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Initial Discussion on Potential Seawall Layouts at Newport SLSC

A series of Figures are shown overleaf, depicting various potential seawall layouts. In all the Figures:

- the aerial photograph was taken on 13 April 2020;
- the existing and proposed clubhouse layout is depicted in dark blue;
- the Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) of the Norfolk Island Pine trees immediately north and south of the clubhouse are depicted in green (solid circle for the SRZ, and dashed circle for the TPZ);
- an indicative 'subtle' ramp location, integrated into the stairs, is depicted in light blue;
- the thickness of the red vertical seawall line of 0.75m represents the likely pile diameter; and
- the yellow line shows the 1% AEP coastal hazard line position (landward edge of the slumped erosion escarpment) at present, based on a study for Council in 2012.

Note that some excavation landward of the seawall layout depicted would be required. That is, the red line does not represent the limit of disturbance to the trees.

For Option 1, a seawall extent is depicted such that no piling of the clubhouse would be required (noting that only the northern portion of the clubhouse could potentially be piled), with the seawall located at the seaward edge of the existing concrete path. This would require removal of the southern tree, and would cause some impact on the northern tree. The total length of seawall for Option 1 is 77m.

For Option 2, this is the same as Option 1, except that the north-south footprint is minimised, thus requiring significant returns. This would be outside the SRZ for both trees, but would be a significant encroachment into the TPZ for both trees. As evident in the aerial photograph, note also that the southern tree canopy would be impacted by piling of the southern return for Option 2, as the piling rig has significant height. The total length of seawall for Option 2 is 93m.

For Option 3, this is the same as Option 1, except that the north-south extent has been increased to reduce the impact on the two trees. The arborist would need to refine this option if it was to be considered. This option would also provide protection to the majority of the SRZ of the trees from coastal erosion/recession. The total length of seawall for Option 3 is 89m.

For Option 4, this is the same as Option 3, except shows a shorter northern extent, which would be possible if piling of the new portion of the clubhouse was undertaken (such that the new portion could remain supported if it was undermined by coastal erosion/recession). The total

length of seawall for Option 4 is 77m, a reduction in 12m in length (say a seawall cost saving of $300K) compared to Option 3. If the additional cost of piling the new portion of the clubhouse was less than this, it could be warranted for consideration. Option 4 does not provide protection to the northern tree from coastal erosion/recession, unlike Option 3.

For Option 5, this is the same as Option 3, except that the seawall is shifted 3m seaward to provide a wider concrete promenade seaward of the clubhouse, which also reduces the extent of the seawall into the TPZ of both trees. The total length of seawall for Option 5 is 95m.

For Option 6, this is the same as Option 4, except that the seawall is shifted 3m seaward as per Option 5 (maintaining the same landward extent of returns as Option 4). The total length of seawall for Option 6 is 83m.

The various options have different impacts on the dune vegetation north of the clubhouse, but this was not considered to be a significant differentiator, as any construction impacts on the vegetation could be restored at the completion of the works, with the vegetated dune recreated.

A summary of the characteristics of each option is provided in Table 1.

Table 1: Characteristics of options assessed herein

Option	Length (m)	Indicative Cost	Advantages	Disadvantages
1	77	$1.93M	Lowest cost	Removal of southern tree and some impact on northern tree; both trees are not protected from coastal erosion
2	93	$2.33M		Relatively high cost, significant encroachment into the TPZ of both trees and canopy of southern tree; and both trees are not protected from coastal erosion
3	89	$2.23M	Limited impact on trees, and both trees are protected from coastal erosion	
4	77	$1.93M		Has additional cost for piling of clubhouse. Northern tree is not protected from coastal erosion
5	95	$2.38M	Limited impact on trees, both trees are protected from coastal erosion, and additional promenade space	Highest cost
6	83	$2.08M	Limited impact on trees, and additional promenade space	Northern tree is not protected from coastal erosion

Note that cost estimates provided herein are indicative, being based on experience from a number of projects at a range of sites and conditions. The estimates are provided for broad guidance only, and are not guaranteed as Horton Coastal Engineering has no control over contractor's prices, market forces and competitive bids from tenderers. Any construction cost estimate provided may exclude items which should be considered in a cost plan. Examples of such items are design fees, project management fees, authority approval fees, contractor's risk, preliminaries and project contingencies (eg to account for construction and site conditions, weather conditions, ground conditions and unknown services). If a reliable cost estimate is required, an appropriately qualified Quantity Surveyor should be engaged and market feedback sought.

