Douglas Partners
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Integrated Practical Solutions

Report on
Preliminary Phase 1 Contamination Assessment

Macquarie Village
110-114 Herring Road
Macquarie Park

Prepared for
Stamford Property Services Pty Ltd

Project 72138
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Executive Summary

This report details the methodology and results of a Phase 1 contamination assessment undertaken by Douglas Partners Pty Ltd (DP) for 110 – 114 Herring Road, Macquarie Park. The assessment was commissioned by Stamford Property Services Pty Ltd to support a Development Application (DA) for Macquarie Village which is to include seven new multi-storey building together with an underground basement carpark ranging in depth from 7 to 13 m.

The objectives of the Phase 1 contamination assessment are to assess the potential for contamination of the site based on past and present site usage, identify the contaminants of concern, if any, and recommend future actions, if applicable.

The Phase 1 contamination assessment included a site history review (from historical aerial photograph records, WorkCover records on the NSW Dangerous Goods Database, Section 149 [2] and [5] certificates, historical title deeds and a groundwater bore search, a site walkover inspection, limited chemical testing and preparation of a report summarising the findings.

The site is identified as 110 – 114 Herring Road, Macquarie Park (Lot 1 in D.P.780314). The site is an approximate rectangular shaped area of 2.24 hectares. The site is currently in operation as the Stamford Grand North Ryde Hotel and includes several buildings ranging in height from one to three storeys, a one level underground basement together with associated driveways, gardens and recreational facilities (e.g. pool, tennis court etc).

Based on the title deeds and aerial photographs, it appears that the site may have been used for a residential, orchards and/or other agricultural applications until the 1950s. The site appears to then be used for various residential and commercial uses before being used as a hotel.

On the basis of the site features and historical uses, it is considered that the likelihood for contamination is generally low. The significance of chemical contamination (the ability of chemicals to affect the site in the long-term) from past site uses is also low. These results were confirmed by laboratory testing on a limited number of soil samples, with all contaminants analysed below the adopted Site Assessment Criteria (SAC) adopted. Sub-surface conditions across the site are not expected to vary significantly between sampled locations. It should be noted that the construction of deep and extensive basements will result in most of the shallow soils being removed from the site. This will give additional surety that the site will be suitable for the proposed development following construction. Based on the assessment undertaken it is considered that the site appears to be compatible with a residential with minimal access to soil land use, subject to the following:

- Sampling should be undertaken beneath the on-ground floor slabs and the soil checked for pesticides (OCP).
- Should any visual or olfactory indicators of contamination (e.g. asbestos) be identified during early civil works (i.e. earthworks) DP should be contacted for further assessment;
- Prior to the off-site disposal of any excavated surplus material, the preliminary waste classifications of filling and Virgin Excavated Natural Materials should be confirmed by a qualified environmental consultant in accordance with NSW DECC *Waste Classification Guidelines* (2008, updated 2009) and DP's waste classification report (DP 2010); and
- Any imported fill material should be VENM which is to be accompanied by a validation certificate / report verifying the VENM status of the material.

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Report on Phase 1 Contamination Assessment
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1. Introduction

This report details the methodology and results of a Phase 1 contamination assessment with limited sampling undertaken by Douglas Partners Pty Ltd (DP) for the proposed Macquarie Village development at 110 - 114 Herring Road, Macquarie Park. The assessment was commissioned by Stamford Property Services Pty Ltd to support a Development Application (DA) for Macquarie Village which is to include seven new multi-storey buildings including an underground basement carpark ranging in depth from 7 to 13 m below ground level (bgl).

The site area is approximately 2.24 hectares (ha) and is in use as the Stamford Grand North Ryde Hotel.

The objectives of the Phase 1 contamination assessment are to assess the potential for contamination of the site based on past and present site usage, identify the contaminants of concern, if any, and recommend future actions, if applicable.

This assessment was carried out concurrently with a geotechnical investigation and preliminary waste classification assessment, the results of which are reported separately.

2. Scope of Works

The scope of the assessment comprised:

- A site history review using historical aerial photographs, historical title deeds, City of Ryde Section 149 planning certificates, search of WorkCover's database of historical Dangerous Goods licences and a search of the NSW Office of Water groundwater bore database;
- Drilling at 16 locations;
- Sampling and analysis of 18 soil samples for a range of organic and inorganic contaminants at a NATA accredited laboratory;
- A site walkover; and
- Preparation of this Phase 1 Contamination Assessment report.

The report documents the results of each of the above tasks and provides comments on the potential for contamination of the subsurface and the need for further investigations and/or management (if required).

3. Site Identification and Location

The site is identified as 110 – 114 Herring Road, Macquarie Park (Lot 1 in D.P.780314). The site is an approximate rectangular shaped area of 2.24 hectares and currently operates as the Stamford Grand North Ryde Hotel. The hotel includes several buildings ranging in height from one to three storeys, a one level underground basement together with associated driveways, gardens and recreational facilities (e.g. pool, tennis court etc). The ground surface generally falls to the north at gradients of approximately 1º to 3º over a total height of about 10 m (RL 65.2 – RL 75.1).

The site is bounded by Epping Road to the south-west, Herring Road to the south-east, a residential development which includes single storey villas and a three storey unit block to the north-east and a Baptist Retirement Village with one to two storey buildings to the north-west.

Drawing 1, showing the site location, is included in Appendix A.

