difference between low and high tide) vary significantly throughout each lunar month and from month to month. Very high and very low tides (King Tides) occur around the summer and winter solstices (i.e. around Christmas and in the mid-winter months). The tidal range is relatively constant along the open coast of New South Wales. Tidal planes within Pittwater, adopted from the Australian National Tide Tables (2017), are reproduced in **Table 3-1** below.

Table 3-1 Tidal Planes at Pittwater relative to AHD (from ANTT, 2016)

Tidal Plane	Level (m AHD)
Highest Astronomical Tide (HAT)	+1.1
Mean High Water Springs (MHWS)	+0.7
Mean High Water Neaps (MHWN)	+0.4
Mean Sea Level (MSL)	0.0
Mean Low Water Neaps (MLWN)	-0.4
Mean Low Water Springs (MLWS)	-0.7
Lowest Astronomical Tide (LAT)	-0.9

It should be noted that these levels are likely to change over the design life of the structures due to projected mean sea level rise associated with climate change. Northern Beaches Council has adopted the following Sea Level Rise Planning Benchmarks (SLRPB) for use in assessing the potential effects of sea level rise in NSW and for strategic planning purposes.

> increase in MSL of 0.4m by 2050 (relative to 1990 mean sea level); and

> increase in MSL of 0.9m by 2100 (relative to 1990 mean sea level).

It should be noted with the above that approximately 0.06 m of mean sea level rise has occurred since 1990 already (OEH, 2010). Therefore, the projected HAT at 2050 and 2100 are 1.44 m AHD and 1.94 m AHD, respectively.

Given that the height of the beach berm/escarpment is elevated at approximately +2.0 to +2.2 m AHD, the property is not likely to experience tidal inundation under normal (non-storm) tide conditions up to the year 2100, noting that sometimes tide levels may exceed HAT due to meteorological or oceanographic conditions.

It is important to note that these tidal levels refer to normal (non-storm) tide conditions, and a greater degree of inundation would be expected due to storm surge and storm tides, as well as wave run-up over the beach berm – as discussed in **Section 3.5**. Furthermore, while tidal inundation due to sea level rise alone is not of concern, elevated water levels due to sea level rise will indirectly result in increased wave attack at the rear of the foreshore area. This may result in a gradual recession of the foreshore and width of the 'dune' crest over the long-term. Consequently, it may be required that later, additional shore protection measures are required, such are rock armouring or a seawall to mitigate erosion and protect the site and neighbouring properties.

3.2 Waves

Lawson and Treloar (2003) showed that waves affecting this study area will occur in two distinct frequency bands. One of these bands is that of long period swell waves that arrive in the study area from offshore, and refract and diffract around the Barrenjoey Headland into the site. The position of the study area within the Pittwater Estuary, and in particular being south of Sand Point, means that this site is sheltered from significant swell wave energy. However, persistent, low energy swell that reaches the study area still has the potential to affect sediment transport in the region – see **Section 3.4**.

The other frequency band is that of shorter period local sea waves, which are generated by winds blowing over the Pittwater Estuary. The largest waves occurring within the study area coastline are local sea waves with periods of around 2 to 3 seconds that occur as a result of strong south to south-westerly winds.

Table 3-2 Design Significant Wave Heights

ARI	Local Sea Hs (m)[i]	Ocean Swell Hs (m)[ii]
10	1.09[iii]	*Not Given*
20	1.11	0.55
50	1.17	0.60
100	1.25	0.70

Short period waves, similar to local wind generated seas, can be generated from the bows of boats (i.e. boat wake). The size of the boat wake is dependent on the depth of water, the speed of the boat, and the hull configuration. In many circumstances, boats travelling at around 8 knots generate the largest bow waves. Discussions with a local resident advised Cardno that vessel wake was apparent at the site; however, he expressed no major concerns regarding the frequency/intensity of the generated wake or associated shoreline impacts.

The occurrence of waves overtopping the foreshore edge of the property is discussed in **Section 3.6**.

3.3 Currents

The predominant current structure within the study area is dominated by tidal currents generated by the tides propagating into and out of the Pittwater Estuary. Lawson and Treloar (2003) showed that tidal current velocities are significantly higher near the entrance to the estuary than in the southern parts of the estuary on both the flood and ebb tides. The range of current speeds under these conditions is in the order of up to 0.2 m/s at the entrance and near 0 m/s in the southern areas of the estuary. Current velocities south of Observation Point are very low, even for the peak flows of the spring tidal cycle. Surface currents are generally higher than bottom currents throughout the estuary with no significant differences between the velocities during flood and ebb tides.

The current structure in the estuary is extremely uniform with minimal eddying. Flows simply decrease and reverse with the changing of the tide, and no in-situ evidence of high tidal currents was observed during the site inspection.

In very low tidal current speed environments wind driven currents become relatively important. Lawson and Treloar (2003) undertook hydrodynamic modelling of the Pittwater estuary in order to determine the influence of wind driven currents. That study found that some cross-estuary (surface) and return (bottom) currents are likely to be induced during prolonged periods of strong winds. Nonetheless, this phenomenon is unlikely to generate currents in front of the property that are strong enough to cause observably deleterious effects in terms of erosion.

3.4 Sediment Transport

The foreshore in the vicinity of the property, namely ‘Sandy Beach’, consists mainly of medium grained beach sands. At the rear of the foreshore, a partially vegetated beach berm/escarpment is present (**Figure 3-1**). There is evidence that neighbouring residents have placed ad hoc rock along the escarpment in an attempt to provide increased armouring against wave attack and/or wave run-up. It is understood that this rock was placed after the June 2016 storm event.

[i] Taken from Cardno (2015)
[ii] Taken from Lawson and Treloar (2003)
[iii] Extrapolated value

Figure 3-1 Evidence of rock armouring (at neighbouring property) and vegetated beach berm at 52 Iluka Road

The various sediment transport sinks, sources and pathways within the Pittwater Estuary were previously summarised in Lawson and Treloar (2003). That study found that the foreshore sediment transport mechanisms in the vicinity of the study area are dominated by wave action, including the low energy, but persistent, swell wave energy and the higher energy, but more variable, local wind wave action.

As the property is situated around 3 km from the Pittwater entrance, to the south of Sand Point, the foreshore is predominately sheltered from northerly arriving wave energy. Consequently, the critical mechanism for sediment transport is local wind waves generated over the southerly to westerly fetches. The equilibrium alignment of the beach appears to be well aligned with the largest of the fetches, a 6 km fetch to the south-west of the beach, indicating that the direction of weighted mean wave propagation is likely from south-west. Based on observation of historical aerial imagery, there is little evidence of significant long-shore sediment transport processes or major variability in the planform alignment of the beach over the long-term. This suggests that predominant wave energy in the nearshore area is generally uni-directional.

While there are no major issues associated with long-term shoreline recession, it can be observed that significant cross-shore dune erosion has occurred during recent short-term storm events. Aerial imagery taken shortly before and after the April 2015 and June 2016 east coast lows (**Figure 3-2**), shows that increased wave run-up during those storms caused progressive undermining, slumping and erosion of the sandy foreshore dune. It is also evident that council and/or local residents have undertaken minor excavations to flatten the scour escarpments and restore the pre-storm beach slope at the rear of the foreshore after those events.

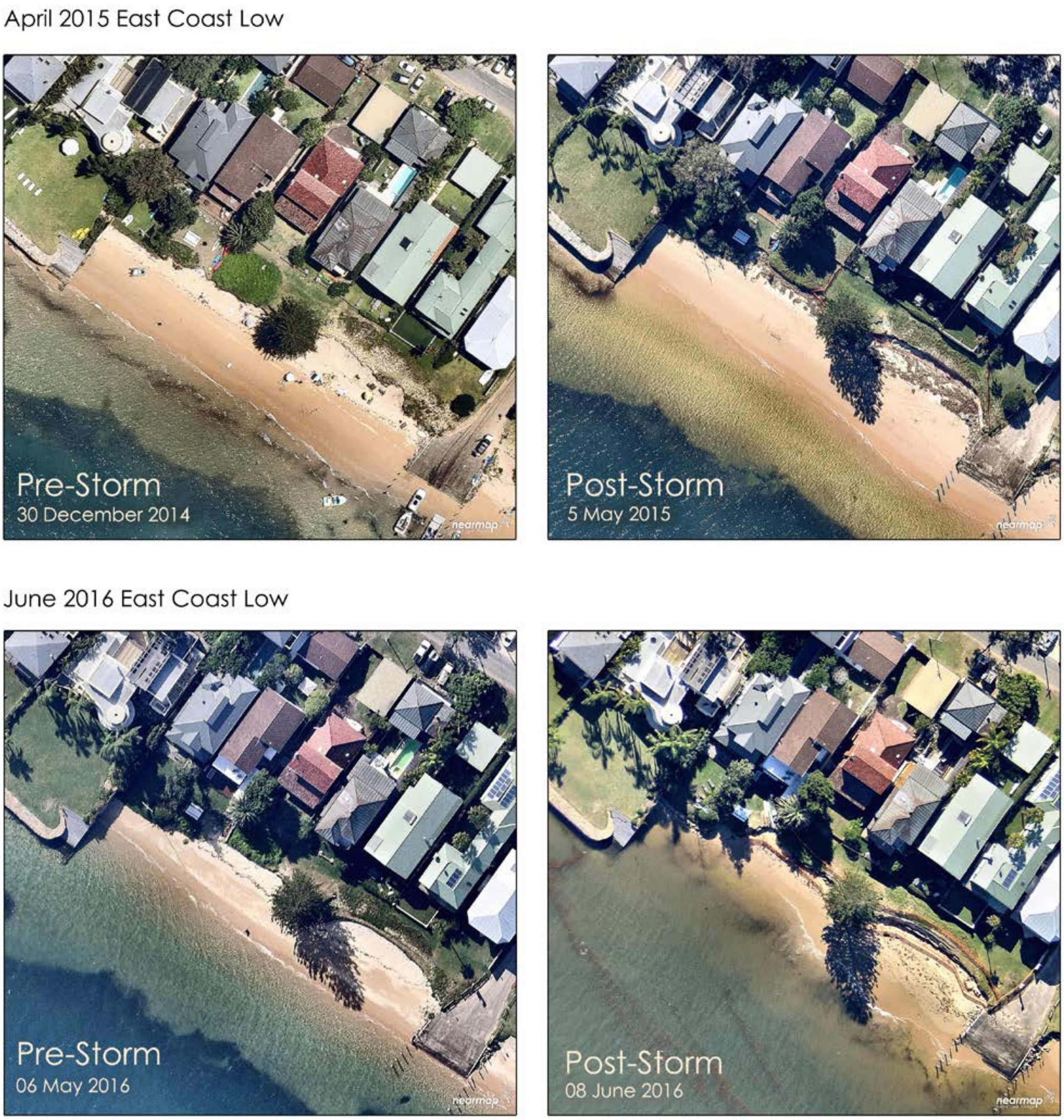


Figure 3-2 Cross-shore erosion for the April 2015 and June 2016 East Coast Low storm events.

It should be noted that EPL levels and reductions in EPL levels have been based on the present foreshore limit, namely, the +1.5 m AHD contour as per the Policy (NBC, 2017). While natural processes will likely restore the foreshore dune after these short-term erosion events, it may take a significant amount of time, particularly in areas subject to low wave energy such as Sandy Beach. Consequently, there is potential that the foreshore limit and EPL reductions may be subject to change if there is continued erosion of the foreshore limit at the property.

The proposed development at 52 Iluka Road is limited to the main dwelling, which is setback behind the foreshore limit. No construction activities have been proposed in the coastal foreshore area, hence the development poses no risk to changes in local sediment transport mechanisms at the site or surrounding properties.

3.5 Extreme Water Levels

Coastal water levels in the study area are dominated by the astronomical tide. However, significant short duration variations from the predicted tide can occur. During storm events such as East Coast Lows, these variations are referred to as storm surge. The physical processes that contribute to storm water levels include:

> Wind Set-up;

> The Inverse Barometer Effect;

> Wave Set-up; and

> Wave Run-up – which is normally addressed separately from storm tide.

Storm tides are the combination of astronomical tides and the increase in the still water level due to storm surge, as shown in **Figure 3-3**.