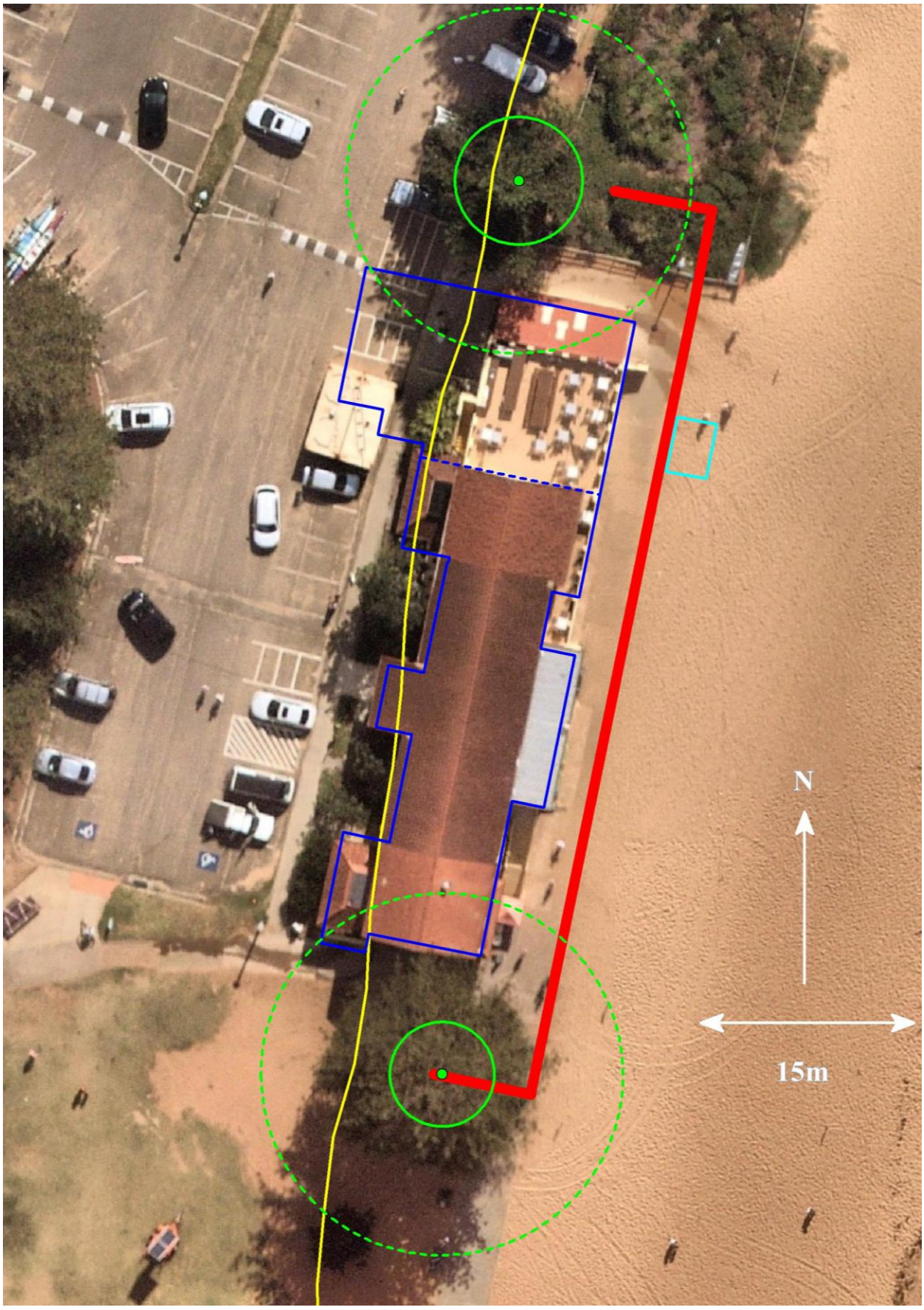


Figure 1: Option 1 – seawall extent for no piling of new clubhouse, with seawall at seaward edge of existing concrete path, without significant returns