4. Geology, Topography and Hydrogeology

4.1 Groundwater Bore Search

A groundwater bore search of the NSW Office of Water website database (previously held by the Department of Natural Resources) was conducted on 18 January, 2011. Three groundwater bores are located within a 1 km radius of the site (see Appendix B, Figure 1). These bores are described below;

- GW011296 – located on the corner of Epping and Balaclava Roads, Marsfield. This bore is recorded to be used for irrigation purposes. Driller's logs indicate that the lithology generally comprised sandstone, underlain by a 7m thick shale layer from 58.2 – 65.2 m depth bgl and then sandstone. Water bearing zones are contained within the shale layer.
- GW0109694, GW0109695 and GW0109696 – all located at the Macquarie University Station site. These bores are recorded to be used for monitoring purposes. There is no information on the driller's logs in relation to lithology or groundwater.

4.2 Hydrogeology

Groundwater flow direction at the site is difficult to determine due to the limited information available; however, shallow groundwater flow is probably to the east towards a dip in the surface levels of an unnamed north-south trending creek within the Macquarie University grounds. This creek is at the base of the gully and flows north towards Lane Cover River. Groundwater bores during the geotechnical investigation suggested groundwater seepage at about 2.6 – 11.7m bgl (RL 62.5 – 68.0). These variable levels were variable and appear to be either groundwater seepage flowing over or near the soil/rock interface or through fractures in the rock, particularly after wet weather.

4.3 Geology

Reference to the Sydney 1:100 000 Geological Series Sheet indicates that the site is underlain by Ashfield Shale but in close proximity to Hawkesbury Sandstone at lower elevations to the north. The fieldwork confirmed the presence of Ashfield Shale underlying Hawkesbury Sandstone on the upper portions of the site.

4.4 Topography

The site is located near the top of a hill which dips towards the north and north-east.

5. Site History

A review of site history was conducted using historical aerial photographs, historical title deeds, WorkCover NSW Dangerous Goods database search, Ryde Council's Section 149 (2) planning certificates and regulatory notices issued under the *Contaminated Land Management (CLM) Act 1997* and the *Protection of the Environment Operations Act 1997 (POEO Act)*.

5.1 Aerial Photograph Record

Historical aerial photographs from the years 1930, 1943 1951, 1970, 1986 and 2008 were obtained from the NSW Department of Lands Office (1930, 1951, 1970 and 1986 photos) and Six Viewer web site (1943 and 2008 photo). These photographs were studied in order to identify the likely past uses and changes to the site, particularly those of a potentially contaminating nature. The findings are summarised below. Copies of the 1943 and 2008 aerial photographs, the clearest available, are provided in Appendix C.

1930 The site appears cleared of bushland and occupied by a few residential building and possibly agricultural land (possibly orchards).

1943 The site is still cleared with residential buildings in the north-west and north-east corners. Some of the previous buildings on site have been removed. Some properties to the east of Herring Road and south of Epping Road appear to be used as orchards; however, the image of the subject site does not indicate the systematic patterns of the adjoining orchards, suggesting a different usage.

1950 The aerial photograph only shows the eastern half of the site. This portion of the site appears not to have changed much since 1943.

1961 Three residential buildings have been constructed in the central section of the site. The site to the north appears to have been developed into orchards.

1970 Four more buildings have been constructed on site. The orchards to the north of the site have disappeared.

1986 The site appears not to have changed much since 1970.

2008 The existing buildings on the site have been demolished and the site has been developed into a hotel, similar to the current layout.

In summary, the aerial photographs indicate that the site was used for residential and agricultural purposes until the 1950s. Following that time the site appears to have been used for residential and possibly commercial purposes. The site was subsequently developed into a Hotel.

5.2 Historical Title Deeds Search

A historical titles deed search was undertaken for the site. Searches were undertaken by Service First Registration Pty Ltd. Table 1 below summarises the reported title deed information. A full copy is also provided in Appendix D.

Table 1: Historical Title Deed

Date of Acquisition and Term Held	Registered Proprietor(s) & Occupations	Potential Land Uses
08.06.1909 (1909 to 1913)	Harry Smith (Refreshment Room Contractor)	Residential/Agricultural
28.11.1913 (1913 to 1915)	Isabella Curzon Smith (Widow) Henry Bertram Fulton Smith (No occupation stated)	Residential/Agricultural
05.07.1915 (1915 to 1920)	William Thomas Wilton (Orchardist)	Residential/Agricultural (Orchards)
09.01.1920 (1920 to 1956)	William Thomas Wilton (Orchardist) Archibald Ernest Wilton (Orchardist)	Residential/Agricultural (Orchards)
22.08.1956 (1956 to 1962)	John Stuart Mill (Company Director) Leonard Edmund Buck (Merchant)	Residential/Commercial
29.03.1962 (1962 to 1988)	Gospel Recordings Incorporated	Residential/Commercial
17.02.1988 (1988 to 1994)	The Leura Gardens Motor Inn Pty Ltd (Now Resort Hotels of Australia Pty Limited)	Hotel
20.09.1994 (1994 to date)	HSH Hotels (Australia) Limited	Hotel

The title deeds are generally consistent with the aerial photographs, indicating that the site has been initially used for residential and possibly agricultural purposes up to the 1950s, then residential and commercial purposes until being developed as a Hotel.

Note that the possible site uses noted on the tables have been interpreted using the land titles information in conjunction with historical aerial photography where applicable.

5.3 WorkCover NSW Dangerous Goods Database

WorkCover has advised that they do not hold any records in their database for current or historical licences for the storage of dangerous goods. WorkCover's advice is included in Appendix E.

5.4 Council Section 149 (2) and (5) Planning Certificates

A review of Section 149(2) and (5) certificates was conducted for the allotment that forms the site. The certificates indicate that, within the meaning of the *Contaminated Land Management Act*, 1997:

- The land is not within an investigation area or remediation areas;
- The land is not significantly contaminated land;
- The land is not subject to an investigation or remediation order;
- The land is not subject to a voluntary investigation or voluntary remediation order;
- The land is not subject to an ongoing maintenance order; and
- The land is not subject to a site audit statement.