Non-periodic variations from the astronomical tide are typically associated with the effect of wind on sea level. When the wind blows over an open body of water, drag forces develop between the air and the water surface. These drag forces are proportional to the square of the wind speed. The result is that a wind drift current is generated. This current may transport water towards the coast, where it then piles up causing an elevation in the still water level know as wind set-up. Wind set-up is inversely proportional to depth, which means that it becomes more severe where depths are shallow near the coast.

The 'inverse barometer effect' is the result of the effect that atmospheric (also known as barometric) pressure has on local sea levels. When the barometric pressure increases, it applies a local depressing force on sea levels. However, when barometric pressure drops, such as during severe meteorological events, it causes local sea levels to rise. During severe storms this process may result in water level increases up to 1 cm for each hecta-Pascal (hPa) drop in central pressure below regional average atmospheric, typically about 1006-1012 hPa. The actual increase depends on the forward speed of the meteorological system and 1 cm is only achieved if it is moving slowly. The phenomenon causes daily variations from predicted tide levels up to 5 cm. However, during East Coast Lows, when the central barometric pressure within a low pressure cell can be in the vicinity of 980-990 hPa, local sea levels may increase temporarily by tens of centimetres.

When waves break on a beach, they produce wave set-up, which is an increase in the nearshore water level above the still water elevation of the sea. Wave set-up can be considered as a piling up of water against the shoreline that is caused by breaking waves causing a transfer of kinetic to potential energy.

Wave run-up is the vertical distance that a wave will run up a beach or coastal structure after it breaks. Wave run-up *height* is defined as the difference between the maximum elevation that a wave runs up the beach or a coastal structure, and the still water level (comprised of the astronomical tide plus storm surge). Wave run-up *level* is defined as the maximum vertical elevation of the run-up. Generally speaking, wave run-up height depends on the wave height and length, the slope of the sea bed, and the form of the shoreline. Wave run-up heights and levels therefore change on a wave by wave basis.

According to the Pittwater Foreshore Floodplain Mapping Study (Cardno, 2012), the 100-years ARI storm tide level at the property is 1.50 m AHD, which includes 0.06 m of local wind set-up – see **Table 3-3**.

The 1 in 100 years ARI storm tide level, including projected sea level rise for 2050 is 1.90 m AHD. At the rear of the foreshore the approximate elevation of the beach berm is 2 m AHD with the properly reaching an elevation of up to +2.8 m AHD at the roadside. Therefore, for the projected 2050 sea level rise, the 1 in 100 years ARI event storm tide is not expected to result in any still-water inundation. **Table 3-3** also outlines storm tide levels for the 2100 projected sea level rise scenario. This shows that under the projected 2100 sea level rise, the 100-years ARI storm tide inundation could be expected to propagate partially onto the property. However, it should be noted that all finished floor levels of the inhabitable dwelling under the existing and developed conditions remain above the +2.40 m AHD storm tide elevation.

Table 3-3 100 Years ARI Storm Tide Level

Timeframe	m AHD
Present Day	1.52
2050	1.90
2100	2.40

On top of the storm tide, some additional transient inundation on the property due to wave run-up processes could be expected. Based on the design wave climate (**Section 3.2**) and the elevation of the beach berm, it is likely that the berm may be overtopped during rare and severe storm events such as east coast lows, or periods of strong southerly winds that coincide with king tide events. For the 2050 projected sea level rise, the expected elevation of wave run up for the 1 in 50 years ARI event is +2.52 m AHD (excluding any additional freeboard for uncertainties).

As discussed in **Section 3.6**, all proposed redevelopment at 52 Iluka Road is confined to the existing dwelling footprint, which is setback a minimum of 10 m from the foreshore. As such, the elevation/ depth of any expected inundation due to wave run-up will be reduced with distance from the foreshore.

3.6 Estuary Planning Levels

in order to manage estuarine flood risk around the Pittwater Estuary, Estuarine Planning Levels (EPLs) have been calculated and are to be used in Pittwater Council's (now Northern Beaches) planning and development assessment processes. This has been achieved by accounting for and calculating the following (see **Figure 3-2**).

> Identifying the 100-years ARI storm tide level (including a local wind set-up);
> Incorporating a sea level rise value for a specified planning period;
> Calculating the local wave heights;
> Calculating wave run-up and overtopping, which requires:
  - Identification of the foreshore type at the property (in this instance, a vertical seawall); and
  - Calculation of the reduction in overtopping wave heights as a result of inland distance from the foreshore.
> Applying a freeboard to allow for any uncertainties primarily associated with local wave and wind action.

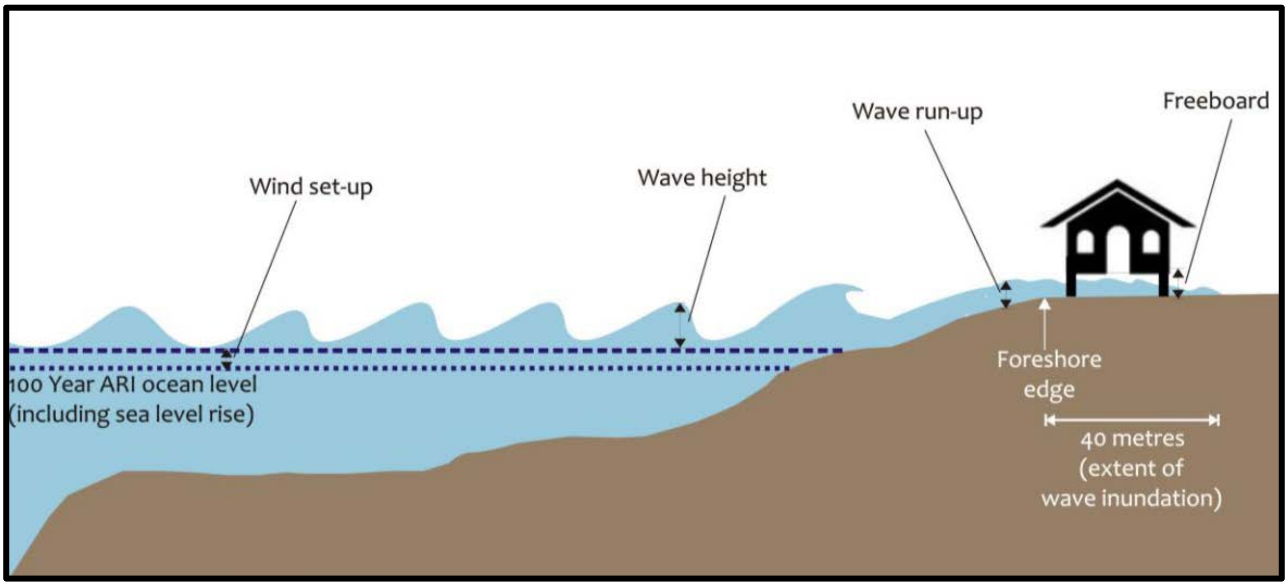


Figure 3-3 Estuary planning level components

The EPL adopted by Council for the property at 52 Iluka Road is given in **Table 3-4**, along with the various components that comprise it. As the development is not considered to be of 'vulnerable use', and is residential in nature, an EPL valid up to the year 2050 has been adopted; that is an EPL with consideration of projected sea level rise for the year 2050.

Table 3-4 Estuary planning level & components at the foreshore edge (up to 2050)

Component	
Local Still Water Level	1.50 m
Mean Sea Level Rise to 2050	0.40 m
Freeboard	0.30 m
Allowance for Wave Run-up & Overtopping	0.61 m
Estuary Planning Level	**2.81 m AHD**

The EPL at the foreshore edge with consideration of the berm elevation (~2 m AHD) is +2.81 m AHD. As per the architectural plans (**Appendix A**), there are no proposed modifications to existing floor levels at the site, which remain at a minimum of +2.63 m AHD within the main dwelling. All other renovations, which include the addition of new flooring, such as the cabana, bar and pool coping, albeit non-habitable, feature a minimum FFL of +2.43 m AHD. While there are no proposed developments to the boat shed, located at the seaward extent of the property, it is worth noting that that floor level has been surveyed at +2.13 m AHD, and is lower lying than the main dwelling.

Council advises that a reduction factor to the EPL, based upon the distance of proposed development from the foreshore edge, may also apply. The reduction equates to 0.08 m for every 5.00 m distance from the foreshore edge up to a maximum reduction of 0.56 m at a distance of 35.0 m, beyond which no further reduction will apply. With consideration of these reduction factors, EPLs have been determined at five locations across the property in the landward direction from the 1.5m AHD contour (**Figure 3-4**). The final EPLs for each location are presented in **Table 3-5**.

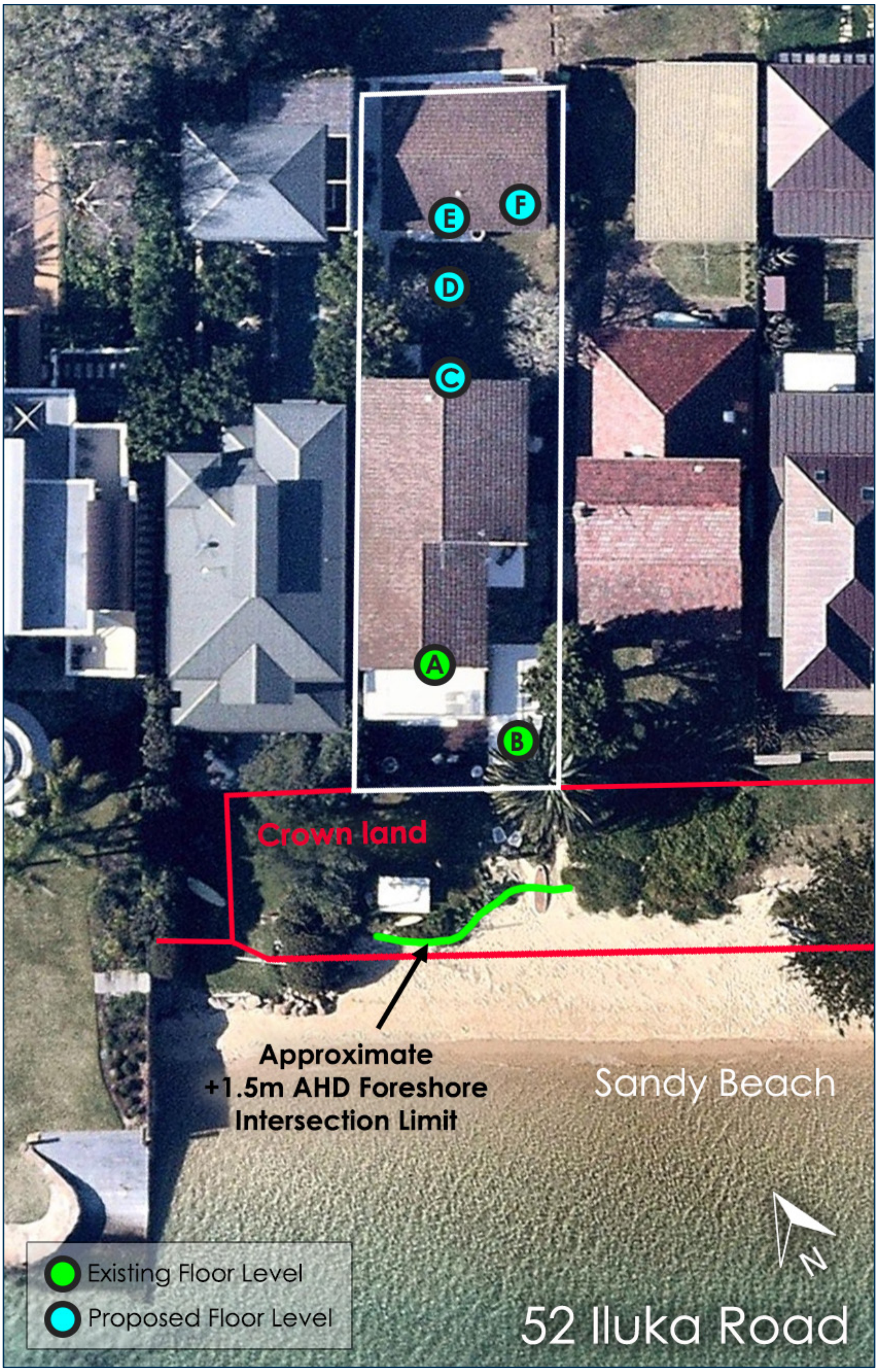


Figure 3-4 Property boundaries, foreshore edge and locations for assessment of EPLs

Table 3-5 Estuarine planning levels at key locations

Location	Description	Distance from Foreshore Edge (m)	EPL Reduction (m)	EPL (m AHD)	Existing/ Proposed FFL (m AHD)
A	Ground Floor Living Room	10	0.16	+2.65	+2.63
B	Boat Shed	6	0.10	+2.71	+2.13
C	Covered Terrace	24	0.38	+2.43	+2.63
D	In-ground Swimming Pool	35	0.56	+2.25	+2.43
E	Bar	40	0.56[iv]	+2.25	+2.83
F	Cabana	42	0.56[iv]	+2.25	+2.83

All developments that feature the addition of new flooring, namely points C, D, E and F remain above the 2050 EPL level and hence it is not expected that these locations will be subject to inundation up to the year 2050. At the remaining locations, namely A and B, for which existing floor levels remain the same, it should be noted that there may be some risk of storm inundation over the long-term. The EPL level for the ground floor living room (Location A), is only 2 cm below the EPL level and hence inundation is of less concern in comparison to the boat shed (albeit it is not part of the proposed development). The level of the boat shed floor is 0.4 m below the 2050 EPL level, however, given it is a non-habitable building, this is not of critical importance in terms of safety. It is important to note, however, that inundation and possible wave run-up loading on the structure may occur over the long-term.