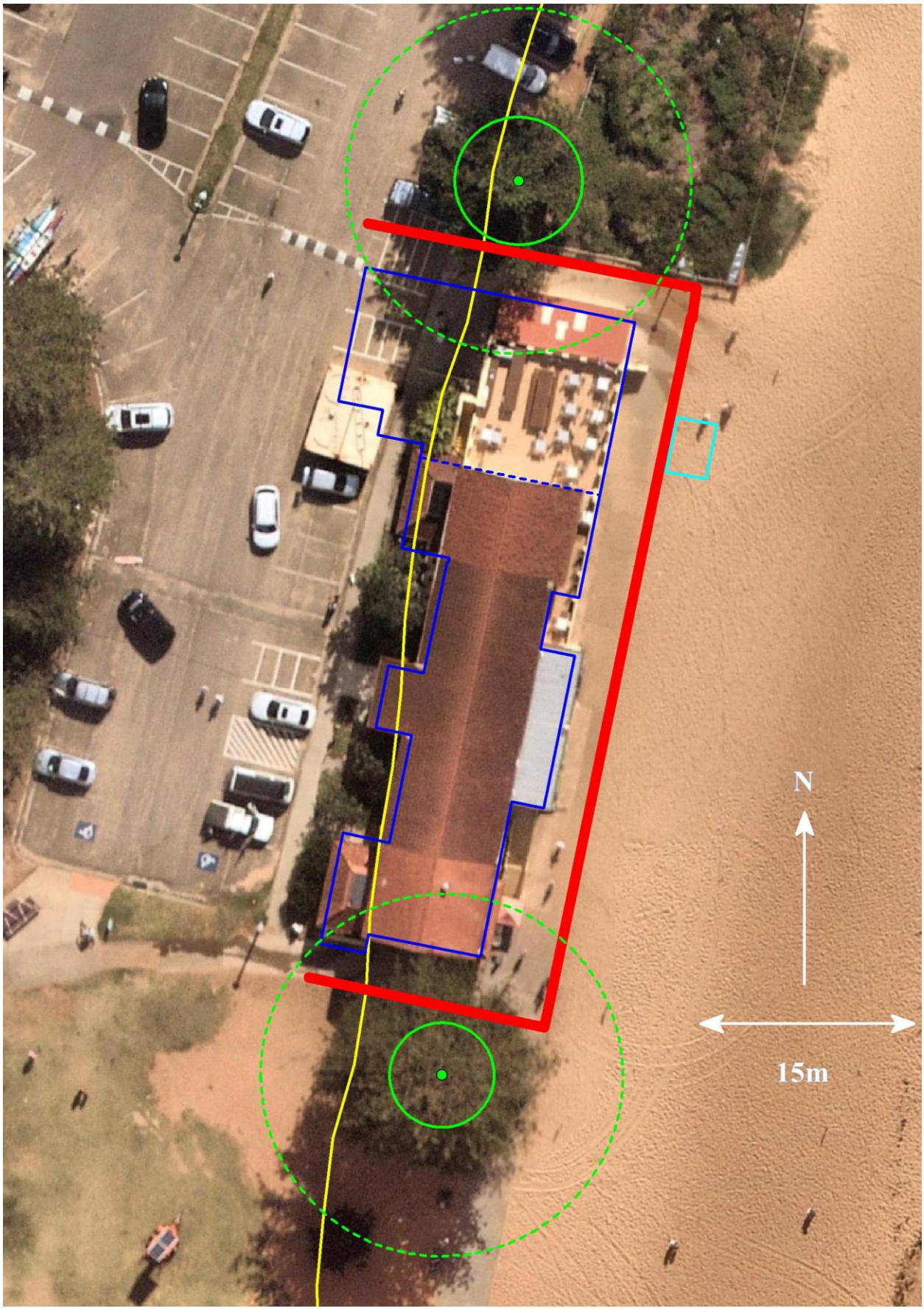


Figure 2: Option 2 – as per Option 1, but with a minimised north-south footprint and significant returns