The planning certificates are presented in Appendix F.

5.5 Regulatory Notices Search

The NSW Department of Environment, Climate Change and Water (DECCW) publish records of contaminated sites under Section 58 of the CLM Act (1997) on a public database accessed via the internet. The Notices relate to the investigation and/or remediation of significantly contaminated land as defined under the CLM Act. More specifically, the Notices cover the following:

- Actions taken by the EPA under Sections 15, 17 and 28 of the CLM Act; and
- Site audit statements provided to the EPA under Section 52 of the CLM Act on sites subject to an in-force declaration or order.

A search of the public database revealed that the subject site is not listed. There are also no listed sites within close proximity to the site (i.e. within 2 km).

It should be noted that the DECCW record of Notices for Contaminated Land does not provide a record of all contaminated land in NSW.

The NSW DECCW also issues environmental protection licences to the owner or operators of various industrial premises under the POEO Act (1997). Licence conditions relate to pollution prevention and monitoring, and cleaner production through recycling and reuse and the implementation of best practice.

The NSW DECCW has made available a public register of licences under Section 308 of the POEO Act (1997). The register contains:

- Environment protection licences;
- Applications for new licences and to transfer or vary existing licences;
- Environment protection and noise control notices;
- Convictions in prosecutions under the POEO Act;
- The results of civil proceedings;
- Licence review information;
- Exemptions from the provisions of the POEO Act or Regulations;
- Approvals granted under clause 9 of the POEO (Control of Burning) Regulation;
- Approvals granted under clause 7A of the POEO (Clean Air) Regulation.

A search of the public register indicates that **no** licences, notices, prosecutions, proceedings, exemptions, approvals or other relevant items that were listed within the site.

6. Site Walkover

A walkover of the site was conducted by a DP geo-environmental engineer. At the time of the inspection the site was in use as the Stamford Grand Hotel, North Ryde. The site included three to four storey buildings and structures, car parks, driveways and garden areas. The carpark pavement is covered with either asphalt concrete or segmental block pavers.

There was no evident of any fuel storage tanks (above or underground), stains, odours, mechanical workshops, chemical storages or other areas of concern. It is understood that all dry cleaning for the hotel is done off-site.

7. Areas of Potential Environmental Concern

Potential areas of environmental concern (PAEC) identified during the site history review and the site inspection are as follows:

- The former buildings on the site may have contained fibrous cement product. Careless demolition of these buildings could have resulted in fibrous cement waste (potentially containing asbestos) being present at the site.
- Filling may have been imported to produce uniform levels for the carpark. Filling from unknown sources can contain a range of common contaminants including heavy metals, PAH and asbestos-based building materials.
- The site was possibly part of an orchard which were common in the area up to the 1950s. Commonly used pesticide sprays at that time could have included organochlorine pesticides

(OCP) and arsenic and mercury based compounds. A range of heavy metals can also be associated with fertilisers.

8. Sampling and Analytical Regime

8.1 Sampling and Analysis

On the basis of the EPA's publication *Sampling Design Guidelines*, a minimum of 32 sampling locations are recommended to 'characterise' a site of 2.24 hectares. DP has drilled a total of 16 test bores and analysed samples from 10 locations. This represents approximately 30% of the recommended minimum which is considered adequate for a preliminary investigation.

Fieldwork was undertaken between 9 and 20 December, 2010, and was carried out primarily for a geotechnical investigation and preliminary contamination assessment. It included sixteen boreholes (Bores 101 - 116) drilled with an underpinning rig or a truck-, track- or bobcat-mounted auger/rotary drilling and sampling rig. The boreholes were generally drilled to depths ranging from 0.5 m to 2.3 m with 110 mm spiral flight augers, then cased using HW or NW casing and extended to final depths ranging from 10.0 m to 17.55 m by NMLC (52 mm core diameter) diamond coring techniques. Bores 101, 111 and 112 also required dia-coring to penetrate concrete layers at various stages during auger drilling. Standard penetration tests (SPTs) were carried out within soils at regular depth intervals. Disturbed soil samples retrieved from the cuttings returned by the auger blade were used for sampling, identification and classification purposes. Due to the presence of the existing buildings and site operations, a significant proportion of the site area could not be accessed with drilling rigs. Sampling beneath existing buildings only occurred at one location during this investigation within a basement carpark

The investigation also included the installation of standpipes to depths of 14.0 m, 16.0 m and 11.8 m in Bores 103, 110 and 116 respectively, for subsequent monitoring of the groundwater level. The standpipe wells were purged of water after the completion of drilling and then measured on two subsequent occasions. The sampling and anlaysis of groundwater was outside the scope of work for this assessment.

The locations of the bores are given in Drawing 1, Appendix A. The test bore surface levels relative to AHD, shown on the borehole and test pit logs, were generally estimated from the survey plan of the site dated 13 October, 2010, prepared by Denny Linker & Co. Pty Ltd (Drawing No. 100915). Test Bore 113 was located within the basement and its level was not indicated on the survey plan and was levelled relative to an identifiable point on the survey plan, to determine its level relative to AHD.

Selected fill and natural soil samples obtained from the test bores were sent for analysis at a National Association Testing Authority (NATA) accredited laboratory for a variety of common contaminants including:

- Heavy Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
- Total Petroleum Hydrocarbons (TPH);

- Benzene, Toluene, Ethyl Benzene and Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Polychlorinated Biphenyls (PCB);
- Organochlorine Pesticides (OCP); and
- Asbestos.