[iv] Maximum EPL reduction of 0.56 m at 35 m from foreshore

4 Concluding Remarks

Cardno has been engaged by Jane Cole (through Rachel Hudson Architecture), to undertake an Estuarine Risk Management Report as part of the development application (DA) for their proposed development at 52 Iluka Road, Palm Beach.

The report has been commissioned in accordance with Northern Beaches Council's Estuarine Risk Management Policy for Development in Pittwater (NBC, 2017). The purpose of this report, therefore, is to investigate the relevant coastal and estuarine processes (including wave action and tidal inundation) at the study area and provide information regarding how they relate to the proposed development.

Considering the setback of the dwelling and the elevation of the floor levels, the dwelling is not expected to be exposed to coastal or estuarine hazards, discussed in **Section 3** up to the year 2050. It is worth noting, however, that while the existing boat shed is not part of the proposed development it is low lying and may be subject to storm inundation and damage over the mid-term.

Furthermore, all proposed developments are confined to the main dwelling, and do not extend seaward of the existing building setback. Hence, the proposed developments will not result in any changes to local coastal processes at the project site and surrounding properties.

5 References

Cardno (2015), Pittwater Foreshore Floodplain Mapping of Sea Level Rise Impacts. LJ2882/R2658v5 – Final Report Prepared for Pittwater Council

Lawson and Treloar (2003), Pittwater Estuary Processes Study. J1924/R1945 - Report Prepared for Pittwater Council

NSW OEH (2010), NSW Coastal Risk Management Guide Incorporating sea level rise benchmarks in coastal risk assessments.

Pittwater Council (2017) Estuarine Risk Management Policy for Development in Pittwater – Appendix 7 of DCP.

Rachel Hudson Architecture (2018), Sandy Point House, 52 Iluka Road, Palm beach – Architectural Design Drawings. Document Ref: Cole DA 10.09.18.pdf

52 Iluka Road

APPENDIX

A

ARCHITECTURAL DESIGN PLANS AND SURVEY

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach
NSW 2108

DEVELOPED DESIGN

SEPTEMBER 2018

SPH - 01 - DA	SITE ANALYSIS PLAN	1:200
SPH - 02 - DA	SEDIMENT / EROSION CONTROL + WASTE MANAGEMENT PLAN	1:200
SPH - 03 - DA	SITE PLAN	1:200
SPH - 04 - DA	LANDSCAPE PLAN	1:200
SPH - 05 - DA	GROUND FLOOR PLAN	1:100
SPH - 06 - DA	FIRST FLOOR PLAN	1:100
SPH - 07 - DA	ROOF PLAN	1:100
SPH - 08 - DA	NORTH ELEVATION	1:100
SPH - 09 - DA	SOUTH ELEVATION	1:100
SPH - 10 - DA	EAST ELEVATION 1	1:100
SPH - 11 - DA	EAST ELEVATION 2	1:100
SPH - 12 - DA	WEST ELEVATION 1	1:100
SPH - 13 - DA	WEST ELEVATION 2	1:100
SPH - 14 - DA	SECTION AA	1:100
SPH - 15 - DA	SECTION BB	1:100
SPH - 16 - DA	SHADOW DIAGRAMS JUNE 21 EXISTING	N/A
SPH - 17 - DA	SHADOW DIAGRAMS JUNE 21 PROPOSED	N/A
SPH - 18 - DA	SCHEDULE OF EXTERNAL FINISHES	N/A
SPH - 19 - DA	NOTIFICATION SITE PLAN	1:400
SPH - 20 - DA	NOTIFICATION ELEVATIONS 1	1:400
SPH - 21 - DA	NOTIFICATION ELEVATIONS 2	1:400

rachel hudson *architect*

0410 323 564
www.rachelhudson.com.au
rachelhudsonarchitect@gmail.com
suite 1 & 2 / 6 waratah street mona vale 2103

BASIX Requirements:

RAINWATER TANK
1290L - connect to 190m2 of roof + a tap within 10m of pool/spa

SWIMMIMNG POOL
Outdoors, max 30KL, pool cover, pool pump timer, gas heating

OUTDOOR SPA
2.3KL, spa cover, spa pump timer, gas heating

HOT WATER
Gas instantaneous

LIGHTING
40% fluoro, compact fluoro or LED

FIXTURES
Showerheads: 3 star minimum or no greater than 9L per minute
Toilets: 3 star minimum or no greater than 4L per flush
Taps: 3 star minimum or no greater than 9L per minute

CONSTRUCTION
Concrete slab on ground with in-slab heating system: R1.00 (slab edge)
Suspended floor above garage: concrete and in-floor heating system (R6.00: R0.40 (down) under slab edge (or R1 including construction)
External wall: framed (weatherboard, fibro, metal clad) : R1.30 (or R1.70 including construction)
External wall: cavity brick: nil additional insulation
Internal wall shared with garage: single skin masonry (R0.18): nil additional insulation
Flat ceiling, flat roof: framed: ceiling R1.58 (up), roof: foil backed blanket (55mm), medium (solar absorptance 0.475 - 0.70)

WINDOWS AND GLAZED DOORS

W1: Orientation: NE, Area: 12.3m2, Shading device: eave/verandah/pergola/balcony >=900mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W2: Orientation: NE, Area: 3.2m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single pyrolytic low-e, (U-value: 3.99, SHGC: 0.4)

W3: Orientation: NE, Area: 1.0m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single pyrolytic low-e, (U-value: 3.99, SHGC: 0.4)

W4: Orientation: NE, Area: 2.1m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single pyrolytic low-e, (U-value: 3.99, SHGC: 0.4)

W5: Orientation: NE, Area: 5.1m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single pyrolytic low-e, (U-value: 3.99, SHGC: 0.4)

W6: Orientation: NE, Area: 13.1m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single pyrolytic low-e, (U-value: 3.99, SHGC: 0.4)

W7: Orientation: SE, Area: 1.2m2, Shading device: none, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W8: Orientation: SE, Area: 2.4m2, Shading device: none, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W9: Orientation: SE, Area: 2.3m2, Shading device: none, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W10: Orientation: SE, Area: 10.2m2, Shading device: none, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W11: Orientation: SE, Area: 2.5m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W12: Orientation: SE, Area: 7.5m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W13: Orientation: SW, Area: 7.8m2, Shading device: eave/verandah/pergola/balcony >=900mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W14: Orientation: SW, Area: 10.1m2, Shading device: eave/verandah/pergola/balcony >=900mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W15: Orientation: SW, Area: 16.4m2, Shading device: eave/verandah/pergola/balcony >=900mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W16: Orientation: SW, Area: 1.4m2, Shading device: eave/verandah/pergola/balcony >=900mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W17: Orientation: SW, Area: 14.2m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W18: Orientation: SW, Area: 6.3m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W19: Orientation: SW, Area: 17.5m2, Shading device: awning adjustable >=900mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

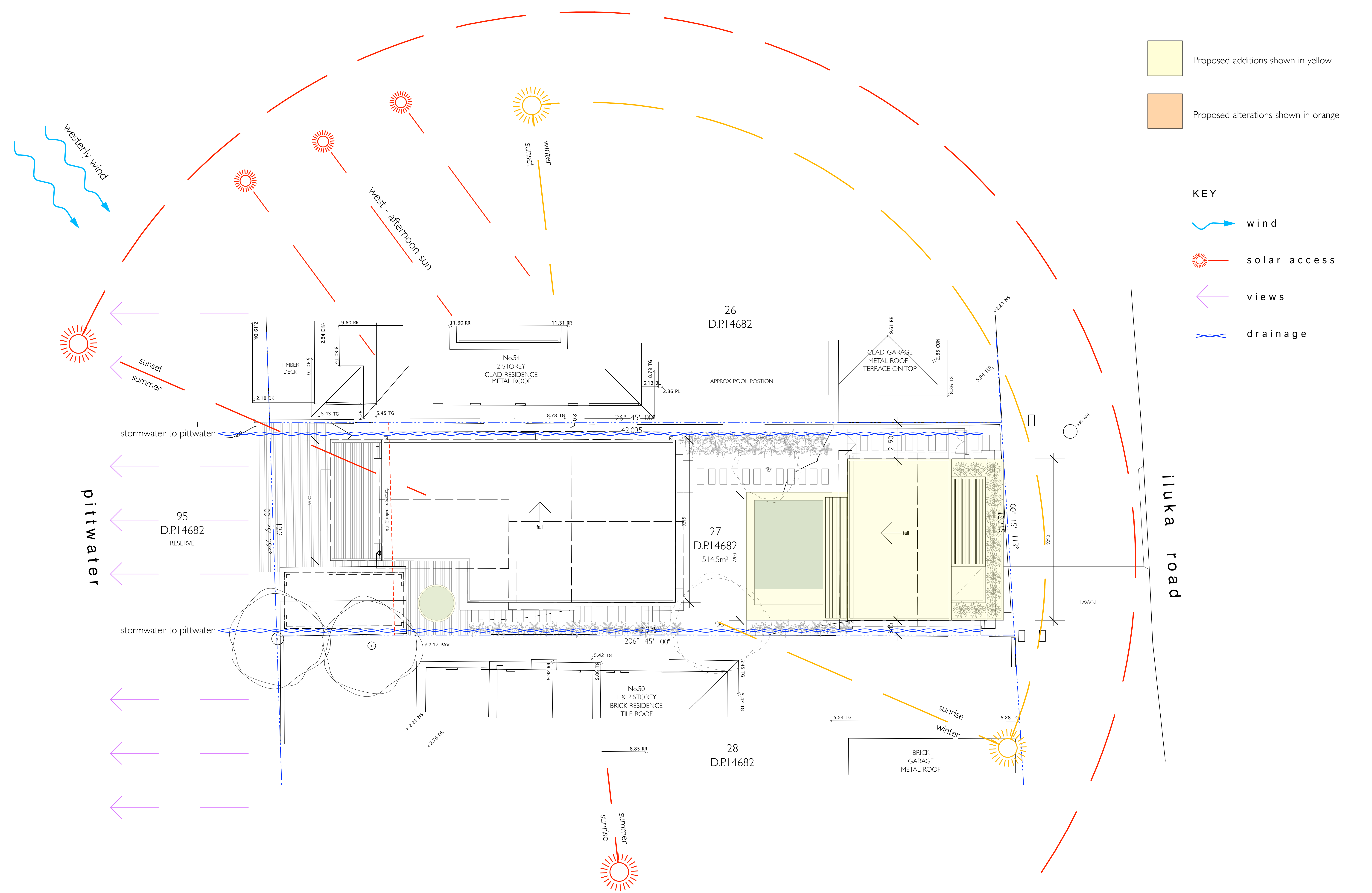
W20: Orientation: SW, Area: 1.0m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W21: Orientation: NW, Area: 15.0m2, Shading device: eave/verandah/pergola/balcony >=600mm, timber or uPVC, single pyrolytic low-e, (U-value: 3.99, SHGC: 0.4)

W22: Orientation: NW, Area: 1.5m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single clear, (or U-value: 5.71, SHGC: 0.66)

W23: Orientation: NW, Area: 2.5m2, Shading device: eave/verandah/pergola/balcony >=450mm, timber or uPVC, single pyrolytic low-e, (U-value: 3.99, SHGC: 0.4)

SKYLIGHTS
S1: Area: 2.0m2, Shading device: no shading, timber, double clear/air fill, (or U-value: 4.3, SHGC: 0.5



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

0 2m 4m 6m 8m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-01-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:200 @ A3

SITE ANALYSIS PLAN

Soil & Water Management Plan

All Erosion and Sediment Control measures detailed herein are to be confirmed by the Contractor to be fully functional after any rainfall exceeding 6mm (in a 24 hour Period) and on a weekly basis. This confirmation shall be provided as a condition for undertaking any further work under the Construction Contract.

