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New Brighton Golf Club
Report for Rezoning of New Brighton Golf Course
- Residential Area
Stage One Contamination Assessment

June 2011



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1. Introduction and Objectives

1.1 Introduction

In 2009, GHD Pty Ltd (GHD) was commissioned by the New Brighton Golf Club to undertake a number of specialist studies at New Brighton Golf Club, NSW. The studies were commissioned as part of proposed rezoning and redevelopment works to be undertaken. In 2011, GHD was requested by Mirvac Homes Pty Ltd (Mircac) to update the studies to reflect the updated concept master plan and provide separate reports for the proposed residential development site and the proposed golf course site. This report is for the proposed residential development site, as shown in Figure 1, Appendix A (hereafter referred to as the Site).

The Site currently comprises part of New Brighton Golf Course and contains the club house, pro shop and grounds maintenance shed (Figure 2, Appendix A)¹.

This report presents a Stage One Contamination Assessment for the Site.

1.2 Objectives

The objectives of the Stage One Contamination Assessment are:

- ▶ Document (insofar as it is possible based on available information) the Site history and current operations to enable identification of potential contaminant sources;
- ▶ Provide a desk-based review of site information including hydrology, topography, geology and soils; and
- ▶ Produce a stand-alone Stage One Contamination Assessment report documenting the outcomes of the investigations, including an assessment of the potential for the Site to be subject to soil and / or groundwater contamination.

1.3 Scope of Work

In order to meet the stated objectives, GHD undertook the following scope of work:

- ▶ A review and interpretation of existing background information pertaining to the site, including a review of the following sources of information:
 - Relevant existing reports pertaining to the Site;
 - Council information, including Section 149 Planning Certificates, Local Environment Plan, land zoning and permissible use;
 - Historical title deeds;
 - Historical aerial photographs;
 - NSW Department of Environment and Climate Change and Water² (DECCW) Contaminated Sites Register (notifications or incidents);

¹ As detailed in the *New Brighton Golf Club Master Plan*.

² Formerly the Department of Environment and Climate Change (DECC)



- NSW DECCW Protection of the Environment Operations (POEO) Licence register;
- NSW Department of Water and Energy water information (regional bore information); and
- Hydrogeological, geological and topographical maps depicting the site.
- ▶ A site inspection of readily accessible parts of the Site to observe the following:
 - Site activities including current fuel and chemical storage, potential for filling and stockpiling;
 - Visual and olfactory indications of contamination; and
 - Surrounding land uses.
- ▶ Preparation of this Stage One Contamination Assessment report detailing the results of the investigation.



2. Site Information

2.1 Site Location

The Site is located to the east of Nuwarra Road, Moorebank, NSW, 2170. Further Site details are contained in Table 1. The Site location is shown on Figure 1, Appendix A.

Table 1 Site Location Details

Street Address	New Brighton Golf Club, Nuwarra Road, Moorebank, NSW.
Site Area	Approximately 15 hectares
Title Identifiers	Part of Lot 103 in DP 1070029
Local Government Area	Liverpool
Current Land Use	Recreational and Open Space (Golf Course, with associated storage shed, club house and car parking and reserve)
Zoning	RE2 Private Recreation/ RE1 Public Recreation

The Site comprises part of the New Brighton Golf Course. The South Western Motorway runs along the southern boundary of the site with continuation of the golf course to the east.

The Site surroundings are as follows:

- North – A large clay and shale quarry is located on the northern boundary, which is subject to widespread filling. The area appears to be undergoing development. To the west of the quarry there is a combination of vegetated and cleared vacant land. The cleared land was previously part of a concrete recycling facility and a large volume of filled land was observed.
- East – continuation of New Brighton golf course;
- South – The M5 motorway, beyond which are residential premises; and
- West – Residential premises and aged care facilities (Hammondville Nursing Homes).

2.2 Site Conditions and Surrounding Environment

2.2.1 Topography

An inspection of topographical maps on the Department of Lands SIX Viewer website indicates that the majority of the Site is relatively level, at an approximate elevation of less than 10 metres Australian Height Datum (mAHD). The highest point of the Site, where the club house is located (south west corner) is at an elevation of approximately 30 metres AHD.



The site inspection confirmed the Site sloped relatively steeply to the east from the clubhouse.

Cut and fill activities had been carried out over the majority of the Site including constructed dams, sunken sand bunkers, elevated tee boxes and greens.

2.2.2 Geology

The 1:100,000 *Geological Series Sheet 9030, Penrith*³ indicates that the Site is underlain by the following geological unit:

- ▶ Triassic aged Ashfield Shale of the Wianamatta Group, which comprises dark-grey to black claystone-siltstone and fine sandstone-siltstone laminate.