Table 2 shows the analytical scheme for the fill and natural soil samples.

Table 2: Analytical Scheme for Samples

Sample ID	Material	Heavy Metals	TRH	BTEX	PAH	PCB	OCP	Phenols	Asbestos
101/1.0-1.4m	Filling	✓	✓	✓	✓	✓	✓	✓	✓
102/0.1-0.2m	Filling	✓	✓	✓	✓	✓	✓	✓	✓
102/0.5-0.6m	Clay	✓	✓	✓	✓	✓	✓	✓	
102/1.0-1.1m	Sandstone	✓	✓	✓	✓	✓	✓		
103/0.1-0.2m	Filling	✓	✓	✓	✓	✓	✓		✓
104/0.1-0.2m	Filling	✓	✓	✓	✓	✓	✓	✓	✓
107/0.1-0.2m	Filling	✓	✓	✓	✓	✓	✓	✓	✓
107/0.5-0.6m	Filling	✓	✓	✓	✓	✓	✓		
109/0.1-0.2m	Filling	✓	✓	✓	✓	✓	✓	✓	✓
109/0.5-0.6m	Filling	✓	✓	✓	✓	✓	✓	✓	
110/0.1-0.2m	Filling	✓	✓	✓	✓	✓	✓		✓
110/0.5-0.6m	Filling	✓	✓	✓	✓	✓	✓		
111/0.2-0.3m	Filling	✓	✓	✓	✓	✓	✓	✓	
111/0.5-0.6m	Filling	✓	✓	✓	✓	✓	✓	✓	
112/0.1-0.2m	Filling	✓	✓	✓	✓	✓	✓		✓
115/0.1-0.2m	Filling	✓	✓	✓	✓	✓	✓		✓
116/0.3-0.4m	Filling	✓	✓	✓	✓	✓	✓		
116/1.0-1.1m	Clay	✓	✓	✓	✓	✓	✓		

8.2 Field Quality Assurance and Quality Control (QA/QC)

Environmental sampling was performed according to standard operating procedures outlined in the DP *Field Procedures Manual*. All sampling data was recorded on DP chain-of-custody (COC) sheets. The general soil sampling procedure comprised:

- Decontamination of all re-useable sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and distilled water prior to collecting each sample or use of disposable sampling equipment;

- Transfer of samples into laboratory-prepared glass jars and capping immediately with teflon-lined lids;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth; and
- Placement of the sample jars and replicate sample bags into a cooled, insulated and sealed container for transport to the laboratory.

8.3 Laboratory QA/QC

The analytical laboratory is NATA accredited and is required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include reagent blanks, spike recovery, surrogate recovery and duplicate samples. These results are included in the laboratory reports in Appendix H.

9. Data Quality Objectives

The scope of the Preliminary Phase 1 Contamination Assessment has been devised generally in accordance with the seven step data quality objective (DQO) process, as defined in Australian Standard *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil Part 1: Non-volatile and Semi-volatile Compounds* (AS 4482.1 – 2005).

The seven step DQO process is as follows:
1) State the Problem
2) Identify the Decision
3) Identify Inputs to the Decision
4) Define the Boundary of the Assessment
5) Develop a Decision Rule
6) Specify Acceptable Limits on Decision Errors
7) Optimise the Design for Obtaining Data

1. State the Problem

The proposed Macquarie Village development will include the construction of seven multi-storey buildings. A common, split level basement ranging from 7 m to 13 m in depth. The lower level bulk excavation level (BEL), on the western side, will be at RL 58.3. The upper level BEL, on the eastern side, will be at RL 61.4. The excavation is generally located at least seven metres from the property boundary. In addition, an access pavement is proposed surrounding the perimeter of the building. Some minor filling may be required around the perimeter of the site beneath pavement formations.

The site history suggests that fill material may have been imported onto the site for levelling purposes. The site and surrounding are have also previously been used for agricultural activities, which could

lead potentially to contamination issues. The demolition of buildings may also have led to contamination issues on-site.

2. Identify the Decision

In assessing the analytical data for soil against guideline levels for human health, the site conditions can be stated to meet the human health guidelines if:

- The 95% Upper Confidence Limit (UCL) of the average concentrations for a data set of samples of like material complies with the adopted criteria;
- Individual concentrations of analytes (non-volatile) are less than 250% of the adopted guideline value; and
- The standard deviation of the population is <50% of the guideline.

The results of the soil investigation have been used to assess the contamination status of the site, and potential risks posed to human health and the environment. Based on the desktop study it is considered that the principal contaminants of concern are heavy metals (particularly arsenic and mercury), PAH, OCP and asbestos. As such, the analysis focussed on these contaminants; however other common contaminants (TPH/BTEX, PCB and phenols) were also addressed.

The soil analytical data was compared to the Site Assessment Criteria (SAC) for residential sites with minimal access. The optimal situation is for soil/fill materials remaining on the site to be within the adopted SAC, therefore forming a suitable substrate without requiring management. The soil health-based investigation levels (HIL) sourced from the DECC (now DECCW) publication *Guidelines for the NSW Site Auditor Scheme* (2006), Appendix II, Column 2, are summarised in Table 4.

3. Identify Inputs to the Decision

The primary inputs that will be utilised to assess the contamination status of the site are:

- Available site information regarding activities undertaken on the site and the surrounding area;
- The local geology, topography and hydrology;
- Potential contaminants;
- Published guidelines for assessing soil quality; and
- Field observations / measurement and analytical results from the current assessment.

4. Define the Boundary of the Assessment

The assessment is conducted on the property defined by 110 – 114 Herring Road, Macquarie Park (Lot 1 in D.P.780314). The site locality and layout plan is depicted on Drawing 1, Appendix A.