All services trenches must be backfilled immediately after services are laid and approval is granted to carry out backfilling operations.

Any road vehicle leaving the site which has been in contact with clay soil shall be washed or brushed down on the Site Entry Platform.

The public road in the vicinity of the site is to be swept at regular intervals to prevent sediment buildup at the Site Entry

1. Site works are not to be commenced until all erosion and sedimentation works as outlined on these documents has been completed.

2. Entry and exit to the site is to be via a single means of access/egress - the Site Entry Platform - use site fencing to ensure that all site access and egress is by way of this Platform. Either the existing, concrete driveway; a new, temporary driveway or new Site Entry Platform (as per detail on these drawings) shall be used as the sole site access point.

3. Sediment Control fences are to be installed as indicated on these drawings and are to include provision for site water ingress by means of mounded banks at the outboard edge of the Site Entry Platform or other overland flow paths which may be evident on site.

4. Geotextile 'sausages' filled with aggregate are to be provided to protect Council's Street Stormwater system from sediment pollution from the site.

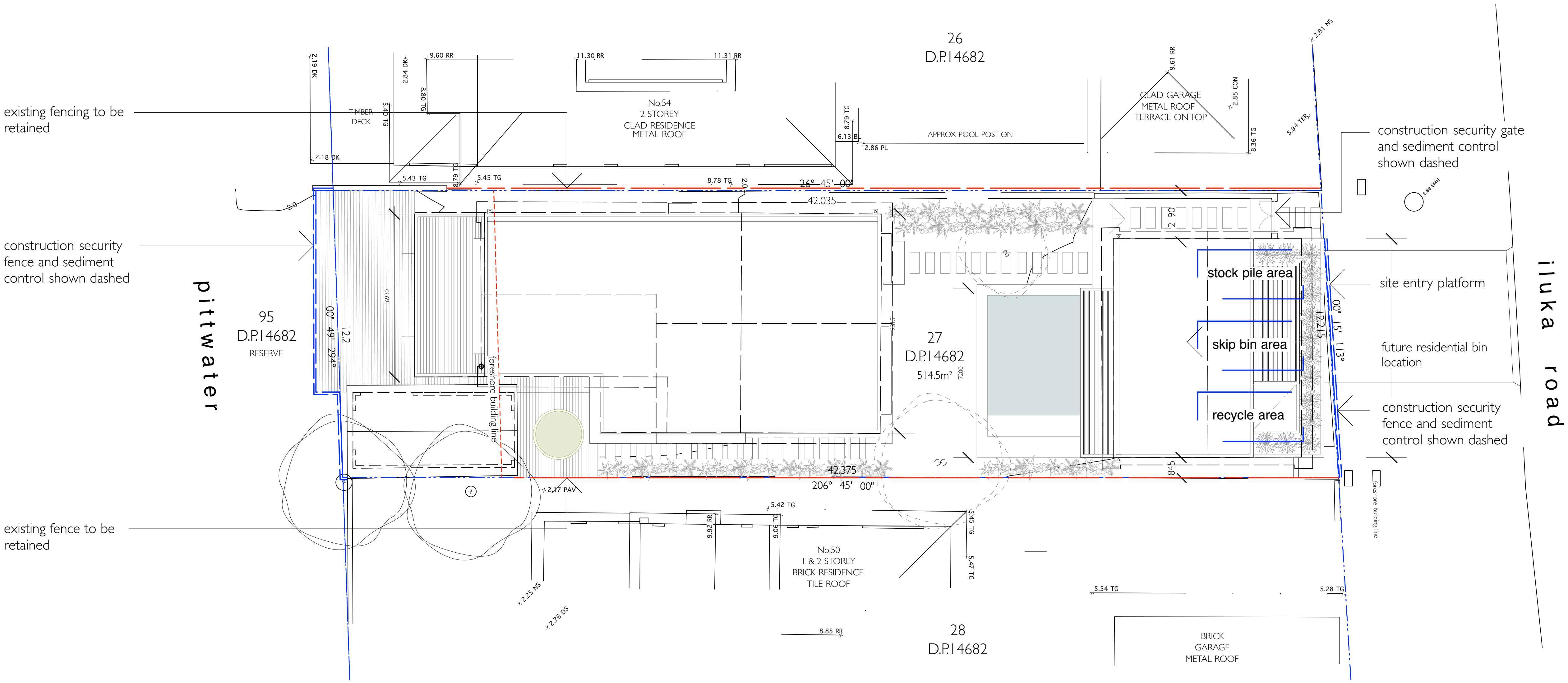
5. All existing topsoil that is disturbed to facilitate excavation is to be stockpiled on site for landscaping purposes. Where any material (topsoil or excavated) is stockpiled on the site, stockpiles are to be covered with a water repellant covering and located outside any area of concentrated Stormwater flow, away from the street and at a distance greater than 2.4m clear of any boundary of the site. Where possible, stockpiles are to be located on a local high point or are to be protected with diversion channels and swales around the stockpile.

6. Areas towards the boundaries of the site are not to be disturbed during the works except where these works are essential for the completion of the project. Where disturbance is essential, work shall be carried out in a manner that minimizes the erosion hazard for as short a time as practicable and includes suitable erosion protection, reinstatement or rehabilitation as part of the disturbance process.

7. The Contractor shall provide approved bins for all site waste to be accumulated and stored for collection and disposal.

Site waste includes:-
- Litter
- All packaging
- mortar, cement and concrete slurries, acid wash down water, paint and any contaminated water

8. Site Stormwater drainage is to be connected and commissioned as soon as practicable following completion of the works.



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

0 2m 4m 6m 8m

SANDY POINT HOUSE

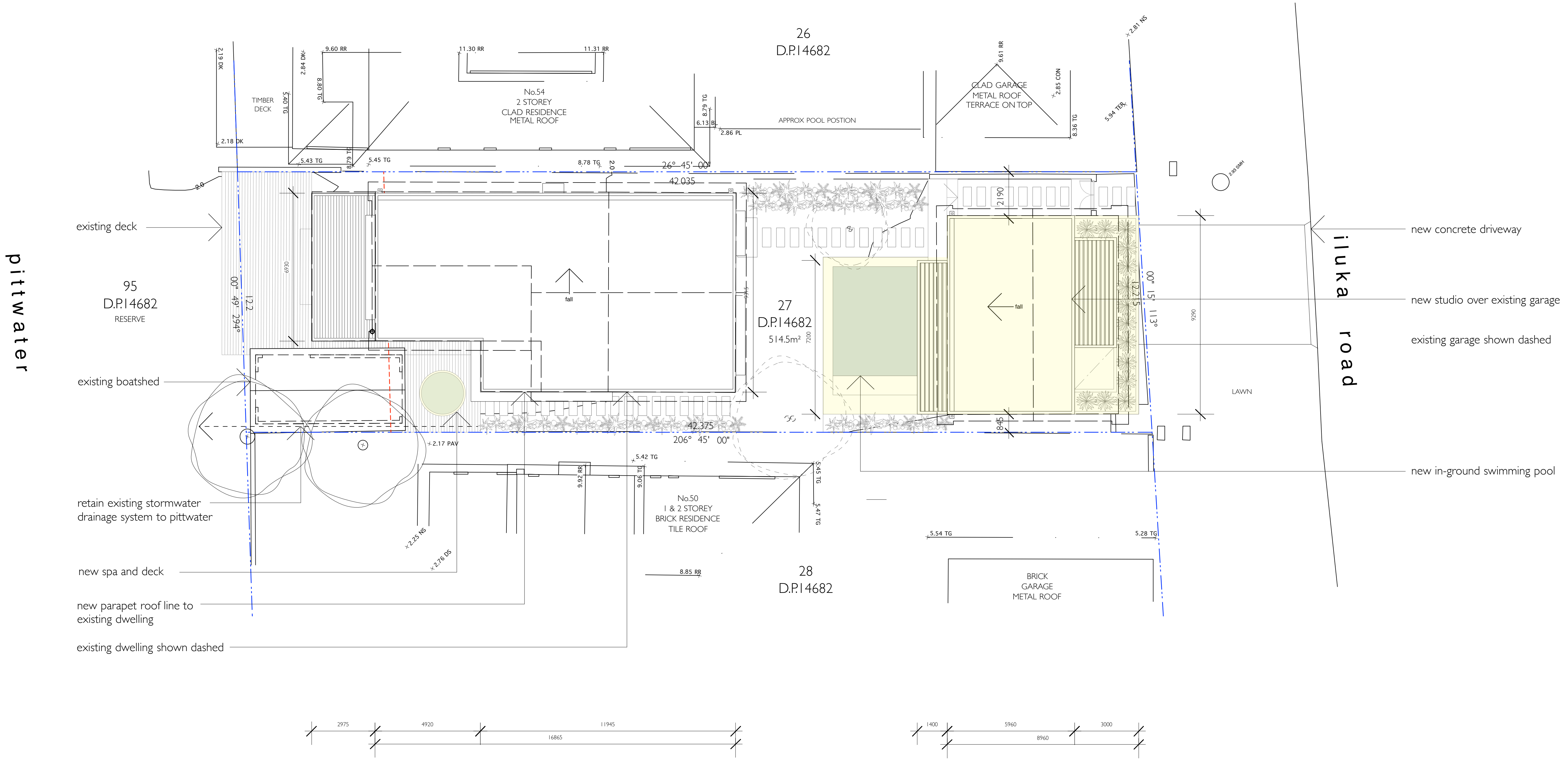
Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-02-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:200 @ A3

SEDIMENT / EROSION CONTROL
WASTE MANAGEMENT PLAN

Proposed additions shown in yellow

Proposed alterations shown in orange



0 2m 4m 6m 8m

rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-03-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:200 @ A3

SITE PLAN

D1.10 Site coverage - Environmentally Sensitive Land

Controls

The total landscaped area on land zoned E4 Environmentally Sensitive Land shall be 60% of the site area.

The use of porous materials and finishes is encouraged where appropriate.

Any alterations or additions to an existing dwelling shall provide a minimum 60% of the site area as landscaped area.

Variations

Provided the outcomes of this control are achieved, the following may be permitted on the landscaped proportion of the site:

o impervious areas less than 1 metre in width (e.g. pathways and the like);

o for single dwellings on land zoned R2 Low Density Residential or E4 Environmental Living up to 6% of the total site area may be provided as impervious landscape treatments providing these areas are for outdoor recreational purposes only (e.g. roofed or unroofed pergolas, paved private open space, patios, pathways and uncovered decks no higher than 1m above ground level (existing).

