GROUND TESTING:

Alterations and Additions at **23 Bennett Street, Curl Curl**

1. Scope

The aim of this assessment is to determine the ground conditions in the location of excess seepage across the uphill side of the property and provide one possible solution to address the drainage issues.

The site was inspected on the 9th July, 2021.

2. Background and Proposed Development

The owners of the property had noticed the ground surface in the SE corner of the property was very muddy for long periods of time. The owners had dug several pits to try and determine the likely cause of the excess seepage. The owner informed us the pits all filled with water very quickly.

The owners engaged Northern Beaches Council and Sydney Water to try and determine if the excess seepage was caused by a broken pipe. However, no broken pipes were found.

The owners are planning to renovate the property in the near future and would like to address the excess seepage prior to this work. We were engaged to determine the ground conditions in this location and formulate a solution to the drainage issue.

3. Geology

The Sydney 1:100 000 Geological sheet indicates the site is underlain by Manmade Fill (Mf) over the Alluvial Stream and Estuarine Sediment (Qha) with the contact of the Hawkesbury Sandstone immediately upslope of the property. Ground testing indicates the property is underlain by the Hawkesbury Sandstone. It is described as a medium to coarse grained quartz sandstone with very minor shale and laminite lenses.

4. Subsurface Investigation

One Auger Hole (AH) was put down to identify the soil materials. Four DCP (Dynamic Cone Penetrometer) tests were carried out to determine the relative density of the overlying soil and the depth to bedrock. The locations of the tests are shown on the site plan attached. It should be noted that a level of caution should be applied when interpreting DCP test results. The test will not pass through hard buried objects so in some instances it can be difficult to determine whether refusal has occurred on an obstruction in the profile or on the natural rock surface. This is not expected to be an issue for the testing on this site. However, excavation and foundation budgets should always allow for the possibility that the interpreted ground conditions in this report vary from those encountered during excavations. See the appended "Important information about your report" for a more comprehensive explanation. The results are as follows:

AUGER HOLE 1 (~RL5.2) **–** AH1 (Photo 1)

Depth (m)	Material Encountered
0.0 to 0.7	**TOPSOIL**, clayey soil, dark brown, very loose to medium dense, damp to very wet, fine to coarse grained with fine trace organic matter.
0.7 to 1.5	**SANDY CLAY**, derived from weathered sandstone, grey, stiff to very stiff, damp, fine to coarse grained.

End of test @ 1.5m in sandy clay derived from weathered sandstone. Groundwater seepage filled hole to ~0.3m below the surface immediately on completion of the Auger Hole.

DCP RESULTS ON NEXT PAGE

DCP TEST RESULTS – Dynamic Cone Penetrometer				
Equipment: 9kg hammer, 510mm drop, conical tip.			Standard: AS1289.6.3.2 - 1997	
Depth(m) Blows/0.3m	**DCP 1** (~RL5.2)	**DCP 2** (~RL5.0)	**DCP 3** (~RL5.2)	**DCP 4** (~RL4.8)
0.0 to 0.3	1	1	2	2
0.3 to 0.6	10	2	3F	11
0.6 to 0.9	12	10	F	9
0.9 to 1.2	23	24	9	13
1.2 to 1.5	21	21	9	6
1.5 to 1.8	24	26	17	6
1.8 to 2.1	32	38	27	56
2.1 to 2.4	38	46	55	#
2.4 to 2.7	41	#	40	
2.7 to 3.0	53		#	
3.0 to 3.3	#			
	End of Test @ 3.0m	End of Test @ 2.4m	End of Test @ 2.7m	End of Test @ 2.1m

#refusal/end of test. F = DCP fell after being struck showing little resistance through all or part of the interval.

DCP Notes:

DCP1 – End of test @ 3.0m, DCP still very slowly going down, wet muddy tip.
DCP2 – End of test @ 2.4m, DCP still very slowly going down, light brown sand on wet muddy tip.
DCP3 – End of test @ 2.7m, DCP still very slowly going down, light brown sand on wet muddy tip.
DCP4 – End of test @ 2.1m, DCP still very slowly going down, wet muddy tip, dark brown sand in collar above tip.

5. Geological Observations and Interpretations

The surface features of the block are controlled by the underlying sandstone bedrock that steps down the property forming sub-horizontal benches between the steps. Where the

grade is steeper, the steps are larger and the benches narrower. Where the slope eases, the opposite is true. The rock is overlain by a clayey soil and sandy clays that fill the bench step formation. In the test locations, the depth to rock ranged between 0.9 to 1.8m below the current surface, being slightly deeper due to the stepped nature of the underlying bedrock. As every test ended after a high blow count and as sandy clay derived from weathered sandstone was observed in AH1, the sandstone underlying the property is estimated to be Very Low Strength and similar strength rock is expected to underlie the entire site. The Very Low Strength Sandstone is expected to become stronger with depth.