5. Develop a Decision Rule

The decision rule is the comparison of the analytical results against relevant published guideline criteria. These assessment criteria are addressed in Table 6, Section 10.

6. Specify Acceptable Limits on Decision Errors

In order to ensure the quality of the soil data, appropriate and adequate quality assurance and quality control (QA/QC) measures and evaluations should be incorporated into the sampling and testing regime.

The laboratory QA/QC regime is to comply with the following data quality indicators (DQIs):

- Conformance with specified holding times;
- Accuracy of spiked samples within the laboratory's acceptable range (typically 70-130% for inorganic contaminants and greater for some organic contaminants); and
- Laboratory duplicates and replicates samples will have a precision average of +/- 30% relative percentage difference (RPD) for inorganic analytes and +/- 50% RPD for organic analytes.

7. Optimise the Design for Obtaining Data

In order to ensure the representativeness of the data, sampling locations were distributed in a generally systematic pattern in order to maximise the coverage across the site given the limited number of bores. However, due to access constraints, limited samples were collected beneath existing structures. The sampling locations are presented on Drawing 1, Appendix A.

Table 3 summarises the DQIs and the procedures designed to enable achievement of the DQIs. For reference purposes, relevant sections of the report are also identified.

Table 3: Data Quality Indicators

DQI	Achievement Evaluation Procedure
Documentation completeness	Completion of field and laboratory chain-of-custody documentation, completion of test bore report sheets in Appendix G & H.
Data completeness	Sampling density based on DP's proposal, only preliminary at this stage.
Data comparability	Use of NATA accredited laboratories, use of consistent sampling techniques (Appendix H).
Data representativeness	Sampling on a generally systematic basis to obtain a reasonable site coverage (Section 8)
Precision and accuracy for sampling and analysis	Achievement of laboratory QC criteria (Appendix H).

10. Site Assessment Criteria

The significance of the results in regards to the levels of contaminants in the soils with respect to the site's suitability residential usage with minimal access is based on the threshold concentrations given in Table 4 below. The SAC have been sourced from the following Guidelines:

- NSW DECC *Guidelines for the NSW Site Auditor Scheme 2nd edition* (2006);
- NSW EPA *Guidelines for Assessing Service Station Sites (1994);* and
- National Environment Protection Measure (NEPM) – *Assessment of Site Contamination*, 1999 (National Environment Protection Council, NEPC).

Table 4: Site Acceptance Criteria for Soil

Contaminant	SAC (mg/kg)	Rationale
TPH[a]		[a] NSW EPA[1] Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use-soils.
$C_6 – C_9$	65	
$C_{10} – C_{36}$	1000	
BTEX[a]		
Benzene	1	
Toluene	1.4	
Ethylbenzene	3.1	
Xylene	14	
Metals	**HIL**	NSW DEC[2] Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd edition) (2006) Appendix II, Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for Residential development with minimal access to soil (HIL Column 2).
Arsenic (total)	400 mg/kg	
Cadmium	80 mg/kg	
Chromium	48%	
Copper	4,000 mg/kg	
Lead	1200 mg/kg	
Mercury	60 mg/kg	
Nickel	2400 mg/kg	
Zinc	28,000 mg/kg	
Total Phenols	34,000	
PAH		
Total	80	
Benzo(a)Pyrene	4	
PCB	40	
OCP		
aldrin + dieldrin	40	
chlordane	200	
DDT (including DDD, DDE, DDT)	800	
Heptachlor	40	
Asbestos	No asbestos present in soil at the surface	Correspondence from NSW EPA[1] Director of Contaminated Sites to Accredited Site Auditors

1 NSW EPA is now part of the NSW Department of Environment, Climate Change and Water (DECCW).

2. now administered by the DECCW

Conformance with the SAC will be attained when either all sample results meet the specified SAC, or (for non-volatile contaminants) when:

- the 95% upper confidence limit (UCL) average concentration of each contaminant is below the SAC;
- no individual exceedance is greater than 2.5 times the SAC; and
- the standard deviation is less than 50% of the SAC thresholds.

11. Results

11.1 Field Observations – Soils

Details of the conditions encountered in the current boreholes are presented in Appendix G. Notes defining classification methods and descriptive terms used in logging the boreholes are also given in Appendix G. Summary geological cross sections (Sections A – A' to F – F') are included in Drawings 2 - 7 in Appendix A.

The material strata encountered in current and previous bores is described in generally increasing depth order below:

FILLING Ranging from 0.2 m to 2.9 m and comprising a surficial layer of asphaltic concrete, concrete or pavers in all but Bores 1 – 4, underlain by gravels, roadbase, crushed sandstone, gravelly silty sand and clayey silty sand. Additional concrete layer were intersected in Bores 101, 107, 109 – 111 and 116.

CLAYS Clay and sandy clay to depths of 0.4 – 2.4 m in Bores 102, 105, 106 and 113 to 116.

MITTAGONG FORMATION Initially a thin layer of weathered sandstone and laminite (sandstone interbedded with approximately 10% to 30% siltstone) overlying medium and high strength, highly weathered to fresh, fragmented to slightly fractured, grey and brown sandstone and laminite with ironstone banding (including medium, high and very high strength bands) and clay seams up to 200 mm thick to depths of 2.7 – 4.7 m in Bores 103 to 111. This unit contains joints dipping from 45° to 90°. A fault with 50 mm displacement was intersected in Bore 111.

SANDSTONE Typically medium and high strength, moderately weathered to fresh, fractured to unbroken with some fractured zones, medium and coarse grained, grey and orange sandstone with distinct and indistinct siltstone laminations. This unit contained frequent joints dipping from 45° to 85° and some minor crushed zones.