Statement

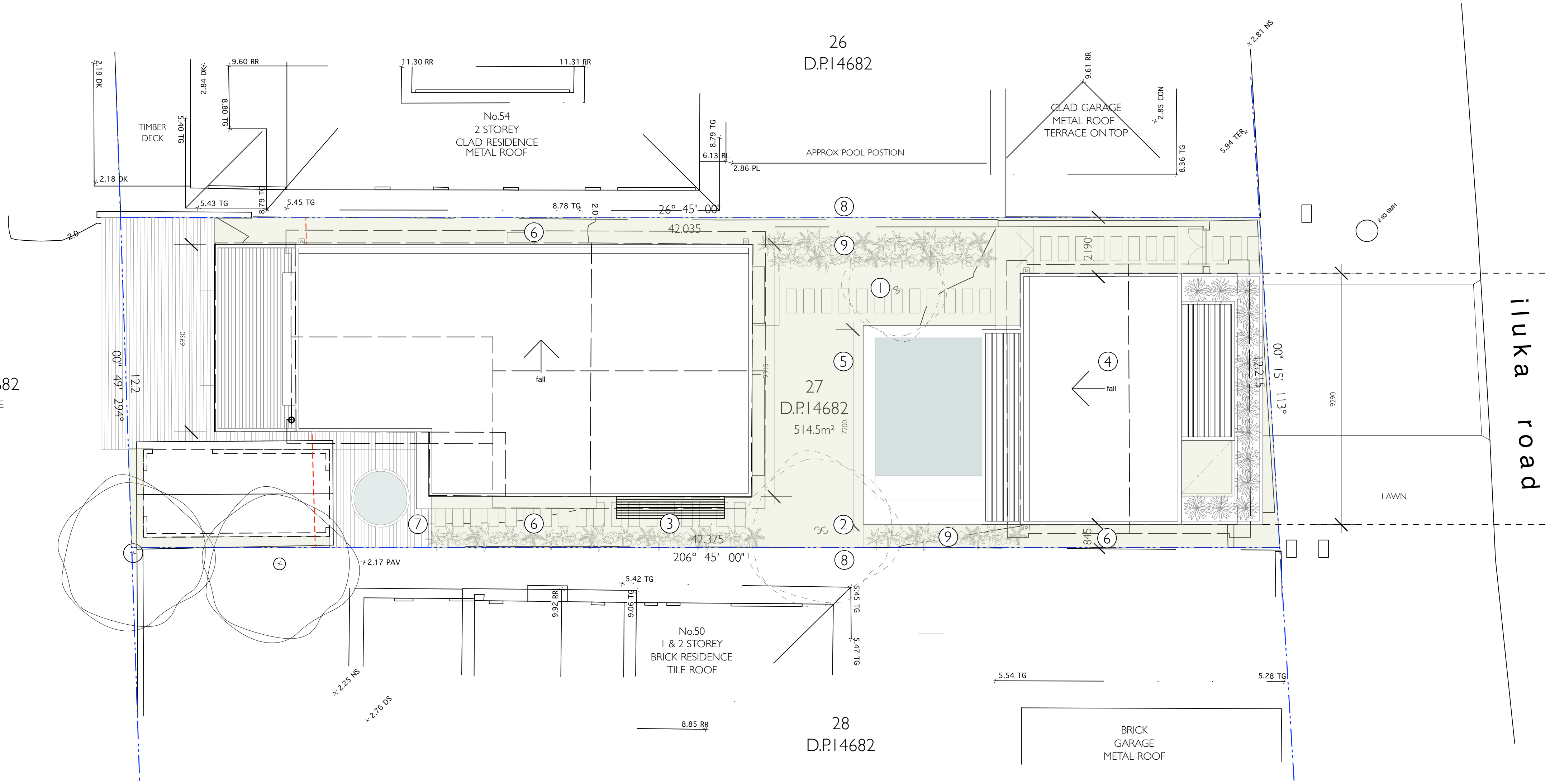
Site Area	514.5m2
Required Landscaped Area (inc 6% variation)	54%: 277.83m2
Existing Landscaped Area	20.5%: .105.36m2
Proposed Landscaped Area	33.0%: 169.70m2

NB: the proposal increases the existing lanscape area by 64.34m2

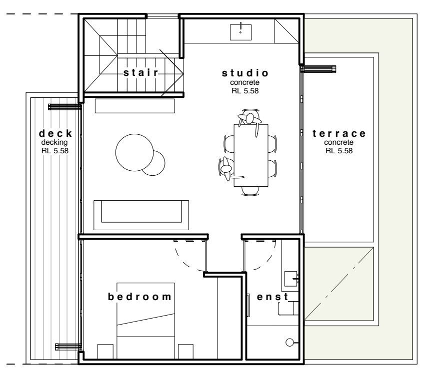
Landscape Legend

1. Remove existing Plumeria (Frangipani) tree
2. Remove existing Plumeria (Frangipani) tree
3. Clothes line
4. Binstore
5. Retain existing lawn area
6. Replace existing concrete with lawn
7. Replace existing concrete with decking around spa
8. Retain existing paling fence
9. Small local native trees with mass shrubs and groundcover

PLANT STOCK TO BE AT LEAST 80% LOCALLY NATIVE PLANT SPECIES FROM THE COASTAL PLAINS COMMUNITY



EXISTING LANDSCAPE AREA - 105.36m2



PROPOSED LANDSCAPE AREA - 169.70m2

rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

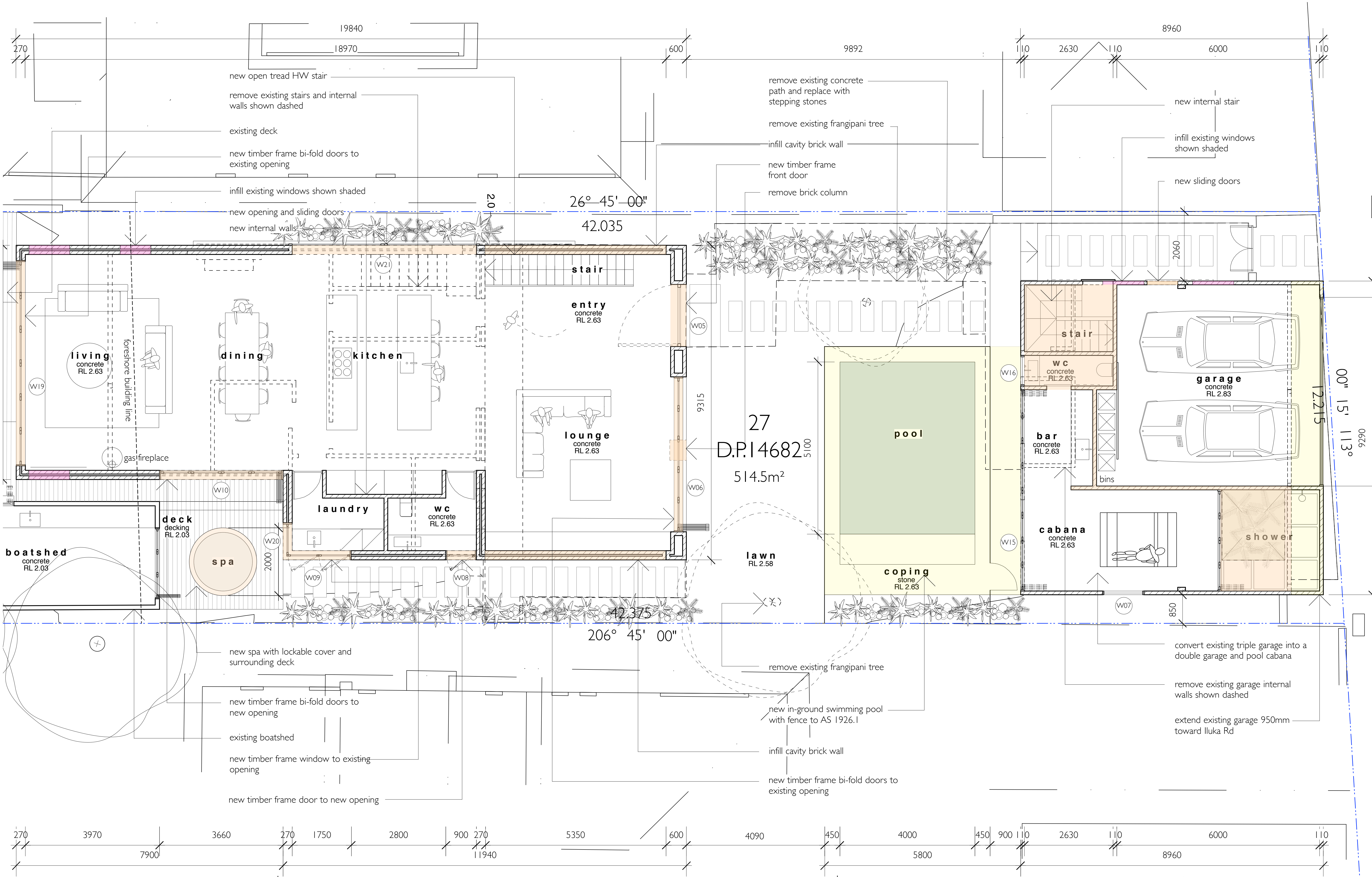
0 2m 4m 6m 8m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-04-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:200 @ A3

LANDSCAPE PLAN



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

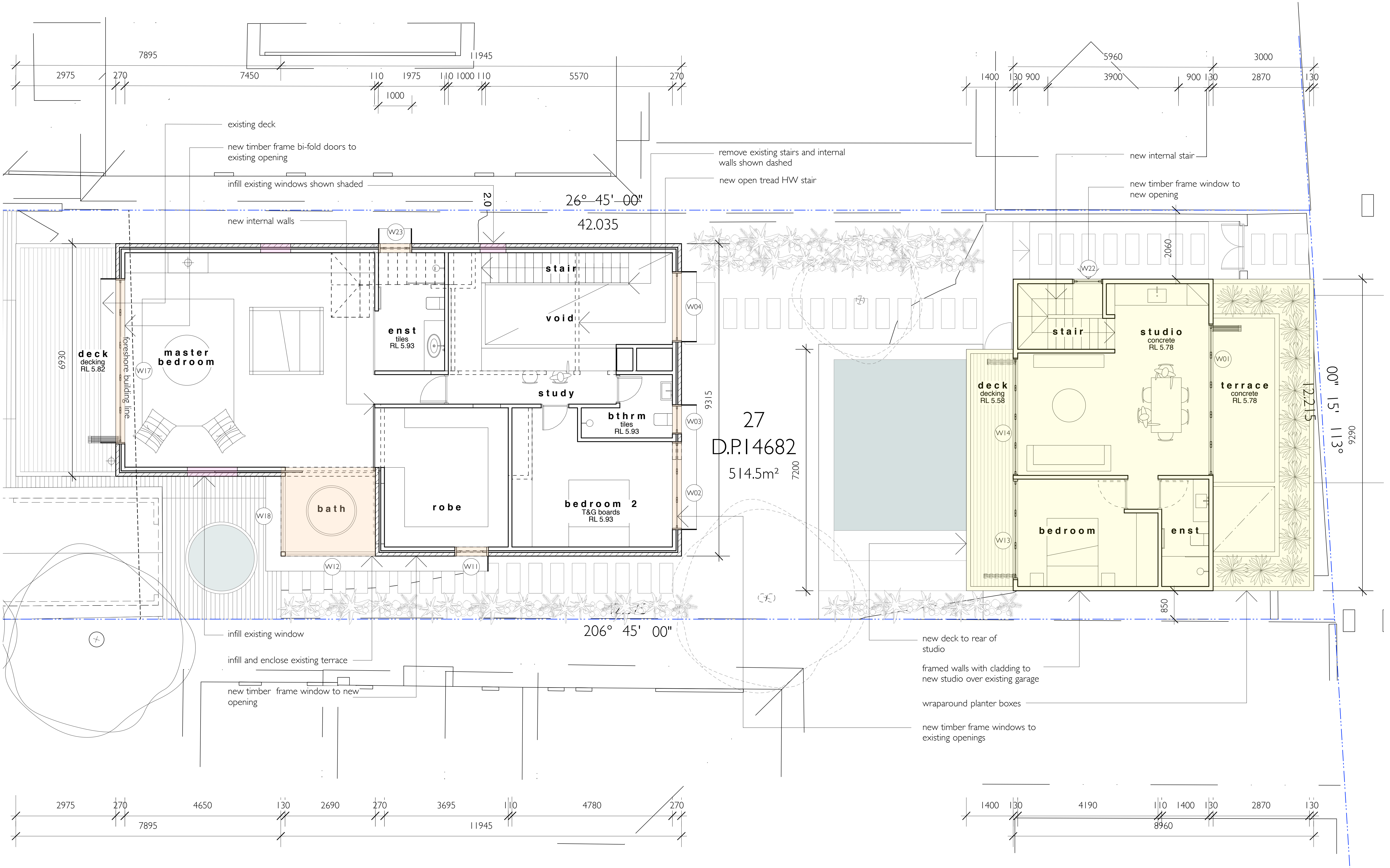
0 1m 2m 3m 4m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-05-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:100 @ A3