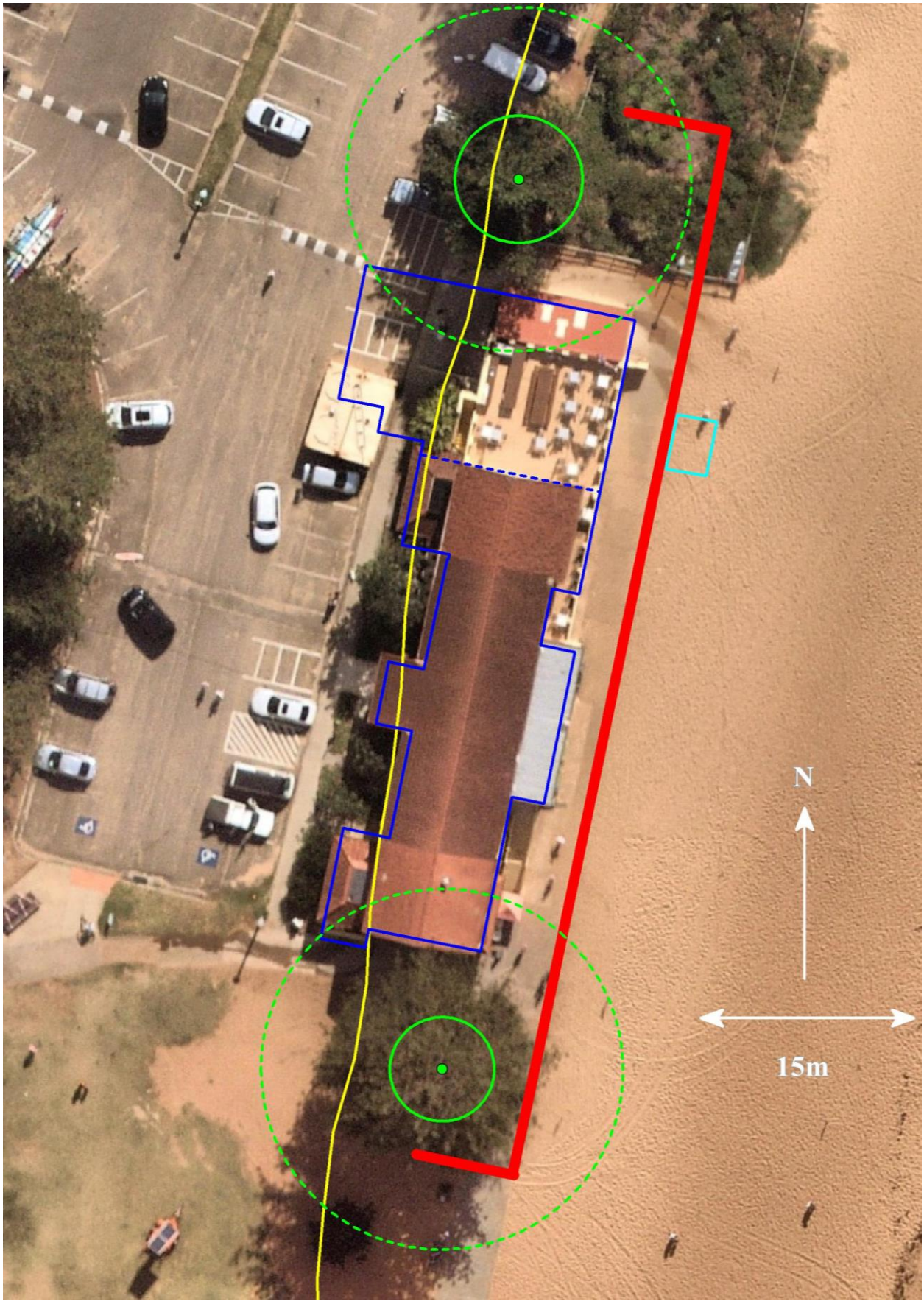


Figure 3: Option 3 – as per Option 1, but with an increased north-south footprint to minimise impact on trees