Outcrops of medium strength sandstone are exposed in the car park on the north-western boundary. The locations and the reduced levels of the top of the sandstone exposure are indicated on Drawing 1, Appendix A.

11.2 Field Observations – Groundwater

No free groundwater was observed in the test bores during auger drilling or the excavation of the test pit. The use of water as a drilling fluid during diamond coring, and the immediate backfilling of the test bores and pit, precluded long-term measurement of the groundwater levels.

The groundwater levels were measured by DP during December 2010 and January 2011 within the standpipes installed in Bores 103, 110 and 116. The results of these measurements are detailed in Table 1.

Table 5: Results of Standpipe Measurements

Test Bore	Surface RL	Water Levels					
		20/12/2010		22/12/2010		11/1/2011	
		Depth (m)	RL	Depth (m)	RL	Depth (m)	RL
103	72.3	4.3	68.0	4.7	67.6	4.6	67.7
110	74.0	11.5	62.5	11.7	62.3	-[1]	-
116	66.8	2.4	64.4	2.6	64.2	2.7	64.1

Note 1: Standpipe appeared to have been damaged– object stuck in pipe. Water level could not be measured

11.3 Analytical Results

The laboratory results of the assessment for soil samples are summarised in Table 6. The NATA accredited laboratory reports for the soil samples are provided in Appendix H. Several samples returned slightly elevated concentrations for lead, nickel and benzo(a)pyrene. However, all soil samples analysed returned results below the adopted SAC.

Table 6: Results of Soil Analysis (All results in mg/kg unless otherwise stated)

Sample ID	Material	Heavy Metals								Polycyclic Aromatic Hydrocarbons (PAH)		Total Petroleum Hydrocarbons (TPH)		Monocyclic Aromatic Hydrocarbons (BTEX)				Asbestos	Total Polychlorinated Biphenyls (PCB)	Organochlorine Pesticides (OCP)[6]	Phenols
		Arsenic	Cadmium	Chromium[5]	Copper	Lead	Mercury	Nickel	Zinc	Benzo(a)pyrene	PAH	C6-C9	C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylene				
		SCC[1] (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)	SCC (mg/kg)		SCC (mg/kg)		SCC (mg/kg)
101/1.0-1.4	Filling	9	<0.5	9	35	14	<0.1	14	62	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	NAD	<0.6	<2.0	<5
102/0.1-0.2	Filling	<4	<0.5	33	54	4	<0.1	100	42	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	NAD	<0.6	<2.0	<5
102/0.5-0.6	Clay	6	<0.5	35	9	11	<0.1	21	10	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.6	<2.0	-
102/1.0-1.1	Sandstone	9	<0.5	40	4	13	<0.1	9	5	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.6	<2.0	-
103/0.1-0.2	Filling	<4	<0.5	33	64	4	<0.1	81	39	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	NAD	<0.6	<2.0	<5
104/0.1-0.2	Filling	<4	<0.5	17	59	3	<0.1	110	44	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	NAD	<0.6	<2.0	<5
107/0.1-0.2	Filling	<4	<0.5	39	61	4	<0.1	110	43	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	NAD	<0.6	<2.0	<5
107/0.5-0.6	Filling	11	<0.5	22	4	17	<0.1	13	6	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.6	<2.0	-
109/0.1-0.2	Filling	<4	<0.5	65	43	7	<0.1	69	40	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	NAD	<0.6	<2.0	<5
109/0.5-0.6	Filling	7	<0.5	17	10	18	<0.1	6	15	<0.05	<2.7	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.6	<2.0	<5
110/0.1-0.2	Filling	18	<0.5	24	36	210	0.1	7	230	0.2	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	NAD	<0.6	<2.0	-
110/0.5-0.6	Filling	8	<0.5	23	18	61	<0.1	6	74	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.6	<2.0	-
111/0.2-0.3	Filling	7	<0.5	19	6	19	<0.1	5	11	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.6	<2.0	<5
111/0.5-0.6	Filling	<4	<0.5	14	3	16	<0.1	2	6	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.6	<2.0	<5
112/0.1-0.2	Filling	<4	<0.5	15	16	9	<0.1	13	28	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	NAD	<0.6	<2.0	-
115/0.1-0.2	Filling	<4	<0.5	11	28	5	<0.1	28	38	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	NAD	<0.6	<2.0	-
116/0.3-0.4	Filling	<4	<0.5	10	27	43	<0.1	13	43	0.9	<11.5	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.6	<2.0	-
116/1.0-1.1	Clay	<4	<0.5	23	9	7	<0.1	21	22	<0.05	<1.55	<25	<250	<0.5	<0.5	<1.0	<3.0	-	<0.6	<2.0	-
SAC		400	80	400	4000	1200	60	2400	28000	4	80	65	1000	1	130	50	25	NAG	40	40/200/800/40	34000

Notes

*	NSW EPA Contaminated Sites: Guidelines for the NSW Site Auditors Scheme, 2006. Health-based guidelines for commercial or industrial (Column 4)
1	Specific Contaminant Concentration (Total Concentration)
2	All Chromium are assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under the normal environment
3	Aldrin+Dieldrin/Chlordane/ DDD+DDE+DDT/Heptachlor
95% UCL*	Based on Student's-t test assuming a normal distribution in accordance with NSW EPA Sampling design Guideline (1995)
-	Not Tested
NA	Not Applicable
ND	Not Defined
NAD	No Asbestos Detected
NAG	No Asbestos on Ground

12. Conclusions and Recommendations

The current Phase 1 Contamination Assessment was conducted to assess the potential for contamination of the site based on past and present site usage and the likely nature of any contamination. At the time of the investigation the site was occupied by buildings, carparks and gardens as part of the Stamford Grand Hotel, North Ryde.