2.2.3 Soils and Landscape

The 1:100,000 *Soil landscape Series Sheet, 9030, Penrith*⁴ indicates that the Site is underlain by fluvial soils of the Berkshire Park Soil Landscape Group which indicates the following:

- ▶ Landscape - dissected, gently undulating low rises on the Tertiary terraces of the Hawkesbury/Nepean river system;
- ▶ Soils - weakly pedal orange heavy clays and clayey sands, often mottled. Ironstone nodules common. Large silcrete boulders occur in sand/clay matrix. Solods and yellow podzolic soils occur where drainage conditions are poor, red podzolic and chocolate soils occur on flats and in small drainage lines, unstructured plastic clays and krasnozems occur in drainage lines or on crests; and
- ▶ Limitations - very high wind erosion hazard if cleared. Gully, sheet and rill erosion on dissected areas. Waterlogging and impermeable soils and low fertility hazard.

2.2.4 Acid Sulphate Soils

The 1:100,000 *Acid Sulphate Soils Risk Map, Liverpool*⁵, indicates that there is no known occurrence of acid sulphate soils on the Site. However, the golf course to the east of the site shows the majority of the golf course to have a High Probability of acid sulphate soils occurring. The soils on the golf course are classified as three different types as follows:

- ▶ Approximately half of the Golf Course and half of the Reserve area are classified as 'Ap2', which indicates that the area has a high probability of acid sulphate soils occurring between one metre and three metres below the ground surface. There is an environmental risk if acid sulphate soil materials are disturbed by activities such as deep excavations for pipelines, dams or deep drains. Typical landform types where these materials occur are alluvial plains, alluvial swamps, alluvial levees and sandplains;

³ New South Wales Department of Minerals and Energy, 1991

⁴ Soil Conservation Series of New South Wales, 1989

⁵ Department of Land and Water Conservation, Edition Two, 1997



- ▶ An area close to the Georges River is classified as 'Ep1', which indicates that the area has a high probability of acid sulphate soils occurring within one metre of the ground surface. There is a severe environmental risk if acid sulphate soil materials are disturbed by activities such as shallow drainage, excavation or clearing. Typical landform types where these materials occur are low alluvial plains, estuarine sandplains, estuarine swamps, back swamps and supratidal flats; and
- ▶ An area immediately adjacent the Georges River is classified as 'Ei0', which indicates that there is a high probability of acid sulphate soils occurring at or near the ground surface. There is a severe environmental risk if acid sulphate soil materials are disturbed by activities such as shallow drainage, excavation or clearing. Typical landform types where these materials occur are estuarine swamps, intertidal flats and supratidal flats.

2.2.5 Hydrology

Stormwater originating from the sealed surfaces around the clubhouse and from residential premises along the western boundary is collected by stormwater infrastructure and flows into the large dam to the east of the Site on the golf course. The water is then pumped to other dams around the golf course and is used for irrigation of the golf course.

There are six man-made dams in the Golf Course area.

The Georges River forms the eastern boundary of the adjoining golf course site and is located approximately one kilometre east of the Site.

The Site comprises unsealed grassed golf course and grassed and wooded open space. Any rainfall would either infiltrate Site soils or enter the Georges River via overland flow.

2.2.6 Hydrogeology

The 1:2,000,000 Groundwater in New South Wales, Assessment of Pollution Risk Map⁶ indicates that groundwater in the vicinity of the Site typically "has a salinity of 0-1000mg/L" and would therefore be considered "suitable for stock, domestic and some irrigation purposes". The map indicates that the Site is likely to be underlain by sandstones and that the potential for groundwater movement is medium.

A search of existing groundwater bore records on the NSW Water Information website⁷ was undertaken in February 2011. No existing groundwater bore were located within one kilometre radius of the Site, however three bores were located 1.5km from the site (west).

The geology encountered in the boreholes comprised clays underlain by water bearing sands from 21 m below the ground surface. A summary of borehole information is provided in Table 2 and detailed bore information is contained in Appendix B.

⁶ NSW Department of Water Resources, 1987

⁷ <http://waterinfo.nsw.gov.au/gw/>



Table 2 Existing Bore Information Summary

Bore Number	Purpose	Date	Final Depth (m)	Depth to Water (m)	Comments
GW017324	Irrigation – horticulture	1954	6.70	1.50	0-1.5m clay 1.5-6.7m sand white, water supply
GW017321	Irrigation – horticulture	1943	5.48	0.90	n/a
GW017325	Irrigation – horticulture	1942	9.10	2.10	0-2.13m topsoil 2.13-7.31m sand 7.31-9.10m sand/shell water supply



3. Site Inspection

An Environmental Engineer from GHD undertook an inspection of the Site on 19 October 2009. During the site inspection, the GHD engineer was accompanied by the Golf Course Superintendent, Norm Foord, whom has worked at the Site for over 30 years.