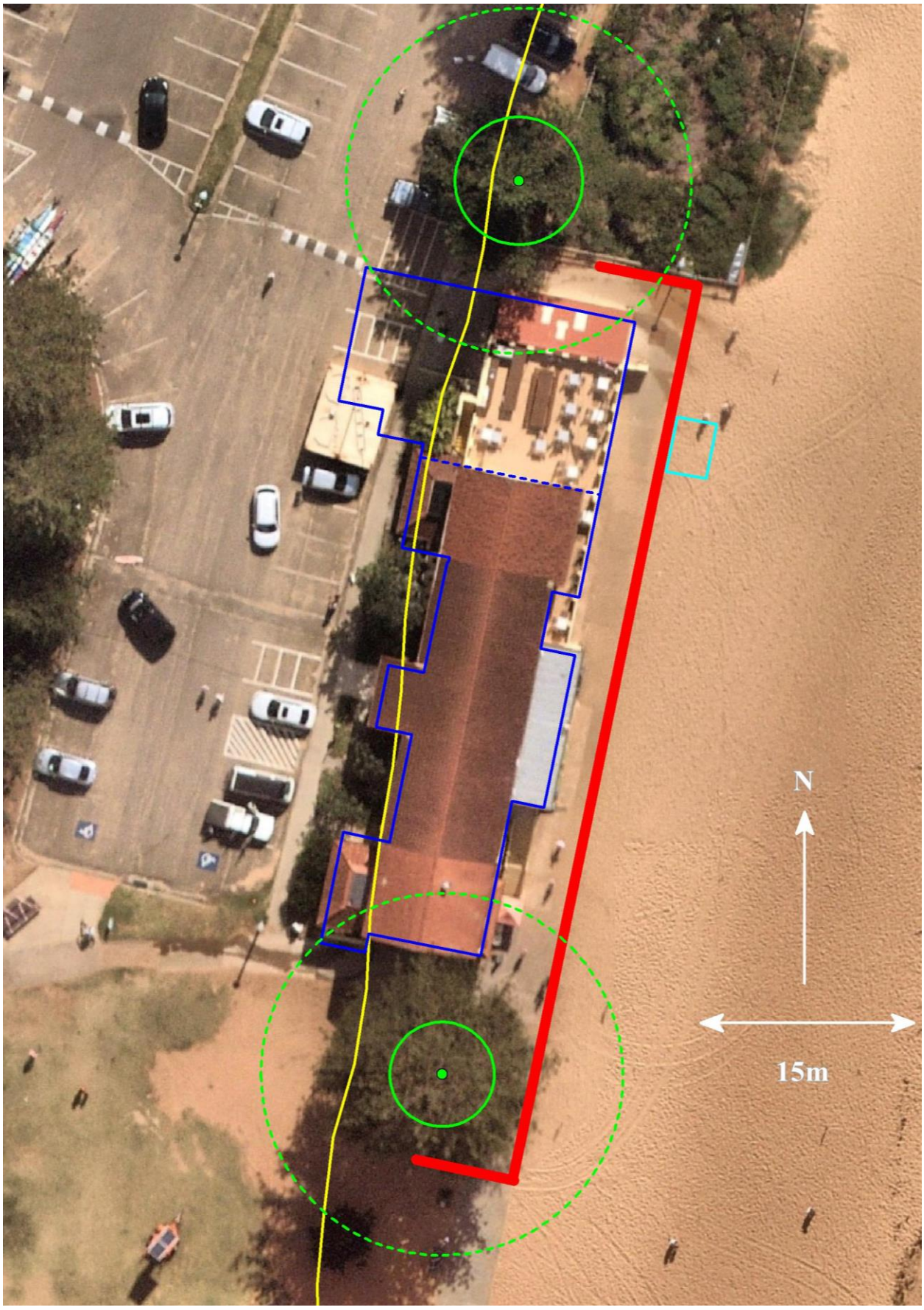


Figure 4: Option 4 – as per Option 3, but with a shorter northern return if piling of the northern portion of the clubhouse was undertaken