Based on the title deeds, it appears that the site may have been used for a residential, orchards or other agricultural applications until the 1950s. The site appears to have then been used for various residential and commercial uses before its current use as a hotel.

The aerial photographs do not strongly indicate orchards or market garden usage, however, the property was owned by an orchardist and orchards and market gardens were evident in the surrounding properties. Practices associated with orchards and market gardens may have included the use of pesticides and herbicides applied to plants and the soil surface. Topsoil was unlikely to have been suitable as a substrate for building purposes and was probably removed from the site at the time of site development. A historical topsoil layer was not observed during drilling.

The use of filling materials for levelling and formation of the site for the hotel development was also considered likely, particularly in pockets as identified in the geotechnical investigation; however, the amount of imported filling appears to be small. The analytical data obtained for the filling shows that the fill is not chemically contaminated.

From aerial photos it is evident that buildings were demolished between 1943 and 1986. They may have contained hazardous building materials such as asbestos-cement sheet. It is not uncommon for demolition waste to be buried on site and this waste to contain asbestos-cement fragments; however, the potential for this appears limited given that later buildings were constructed on the site and demolition materials, including asbestos-cement fragments, were not observed in the bore cuttings. Additionally, there were no positive results for those samples analysed for asbestos.

On the basis of the site features and historical uses, it is considered that the likelihood of contamination is low. The significance of chemical contamination (the ability of chemicals to affect the site in the long-term) from past site uses is also low. This was confirmed by laboratory testing on soil samples from 10 locations across the site, with all contaminants analysed below the adopted Site Assessment Criteria (SAC) adopted. Sub-surface conditions across the site are not expected to vary significantly between sampled locations. It should be noted that the construction of deep and extensive basements will result in most of the shallow soils being removed from the site. This will give additional surety that the site will be suitable for the proposed development following construction.

Based on the assessment undertaken it is considered that the site appears to be compatible with a residential with minimal access to soil land use, subject to the following:

- Limited sampling and testing was carried out. Sampling was undertaken beneath the existing building at only one location. Sampling should be undertaken beneath the on-ground floor slabs and the soil checked for pesticides (OCP). If the soil exhibits physical characteristics which are different to those identified in this report then the analysis should be expanded to include the range of analytes described in this report.

- Should any visual or olfactory indicators of contamination (e.g. asbestos) be identified during early civil works (i.e. earthworks) DP should be contacted for further assessment;
- Prior to the off-site disposal of any excavated surplus material, the preliminary waste classifications of filling and Virgin Excavated Natural Materials should be confirmed by a qualified environmental consultant in accordance with NSW DECC *Waste Classification Guidelines* (2008, updated 2009) and DP's waste classification report (DP 2010); and
- Any imported fill material should be VENM which is to be accompanied by a validation certificate / report verifying the VENM status of the material.

13. Limitations

Douglas Partners (DP) has prepared this report for a project at 110 – 114 Herring Road, Macquarie Park, NSW in accordance with DP's proposal dated 25 November 2010 and acceptance received from Mr Anthony Rice of Stamford Property Services Pty Ltd on 30 November 2010. The report is provided for the exclusive use of Stamford Property Services Pty Ltd for this project only and for the purpose(s) described in the report. It should not be used for other projects or by a third party. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions only at the specific sampling or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of anthropogenic influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be limited by undetected variations in ground conditions between sampling locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion given in this report.

This report, or sections of this report, should not be used as part of a specification for a project without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