6. Comments on Drainage and Possible Solution

The volume of water observed in the Auger Hole appears to be higher than normal when compared to natural ground water seepage observed in the area. It is very difficult to determine the source of the water as it could be coming from any leaking water pipe upslope within the catchment area. We are of the understanding Sydney Water and the Council have been out on site and could find no leaking pipe. As such and due to the difficulties in locating the water source, it is advisable to control the seepage with drainage measures.

Typically, in a sandy profile, any ground water seepage will flow downwards through the profile until it encounters a denser ground material such as clay or sandstone bedrock. At this point, the water will flow downslope over the buried surface of the impermeable material.

The sandy clay that was encountered at a depth of ~0.7m below the current surface in AH1 (Photo 1) is acting as a denser more impermeable layer over which the ground water seepage is flowing. As such if this water is intercepted by a subsurface drain the majority of near surface seepage flows will be cut off below the drain.

As such a trench drain cut through the dark brown sandy soil and embedded at least 0.4m into the under lying light grey sandy clay is one suitable solution (Photo 1). This is essentially a gravel filled trench with drainage cell running through the base. A detailed drainage plan is beyond the scope of these works but we can provide further details of the drain upon request.

White Geotechnical Group Pty Ltd.

Ben White M.Sc. Geol.,
AusIMM., CP GEOL.
No. 222757
Engineering Geologist

Photo 1: AH1 – Downhole is from top to bottom

Important Information about Your Report

It should be noted that Geotechnical Reports are documents that build a picture of the subsurface conditions from the observation of surface features and testing carried out at specific points on the site. The spacing and location of the test points can be limited by the location of existing structures on the site or by budget and time constraints of the client. Additionally, the test themselves, although chosen for their suitability for the particular project, have their own limiting factors. The testing gives accurate information at the location of the test, within the confines of the test's capability. A geological interpretation or model is developed by joining these test points using all available data and drawing on previous experience of the geotechnical consultant. Even the most experienced practitioners cannot determine every possible feature or change that may lie below the earth. All of the subsurface features can only be known when they are revealed by excavation. As such, a Geotechnical report can be considered an interpretive document. It is based on factual data but also on opinion and judgement that comes with a level of uncertainty. This information is provided to help explain the nature and limitations of your report.

With this in mind, the following points are to be noted:

- If upon the commencement of the works the subsurface ground or ground water conditions prove different from those described in this report, it is advisable to contact White Geotechnical Group immediately, as problems relating to the ground works phase of construction are far easier and less costly to overcome if they are addressed early.

- If this report is used by other professionals during the design or construction process, any questions should be directed to White Geotechnical Group as only we understand the full methodology behind the report's conclusions.

- The report addresses issues relating to your specific design and site. If the proposed project design changes, aspects of the report may no longer apply. Contact White Geotechnical if this occurs.

- This report should not be applied to any other project other than that outlined in section 1.0.

- This report is to be read in full and should not have sections removed or included in other documents as this can result in misinterpretation of the data by others.

- It is common for the design and construction process to be adapted as it progresses (sometimes to suit the previous experience of the contractors involved). If alternative design and construction processes are required to those described in this report, contact White Geotechnical Group. We are familiar with a variety of techniques to reduce risk and can advise if your proposed methods are suitable for the site conditions.

SITE PLAN – showing test locations

A1

Approx True North
Magnetic North (PLAN)

BENNETT STREET (BITUMEN FORMATION)

No.21 BRICK RESIDENCE TILE ROOF

9 D.P.242144

POOL

No.9 HOLLOWAY PLACE BRICK RESIDENCE TILE ROOF

No.23 1 & 2 STOREY BRICK & CLAD RESIDENCE TILE ROOF

No.25 2 STOREY BRICK RESIDENCE TILE ROOF

8 D.P.242144

7 D.P.242144

4 D.P.226412

3 D.P.226412
557.2m² (BY CALC)
556.4m² (BY TITLE)

DCP1
DCP2
DCP3
DCP4
AH 1

BENCH MARK NAIL IN KERB RL 6.73 (AHD)

1" NOT FENCED 36.575

NOT FENCED 45.24

FENCED 36.575

270°

00°

90°

WORKST

LEGEND:

BLD = EXTERNAL BUILDING
BS = BOTTOM OF STEP
BW = BOTTOM WALL
CL = CENTRELINE
CON = CONCRETE
DK = DECK
DS = DOOR SILL LEVEL
FCE = FENCE
FL = FLOOR LEVEL
GAFL = GARAGE FLOOR LEVEL
GDN = GARDEN
GM = GAS METER
GRT = GRATE
IL = INVERT LEVEL
NS = NATURAL SURFACE
PAT = PATIO
PAV = PAVING
POOL = POOL
RR = ROOF RIDGE
SIP = SEWER INSPECTION PIT
STR = STAIRS
TKB = TOP OF KERB
TPIT = TELSTRA PIT
TR = TREE
VC = VEHICLE CROSSING
WM = WATER METER
= ELECTRICITY OVERHEAD
= SEWER UNDERGROUND
TREE SPREAD-DIAMETER-HEIGHT

0 1 2 3 4 5 6 7 8 9 10
SCALE 1:100

TITLE INDICATES THAT LOT 9 IN D.P.226412 IS SUBJECT TO:
- RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
- N928095 COVENANT (NOT INVESTIGATED)

NOTES

- WALL TO BOUNDARY DIMENSIONS SHOWN HEREON (LIST NOT BE USED FOR CONSTRUCTION. IF CONSTRUCTION IS ANTICIPATED TO BE UNDERTAKEN ON OR ADJACENT TO PROPERTY BOUNDARIES THE BOUNDARIES OF THE LAND MUST BE MARKED.
- PARTY WALLS HAVE BEEN SET TO TITLE DIAGRAM DIMENSIONS. PARTY WALL THICKNESS CAN BE CONFIRMED BY INTERNAL SURVEY.
- THIS DETAIL SURVEY IS NOT A "SURVEY" AS DEFINED BY THE SURVEYING AND SPATIAL INFORMATION ACT, 2002.
- AREA IS APPROXIMATE ONLY AND HAS BEEN CALCULATED BY TITLE DIMENSIONS. ALL BOUNDARIES OF THE LAND HAVE NOT BEEN CONFIRMED BY SURVEY. IF AREAS ARE CRITICAL WE RECOMMEND A BOUNDARY SURVEY FOR PUBLIC RECORD.
- TREE SIZES ARE ESTIMATES ONLY.
- THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF WAYNE & LOUISE HALL.
- RELATIONSHIP OF IMPROVEMENTS TO BOUNDARIES IS DIAGRAMMATIC ONLY. WHERE OFFSETS ARE CRITICAL THEY SHOULD BE CONFIRMED BY FURTHER SURVEY.
- EXCEPT WHERE SHOWN BY DIMENSION LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
- ONLY VISIBLE SERVICES HAVE BEEN LOCATED. UNDERGROUND SERVICES HAVE NOT BEEN LOCATED. DIAL BEFORE YOU DIG SERVICES (ph 1100 SHOULD BE USED AND A FULL UTILITY INVESTIGATION, INCLUDING A UTILITY LOCATION SURVEY, SHOULD BE UNDERTAKEN BEFORE CARRYING OUT ANY CONSTRUCTION ACTIVITY IN OR NEAR THE SURVEYED AREA.
- SEWER MAIN PLOTTED FROM SYDNEY WATER SEWER DIAGRAM. LOCATION SHOULD BE MARKED ON SITE IF CRITICAL.
- CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
- THIS PLAN IS ONLY TO BE USED FOR THE PURPOSE OF DESIGNING NEW CONSTRUCTIONS.
- CONTOURS SHOWN DEPICT THE TOPOGRAPHY. THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATING OF QUANTITIES WITH CAUTION.
- CONTOUR INTERVAL = 0.25 metre. - SPOT LEVELS SHOULD BE ADOPTED.
- POSITION OF SIDE LINES ARE DIAGRAMMATIC ONLY NOT TO SCALE.
- THE INFORMATION IS ONLY TO BE USED AT A SCALE ACCURACY OF 1:100.
- DO NOT SCALE OFF THIS PLAN / FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED READINGS.
-

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: ASSUMED

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: PM 2003
R.L. 8.460 (ORDER LZ)
SOURCE: S.C.I.M.S. (17/12/17)

1	FIRST ISSUE	22/12/17

CLIENT:
WAYNE & LOUISE HALL
23 BENNETT STREET
CURL CURL NSW 2096

SURVEY PLAN
SHOWING DETAIL & LEVELS
OVER LOT 3 IN D.P.226412
23 BENNETT STREET
CURL CURL NSW 2096

C.M.S. Surveyors Pty Limited
ACN: 096 240 201

LGA: NORTHERN BEACHES | SHEET 1 OF 1

SURVEYED	DRAWN	CHECKED	APPROVED
H.C.	R.M.	H.C.	DR/MDL

SURVEY INSTRUCTION	SCALE	DATE OF SURVEY
17457	1:100 @ A1	08/12/17

DRAWING NAME: 17457detail
CAD FILE: 17457detail.dwg
ISSUE: 1