The site inspection summary, including representative photographs, is presented as Table 3. Relevant site details are annotated on Figure 3, Appendix A.

Table 3 Site Inspection Summary

Site observations	Photographs
<i>Current Golf Course</i> A single storey clubhouse is located in the south west corner of the Site. The clubhouse is bordered on the west and south by a bitumen sealed car park. A two storey brick Pro Shop is located to south east of the clubhouse. Fibre cement sheeting was noted in the clubhouse and pro shop and owing to the age of the buildings, there is the potential for asbestos to be present. A maintenance shed is located in the north west portion of the Site that houses plant, equipment and chemicals used to maintain the golf course. In general, good housekeeping was noted in and around the maintenance shed. Several 44 gallon drums containing hydraulic oil were noted within the shed (Photo 1) while three above ground storage tanks (AST) were located in a secured concrete bunded area (Photo 2). Two of the ASTs contained unleaded fuel and the third contained diesel. All pipework was above ground. On a whole, the ground surface surrounding the storage area did not show signs of impact (i.e. stains, odours). No underground storage tanks were observed on site. Adjacent to the fuel storage area is a wash	Photo 1 – Oil Drums in Maintenance Shed  Photo 2 – Three Above Ground Fuel Storage Tanks 

bay for plant and equipment (Photo 3). The wash bay is typically used for hosing down golf course mowing equipment. The area has a drain that captures the water and directs it to a separator before discharging to the large dam to the east of the shed.

Approximately 20m to the east of the maintenance shed there were stockpiles of sand and mulched timber (Photo 4). The golf course superintendent, Norm Foord, indicated that the sand stockpiles were used for the dressing of greens and tee boxes and were sourced from landscape supply companies. The mulched timber was from wood collected onsite after it had fallen from trees following storms and high wind periods.

Around the course it was noted that the tees and greens had been elevated above the original ground level. Norm Foord indicated that in general the tees and greens had been formed through on-site cut and fill however; soil material had been imported from various unknown locations. Until recently, Virgin Excavated Natural Material (VENM) certificates were not provided for material imported onto the Site.

Norm Foord also indicated that in 1982, the golf course had to be altered to accommodate for the construction of the M2 motorway. Part of the alteration included elevating the 5th, 6th and 12th holes. The large volumes of material to do this were imported onto the Site and were generally sourced from agricultural properties.

A large stockpile of soil was noted near the current 8th hole (Photo 5). It was indicated the stockpile was excavated from alongside the 7th green to create a new dam.

Adjacent to the north western boundary there was a previous large clay and shale quarry (off site). At the time of the site inspection the quarry was being backfilled in preparation for proposed residential redevelopment.

The grass cover across the golf course has been intensively maintained and manicured and in general appeared to be in a healthy condition. The small pockets of native bushland dotted around the course appeared healthy and did not show obvious signs of undue stress.

Photo 3 – Plant / Equipment Wash Down Area



Photo 4 – Stockpiles of Sand and Mulched Timber



Photo 5 – Stockpiled Material Excavated for Construction of a Dam





4. Site Use and History

The following sources of information were reviewed and interpreted in order to compile the Site's history:

- ▶ Historical title deeds;
- ▶ Historical aerial photographs;
- ▶ Council information, including Section 149 Planning Certificates, Local Environment Plan, land zoning and permissible use;
- ▶ NSW DECCW Contaminated Sites Register (notifications or incidents);
- ▶ NSW DECCW Protection of the Environment Operations (POEO) Licence register; and
- ▶ Relevant existing reports pertaining to the Site.

4.1 Historical Title Deeds

A review of title deeds was undertaken for the title identifier Lot 103 in DP1070029.

A summary of the findings is provided in Table 4 and detailed title deed information is presented in Appendix B.

In summary, Lot 103 in DP 1070029 was owned by Perpetual Trustee, Greenacre Park and a private individual (demolisher) between 1918 and 1959. In 1959 the Site was purchased by Clarks Bricks. In 1989 Boral Bricks purchased the site. Boral bricks sold the site to New Brighton Golf Club in 1999.

4.2 Historical Aerial Photographs

A selection of historical aerial photographs was examined in order to ascertain past activities and land uses at the Site. The years examined were 1951, 1961, 1970 and 1986. A current aerial photograph from the Department of Lands SIX website was also examined. A summary of information gained via the review of the historical aerial photographs is provided in Table 4, correlated with the information from the title deed review.