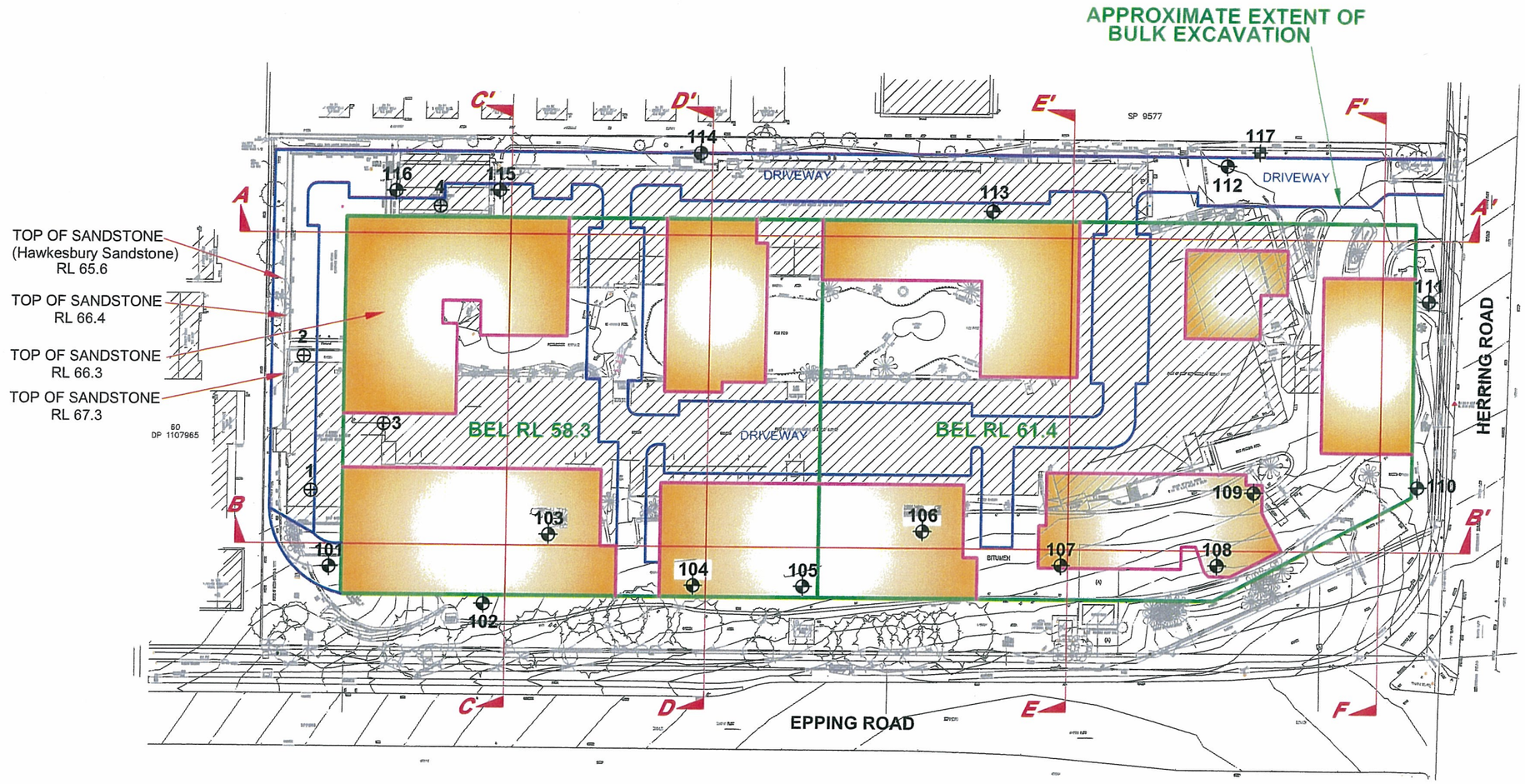
Douglas Partners Pty Ltd

Appendix A

Drawings 1 to 7

Notes About this Report

Locality Plan



NOTE:
Survey drawing from Denny Linker & Co
(Ref.100915, dated 13.10.2010)

0 10 20 30 40 50 75 100m
1:1000 @ A3

NOTE: For details of Sections A-A' to F-F' refer to Drawings 2-7

LEGEND

- ⊕ Previous Test Bore (October 2009)
- ⊕ Current Test Bore (December 2010)
- ⊕ Current Test Pit (December 2010)
- Proposed Multi-Storey Building Footprint
- BEL Bulk Excavation Level

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Stamford Property Services Pty Ltd		
OFFICE: Sydney	DRAWN BY: PSCH	
SCALE: As shown	DATE: 14.1.2011	

TITLE: **Location of Test Bores**
Proposed Macquarie Village
110 - 114 Herring Road, Macquarie Park

MGA

PROJECT No:	72138
DRAWING No:	1
REVISION:	B

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A

A'

PROPERTY BOUNDARY

PROPOSED BUILDING

PROPOSED BUILDING

PROPOSED BUILDING

PROPERTY BOUNDARY

HERRING ROAD

116 Offset 9m N

4 Offset 5m N

115 Offset 8m N

114 Offset 13m N

113 Offset 2m N

112 Offset 12m N

111 Offset - 13m S

UNIT 1

UNIT 2

UNIT 3

UNIT 4

APPROXIMATE GROUND SURFACE LEVEL

TOP OF SANDSTONE IN EXPOSURE OFFSET 8m SOUTH

PROPOSED BASEMENT

BEL RL 61.4

BEL RL 58.3

EL

refusal

M-H

H

M

Bottom Depth 11.84 m

Bottom Depth 10 m

Bottom Depth 10 m

Bottom Depth 10 m

Bottom Depth 10 m

Bottom Depth 14 m

Bottom Depth 14.2 m

ELEVATION (AHD)

72 70 68 66 64 62 60 58 56 54

0 50 100 150 200 250 300 350

DISTANCE ALONG PROFILE (m)

NOTES:
1. The ground surface level is estimated; however is largerly unknown over the existing building footprint.
2. Subsurface profile is accurate at bore locations only and may vary significantly away from bores.
3. For details of Section A-A' refer Drawing 1

GEOLOGICAL PROFILE:
UNIT 1: Filling
UNIT 2: Residual clays and extremely weathered rock
UNIT 3: Laminite and fine to medium grained sandstone (Mittagong Formation)
UNIT 4: Medium to coarse grained sandstone (Hawkesbury Sandstone)

NOTE: Summary logs only. Should be read in conjunction with detailed logs.

LEGEND

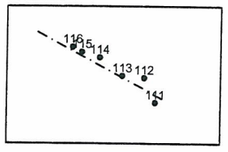
Core Loss
Concrete
Filling
Laminite
Pavers
Sandstone coarse grained
Sandstone fine grained
Sandy Clay
Silty clay

ROCK STRENGTH
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High

SOIL CONSISTENCY
vs - very soft
s - soft
f - firm
st - stiff
vst - very stiff
h - hard
vl - very loose
l - loose
md - medium dense
d - dense
vd - very dense

TESTS / OTHER
N - Standard penetration test value
Water level
BEL Bulk excavation level
Inferred boundary

SITE MAP



Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Stamford Property Services Pty Ltd		
OFFICE: Sydney	DRAWN BY: GRB/LD	
SCALE: 1:1000 (H) 1:100 (V) @ A3	DATE: 17.01.2011	

TITLE: **INTERPRETED GEOLOGICAL SECTION A - A'**
Proposed Macquarie Village
110-114 Herring Road, Macquarie Park

PROJECT No:	72138
DRAWING No:	2
REVISION:	0

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