GROUND FLOOR PLAN



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

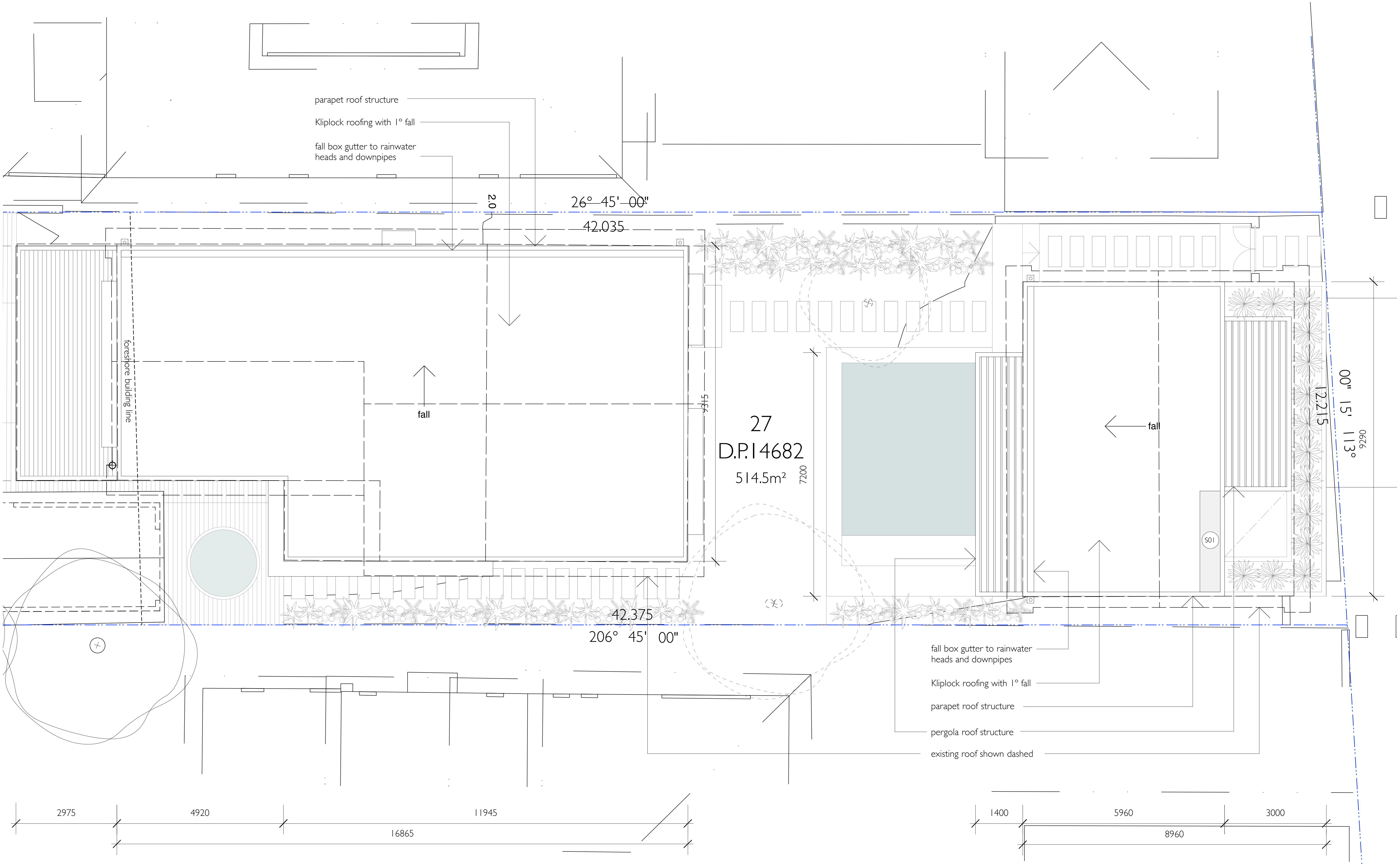
0 1m 2m 3m 4m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-06-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:100 @ A3

UPPER FLOOR PLAN



rachel hudson *architect*
suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

0 1m 2m 3m 4m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-07-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:100 @ A3

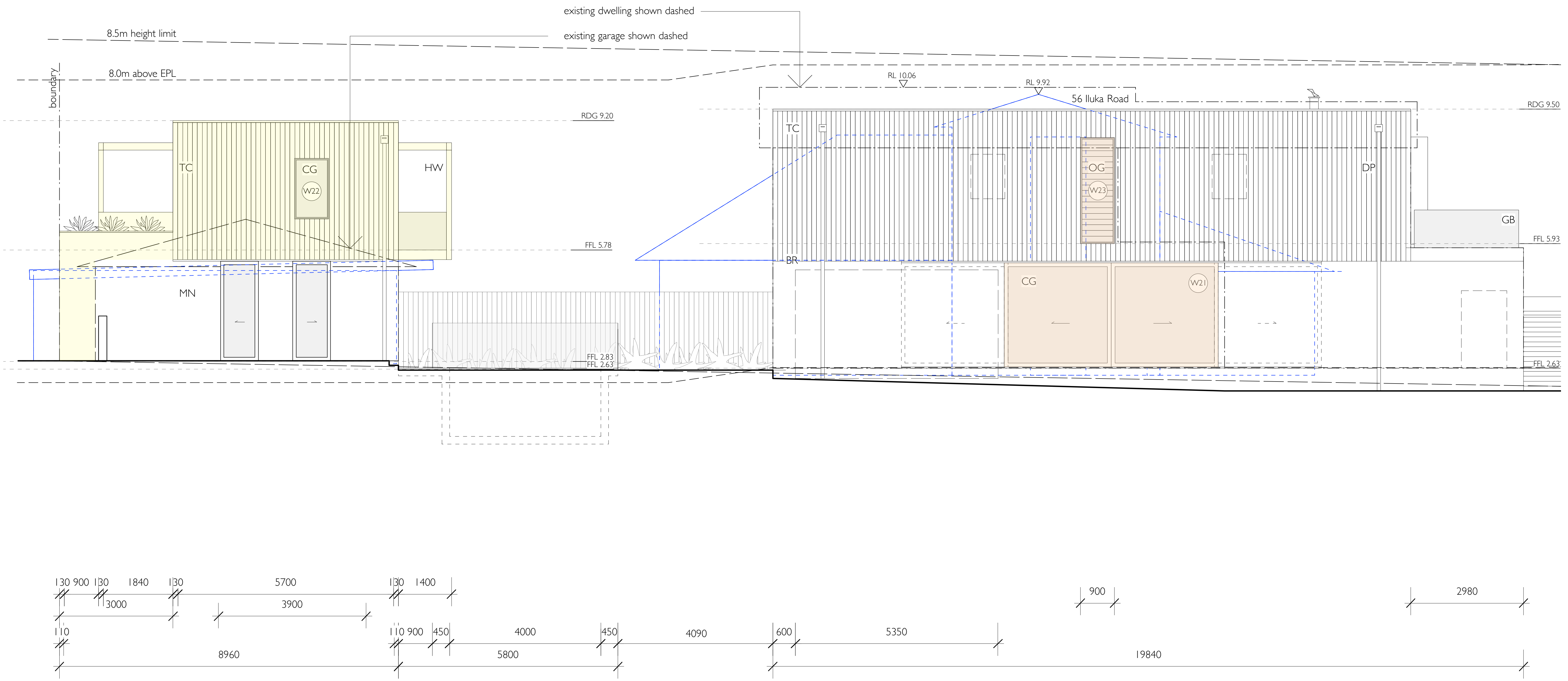
ROOF PLAN

LEGEND

CG	Clear glazing
OG	Opaque Glazing
MN	Masonry
HW	Hardwood
TC	Timber cladding
TD	Timber deck
CB	Colourbond
DP	Down pipe
GB	Glass balustrade

Proposed additions shown in yellow

Proposed alterations shown in orange



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

0 1m 2m 3m 4m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-08-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:200 @ A3

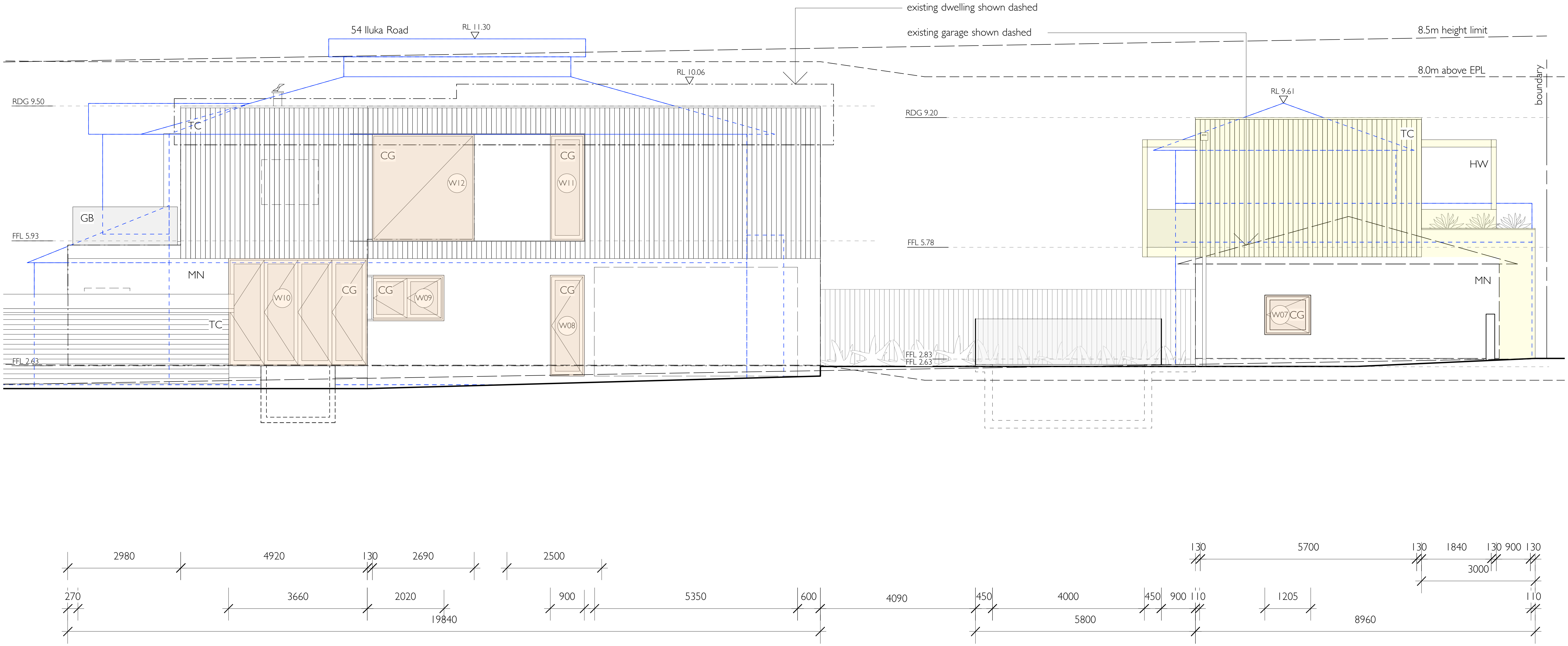
NORTH ELEVATION

LEGEND

CG	Clear glazing
OG	Opaque Glazing
MN	Masonry
HW	Hardwood
TC	Timber cladding
TD	Timber deck
CB	Colourbond
DP	Down pipe
GB	Glass balustrade

Proposed additions shown in yellow

Proposed alterations shown in orange



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

0 1m 2m 3m 4m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG SPH-09-DA
DATE 09.09.18
ISSUE A
JOB # 77
SCALE 1:200 @ A3