Table 4 Summary of Historical Information

Title Deed Information Summary		Aerial Photograph Summary	
Year	Section of Site	Year	Observations
1918-1921	Perpetual Trustee Company	1951	The current Georges River alignment was present to the east of the golf course site, however existing south western highway was not present.
1923-1930	Greenacre Park		The majority of the area north of the now M5 comprised approximately 50% bushland and 50% clearer land. Two small structures were present in the south western portion of the cleared area (northern portion).
1930-1950	New Bankstown Limited		The immediate surrounds comprised largely rural and / or vegetated bush land. Some low density residential properties were located to the west.
1950-1959	John Joseph Challoner		
1959-1989	Clark Bricks Limited	1961	The majority of the site remained as rural / bushland / cleared land likely the golf course. The existing small structures remained and a large building had been constructed in the south western corner. A number of what appeared to be cars were present external to the building. A number of small dams were present in the cleared area.
			The immediate surrounds remained largely unchanged and comprises bush land and low density. A large excavation was present to the north of the site in the wider surrounds.
1959-1989	Clark Bricks Limited	1970	The site remained largely unchanged i.e. a golf course and club house and a number of dams including one large a dam in the north eastern corner.
			The immediate surrounds remained largely unchanged i.e. rural and low density residential. However, a large above ground tank had been constructed immediately west of the club house. The large excavation previously noted north of the site remained.
1989-1999	Boral Bricks	1986	No major changes were observed on the site however, the fairways appeared more established.
			Construction of low density residential properties had occurred in surrounds to the west. The large excavation present to the north was just of the aerial photographs so it was unclear whether this had been filled.
1999-to date	Lot 103, DP 1070029 New Brighton Golf Club	2008	No major changes were observed on the site.
			Widespread residential developed had occurred to the west of the site. The large excavation to the north appeared to be undergoing filling.



4.3 Council Information

4.3.1 Local Environment Plan

The Site is in the Local Government Area (LGA) of Liverpool. The Liverpool Environment Plan does not specifically make any mention of the site, but does make mention to plans for the Georges River Foreshore improvement plan a partnership-based funding program providing \$6 million over four years for projects that improve the environment and increase the accessibility of foreshores in the catchment.

4.3.2 Section 149 Certificate

The Section 149 (2) and (5) Planning Certificate for Lot 103, DP 1070029 was obtained from Liverpool Council. The certificate contains the following relevant information:

- The Regional Environmental Plan (Greater Metropolitan Regional Environmental Plan No.2- Georges River Catchment) applies.
- The land is subject to Clause 5.9 of the provisions of the Liverpool Local Environmental Plan 2008 which relates to the preservation of trees or vegetation on the land.
- The land is subject to the Clause 7.6 the provisions of the Liverpool Local Environmental Plan 2008 which relates additional considerations given to development on environmental sensitive land;
- The land does not comprise a critical habitat;
- The land is not located in a conservation area;
- An item of heritage significant is not situated on the land;
- The land is affected by Liverpool Local Environmental Plan 2008 that restricts development of the land because of the likelihood of acid sulphate soils.
- The site is excluded from land that is identified as being bush fire prone;
- Matter arising out of the Contaminated Land Management Act and under the heading contaminated land are stated as nil; and
- The site is identified as environmental significant under division 2 general provision of the Liverpool Local Environmental Plan 2008.

4.4 DECCW Searches

Under the provisions of the NSW *Contaminated Land Management Act* (1997, Section 58, Subsection 2, the 'CLM Act') a public register of current NSW declarations and orders in force is maintained by the DECCW.

Under the NSW *Protection of the Environment Operations Act* (1997, the 'POEO Act') a register of current and surrendered licences is also maintained by the DECCW. The search of the register was undertaken in August 2009 on a suburb basis (Moorebank and the adjoining suburb of Hammondville).



The searches conducted for this investigation included a one-kilometre radius of the Site. The results of the Contaminated Sites Register and POEO Register searches are summarised in the following Sections 4.4.1 and 4.4.2. The full search results of the Contaminated Sites Register and POEO Register searches are contained in Appendix B.

4.4.1 Contaminated Sites Register

The NSW DECCW Contaminated Sites Register lists both former and current contaminated sites deemed to pose a 'Significant Risk of Harm' (SRoH) under the provisions of the CLM Act⁸. The register identifies the location of listed sites and provides notices (including site audit statements) relating to those Sites. These notices also indicate the contaminants of concern and their nature of harm to the environment and human health.