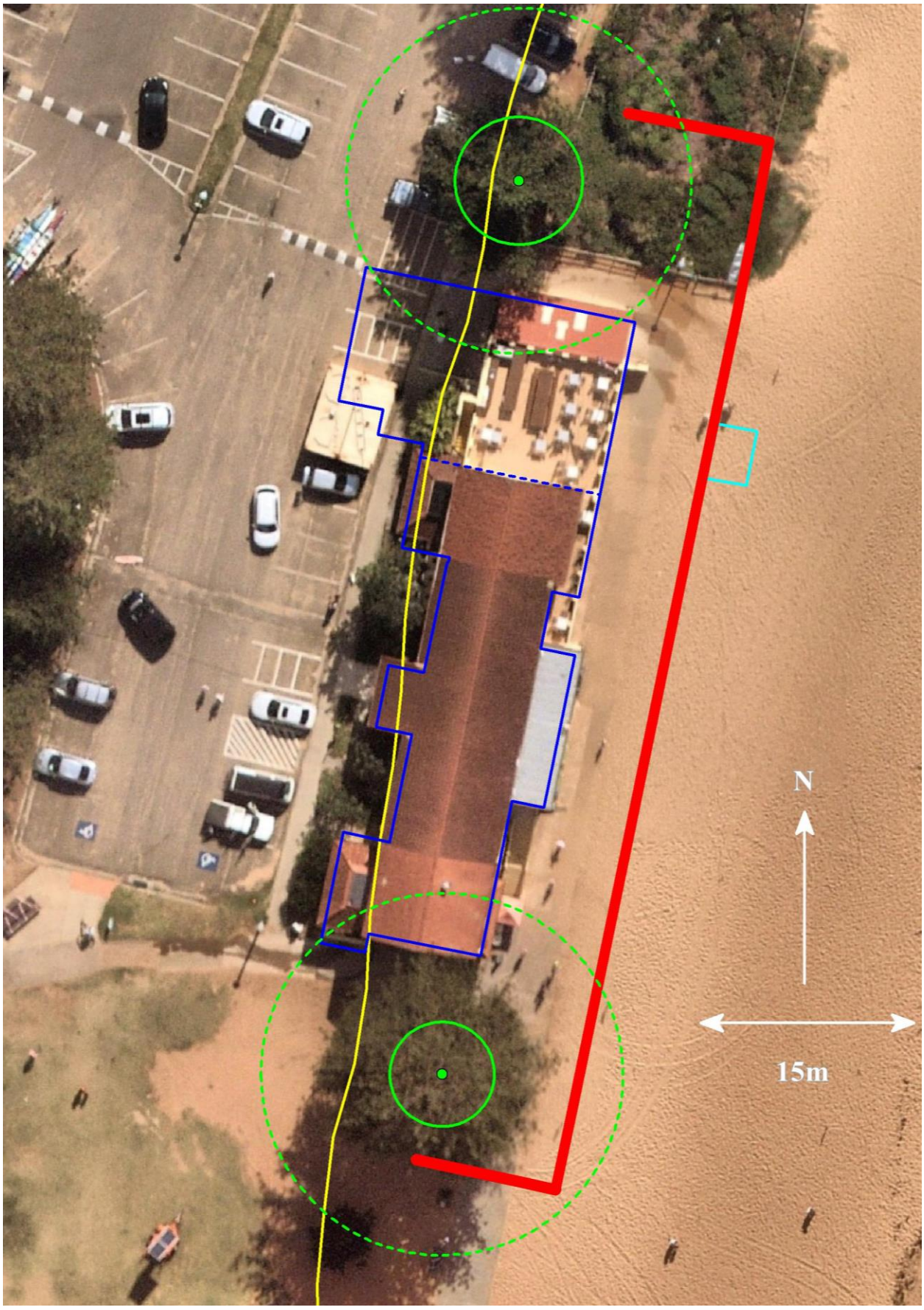


Figure 5: Option 5 – as per Option 3, but with seawall shifted 3m seaward

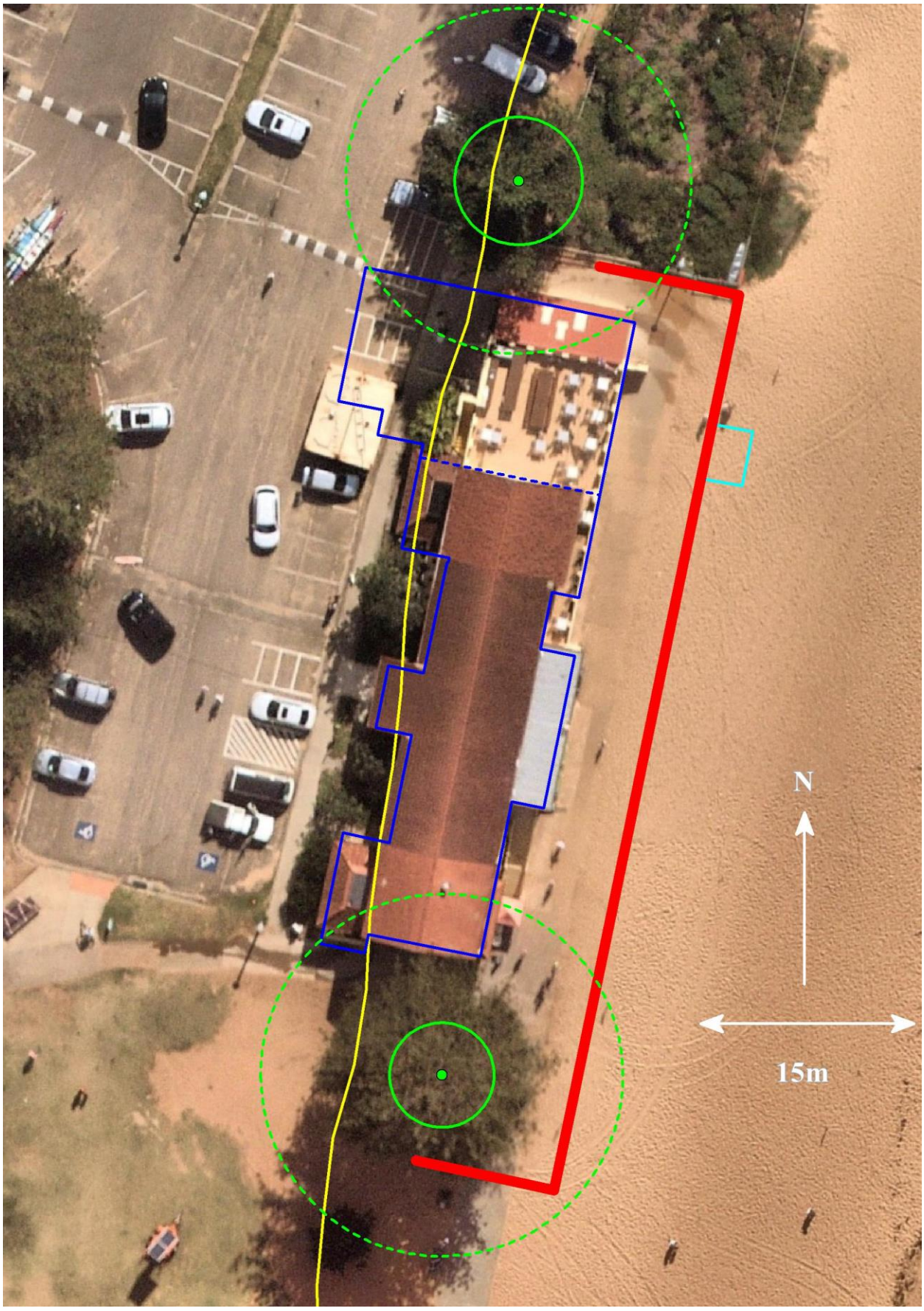
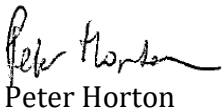


Figure 6: Option 6 – as per Option 4, but with seawall shifted 3m seaward

If you have any further queries, please do not hesitate to contact Peter Horton via email at peter@hortoncoastal.com.au or via mobile on 0407 012 538.

Yours faithfully
HORTON COASTAL ENGINEERING PTY LTD



Peter Horton
Director and Principal Coastal Engineer