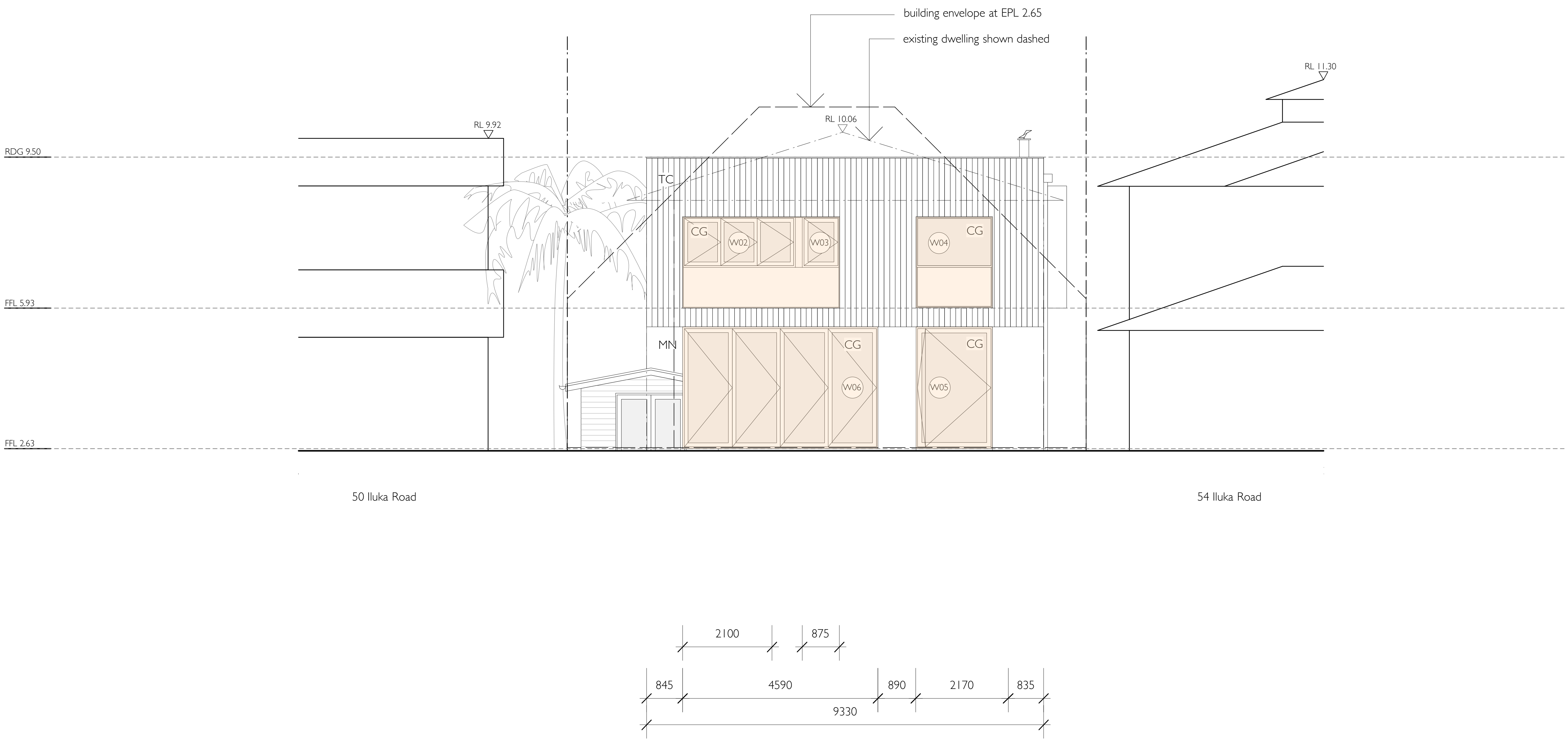
SOUTH ELEVATION

LEGEND

CG	Clear glazing
OG	Opaque Glazing
MN	Masonry
HW	Hardwood
TC	Timber cladding
TD	Timber deck
CB	Colourbond
DP	Down pipe
GB	Glass balustrade

Proposed additions shown in yellow

Proposed alterations shown in orange



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

0 1m 2m 3m 4m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-10-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:200 @ A3

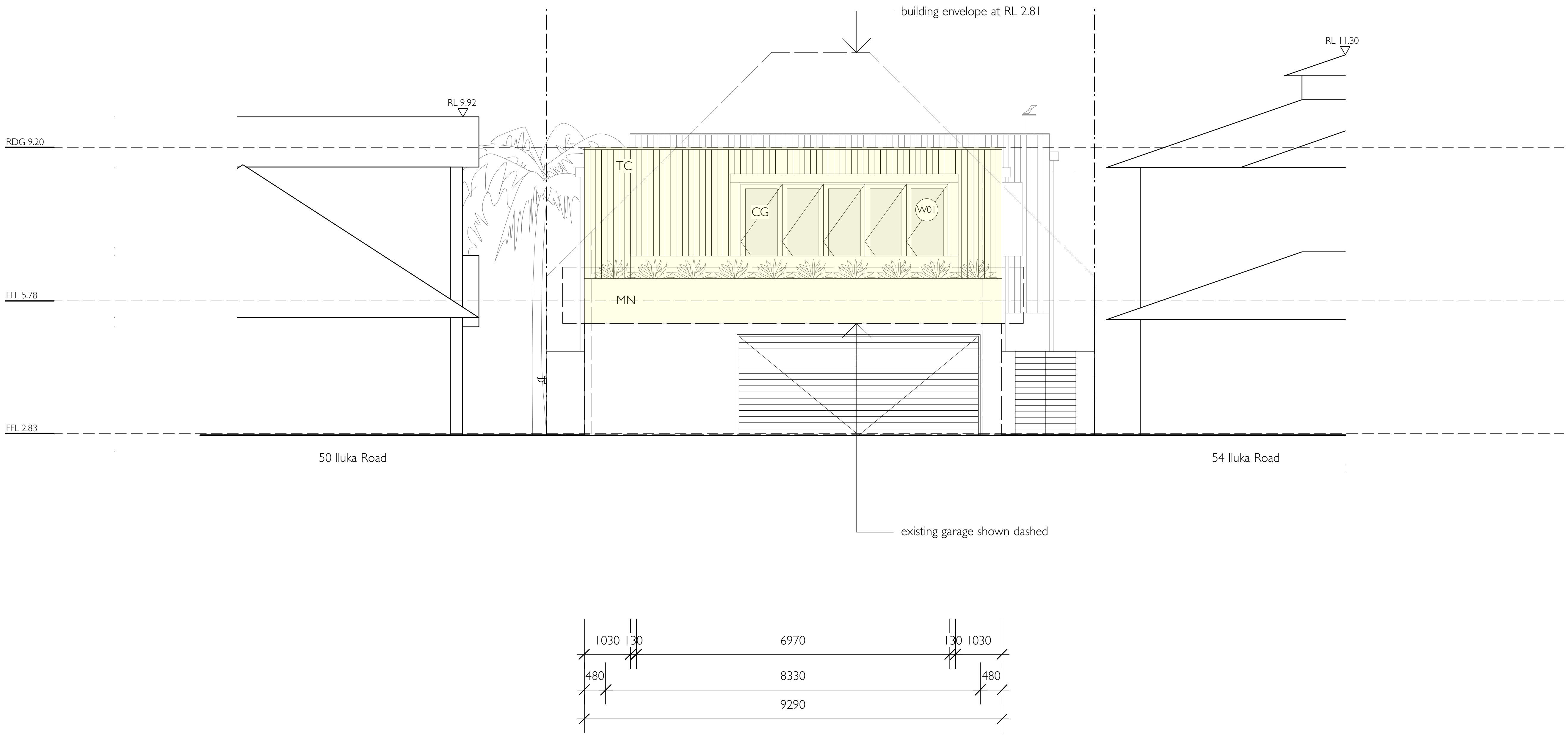
EAST ELEVATION 1

LEGEND

CG	Clear glazing
OG	Opaque Glazing
MN	Masonry
HW	Hardwood
TC	Timber cladding
TD	Timber deck
CB	Colourbond
DP	Down pipe
GB	Glass balustrade

Proposed additions shown in yellow

Proposed alterations shown in orange



0 1m 2m 3m 4m

rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG SPH-11-DA
DATE 09.09.18
ISSUE A
JOB # 77
SCALE 1:200 @ A3

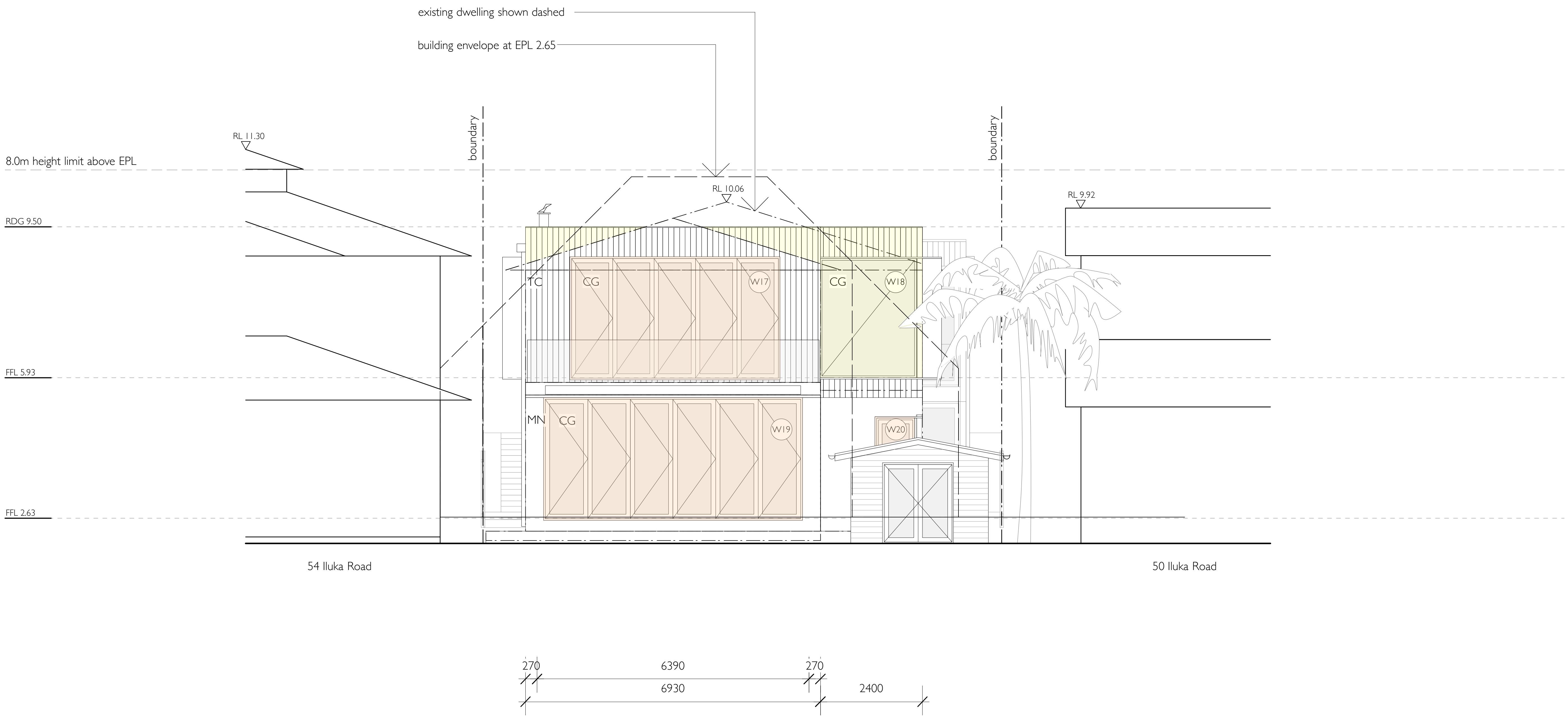
EAST ELEVATION 2

LEGEND

CG	Clear glazing
OG	Opaque Glazing
BR	Brick
HW	Hardwood
TC	Timber cladding
TD	Timber deck
CB	Colourbond
DP	Down pipe
SB	Steel balustrade

Proposed additions shown in yellow

Proposed alterations shown in orange



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

0 1m 2m 3m 4m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-12-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:200 @ A3