The search of the register identified two sites within the Liverpool Local Government Area. The two sites were greater than one kilometre from the Site and are therefore considered too far removed for contamination migration to pose a risk to the Site.

4.4.2 POEO Licence Register

The NSW DECCW POEO Licence Register identifies premises that are licensed for certain activity types under the POEO Act. Information of particular relevance to this investigation, which is listed on the Register, includes site location, activity type, relevant clean up notices, non-compliance information and Load-Based Licensing (LBL) data. Current POEO licences are also available for viewing from the register. Each licence provides information on potential point and non-point sources of soil and groundwater contamination that may be generated on-site through standard operations, accidental spills and leaks. Clean up notices, non-compliance information and LBL data is also relevant when non-compliance is related to soil and water pollution, particularly if contaminants are listed.

The search of the register identified one surrendered licence within Hammondville associated with the construction the M5 Motorway, the licence was for land based extraction (borrow pit), no further details are provided.

The following surrendered/ no longer in force licences were present in within an approximate one kilometre radius of the Site:

- ▶ Boral Recycling, Nuwarra Road, for concrete works, no longer in force, ;
- ▶ Bourne Transport, 27 Paine Avenue, waste transporter hazardous/ industrial, surrendered no further details provided;
- ▶ New Brighton Golf Club, Nuwarra Road, irrigation, surrendered, no further details provided;
- ▶ Pac Rim Printing, Heathcote Road, fuel burning equipment, surrendered, no further details provided; and

⁸ Superseded by the Duty to Report Contamination Guidelines (2009)



- ▶ Thomas Gooden Foundry, Heathcote Road, ferrous and non ferrous metal works, surrendered, no further details provided.

There were no current licences within an approximate one kilometre radius of the site



5. Conclusions and Recommendations

Based on the findings of the Stage One and the limitations provided in Section 6, the following is concluded:

- ▶ Information in the historical land titles the Site indicated the following:
 - Lot 103, DP 1070029 was owned by Perpetual Trustee, Greenacre Park and a private individual (demolisher) between 1918 and 1959. In 1959 the Site was purchased by Clarks Bricks. In 1989 Boral Bricks purchased the site. Boral bricks sold the site to New Brighton Golf Club in 1999.
- ▶ The historical aerial photographs do not indicate that the Site has been subject to widespread development or excavation despite the property having formerly been in the ownership of Clarks Bricks, Boral Bricks and Hammonds Pioneers Homes. The aerial photographs indicated that the site has remained as golf course with some dams and minor associated buildings for a prolonged period.
- ▶ Regulatory information did not identify any contamination issues that may impact the Site.
- ▶ The site inspection identified minor chemical storage and above ground fuel storage at the site, however house keeping was observed and the potential that these sources would have cause widespread gross contamination which would pose a constraint to the proposed redevelopment is considered to be low.
- ▶ The site inspection identified that widespread cut and fill and some uncontrolled infilling has historically occurred at the site. The potential for that imported materials may have been contaminated cannot be completely discounted as the materials were not accompanied by the appropriate documentation.
- ▶ The golf course site appears to be subject to acid sulphate soils. GHD recommends that an acid sulphate soil management plan be prepared based on the proximity of the Site to the area subject to acid sulphate soils.
- ▶ GHD recommends that limited soil sampling be undertaken on the site, targeting any areas subject to uncontrolled filling, stockpiles and the maintenance shed.



6. Limitations

This report has been prepared by GHD for New Brighton Golf Club. No warranties, expressed or implied, are offered to any third party and no liability will be accepted for the use of this report by any third party.

The work conducted by GHD under this commission has been to the standard that would normally be expected of professional environmental consulting firm practising in this field in the State of New South Wales. However, although strenuous effort has been made to assess significant contamination issues required by this brief we cannot guarantee that other issues outside of the scope of work undertaken by GHD do not remain.

It should be noted, that in gathering information for the study, GHD relied on verbal information supplied by client, on site records, and on visual inspection of the site, which may not have been independently verified. No sampling or analytical testing nor any intrusive inspection was undertaken. Evidence of soil contamination is not always obvious by visual inspection and environmental issues may not have manifested themselves at the time of inspection.

An understanding of the site conditions depends on the integration of many pieces of information, some regional, some site specific, some structure-specific and some experienced based. Hence, this report should not be altered, amended or abbreviated, issued in part and issued incomplete in any way without prior checking and approval by GHD. GHD accepts no responsibility for any circumstances that arise from the issue of this report that has been modified other than by GHD.

The Limitations of this report should be read in conjunction with the entire report.