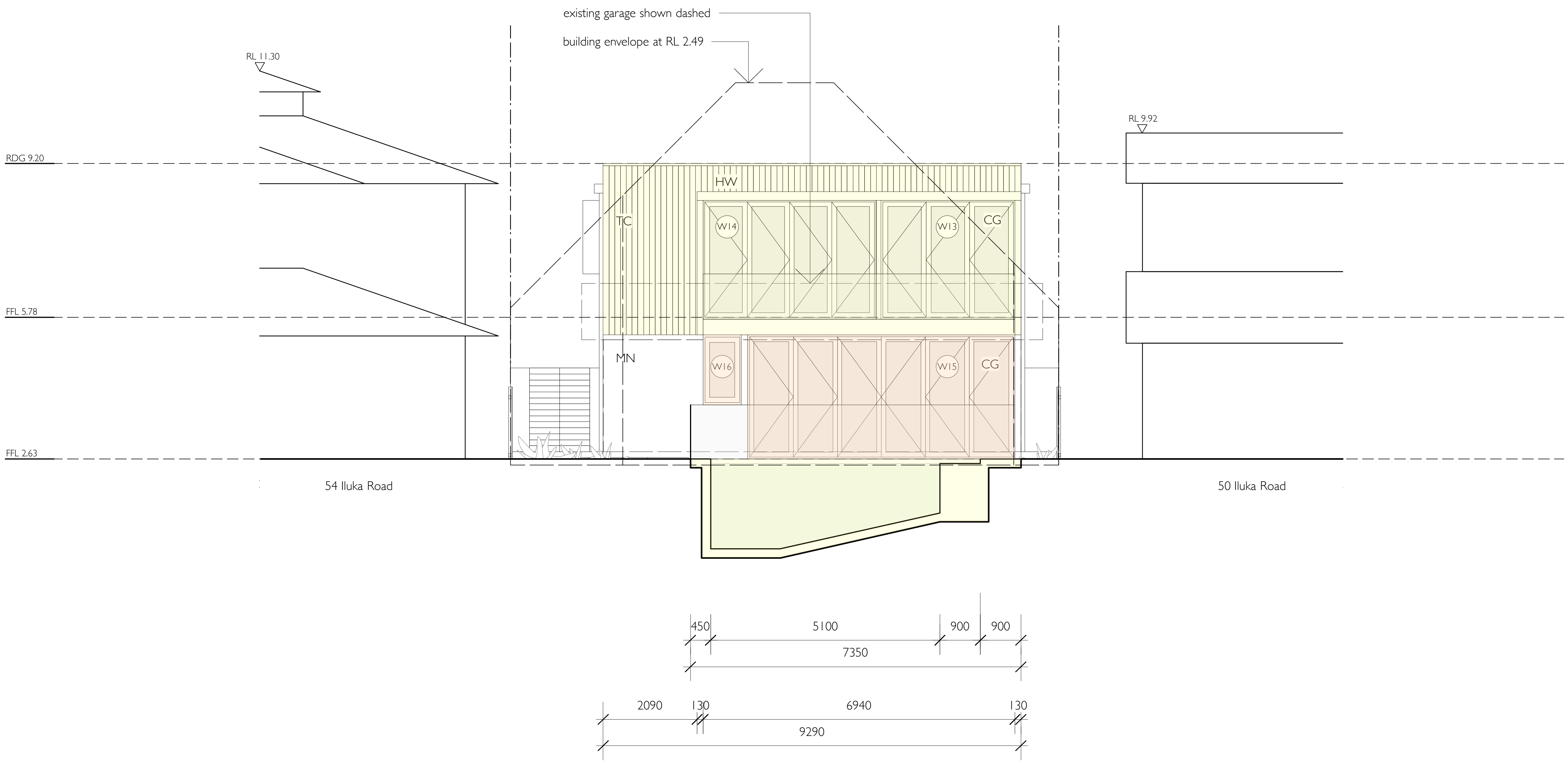
WEST ELEVATION 1

LEGEND

CG	Clear glazing
OG	Opaque Glazing
BR	Brick
HW	Hardwood
TC	Timber cladding
TD	Timber deck
CB	Colourbond
DP	Down pipe
SB	Steel balustrade

Proposed additions shown in yellow

Proposed alterations shown in orange



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

0 1m 2m 3m 4m

SANDY POINT HOUSE

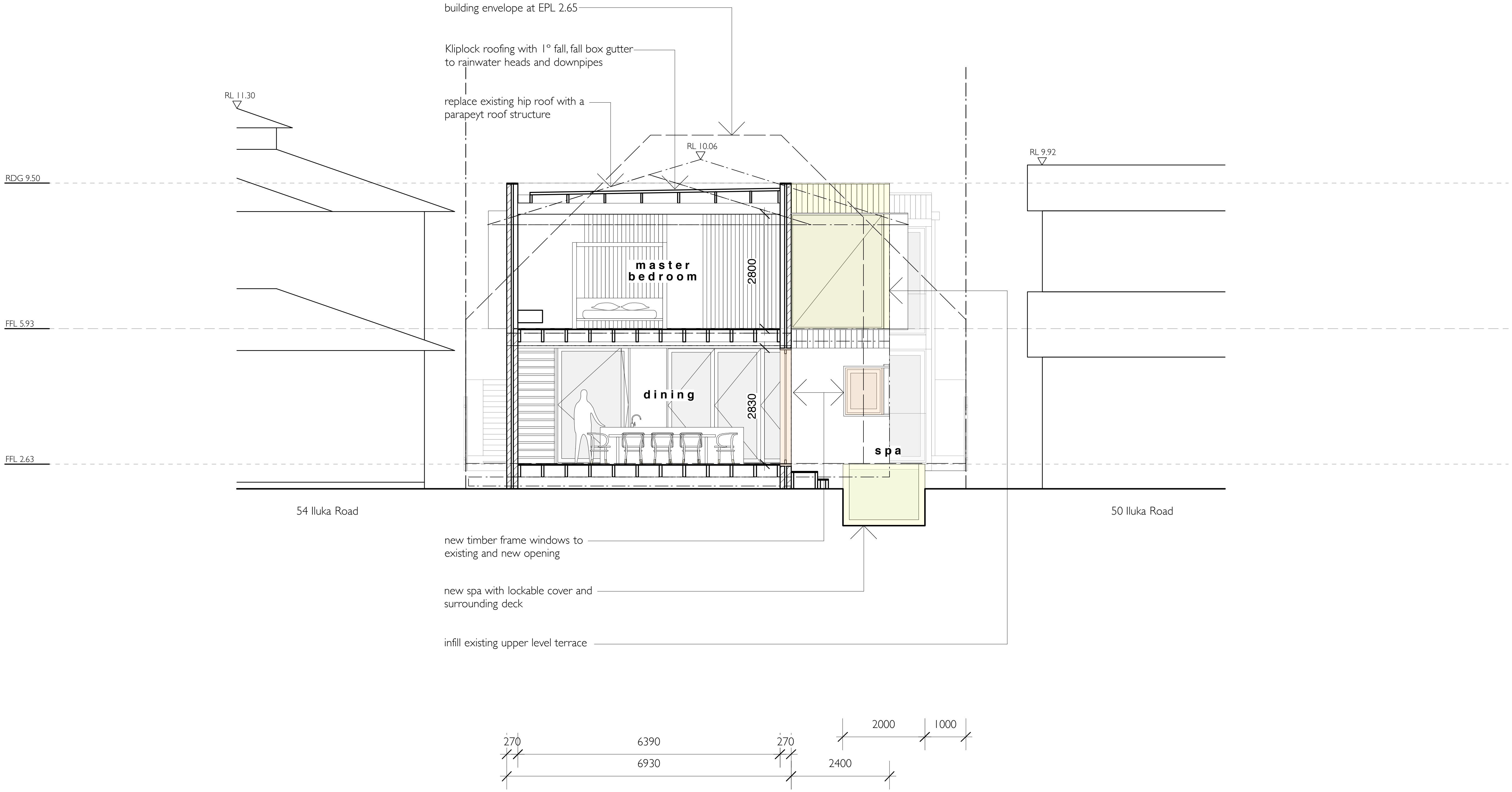
Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-13-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:200 @ A3

WEST ELEVATION 2

Proposed additions shown in yellow

Proposed alterations shown in orange



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

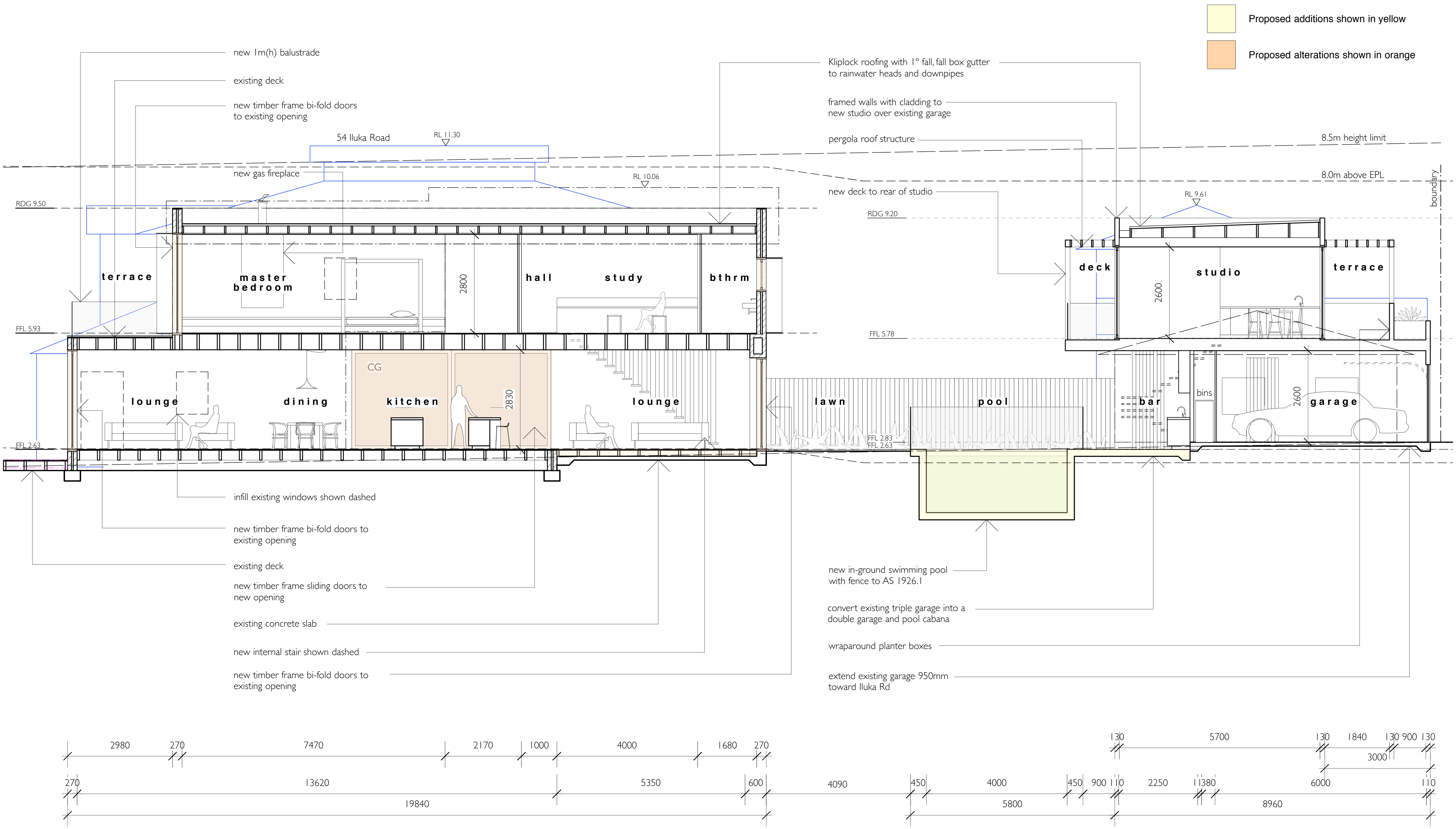
0 1m 2m 3m 4m

S A N D Y P O I N T H O U S E

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG	SPH-14-DA
DATE	09.09.18
ISSUE	A
JOB #	77
SCALE	1:200 @ A3

SECTION AA



rachel hudson *architect*

suite 1 & 2 / 6 Waratah Street Mona Vale 2103
rachel@rachelhudson.com.au
www.rachelhudson.com.au
0410 323 564

0 1m 2m 3m 4m

SANDY POINT HOUSE

Jane Cole
52 Iluka Road
Palm Beach NSW 2108

DWG SPH-15-DA
DATE 09.09.18
ISSUE A
JOB # 77
SCALE 1:200 @ A3

SECTION BB

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Contact

Level 9 - The Forum
203 Pacific Highway
St Leonards NSW 2065
Australia

Phone +61 2 9496 7700
Fax +61 2 9496 7748

Web Address
www.cardno.com

Cardno®