WATER MANAGEMENT PLAN

LOTS 4 AND 5 LUDLOW ROAD, MYALUP
SHIRE OF HARVEY

PREPARED FOR

B & J CATALANO PTY LTD

BY

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1. INTRODUCTION

This Water Management Plan (WMP) relates to an Extractive Industries Licence (EIL) application for limestone extraction over a 25ha area of Lots 4 & 5 Ludlow Road, Myalup in the Shire of Harvey and should be read in conjunction with the report entitled "*Extractive Industries Licence Application and Environmental Management Plan, Lots 4 & 5 Ludlow Road, Myalup, Shire of Harvey (2018)*" prepared for B & J Catalano Pty Ltd by Lundstrom Environmental Consultants Pty Ltd.

This report provides the following information:

- A description of the property and surrounds indicating the current contours and hydrography.
- A description of the proposed extraction program.
- Storm water and erosion management measures.
- A description of the groundwater regime in the area.
- A description of the proposed final land use after extraction has been completed.
- A description of potential impact on surrounding wetlands.
- A description of the potential for acid sulphate soil impacts.

2. PROPERTY DESCRIPTION, OWNERSHIP AND LOCALITY

Property Description:	Lots 4 and 5 on Deposited Plan 15419 Ludlow Road, Myalup Shire of Harvey
Volume:	1884
Folio:	210
Area:	Lot 4 – 81.115ha Lot 5 - 62.030ha
Ownership:	Geoffrey Thomas Pearson T/A Pearson Nominees Pty Ltd

The property is situated west of Forrest Highway, approximately 50km north of Bunbury. Lots 4 and 5 are bounded by Lake Preston to the west, Lot 2 to the north, Lot 17 to the east and Lot 18 to the south. Figure 1 shows the location of the proposed limestone extraction.

3. BACKGROUND

3.1 PRESENT LAND USE

The property includes park-landed pastures and active limestone extraction operations.

The south-eastern section of Lot 5 is currently used for cattle grazing. Limestone extraction operations are currently being undertaken in the south section of Lot 4 and the north section of Lot 5 (Figure 2). The current pit area is approximately 21 ha.

The proposed additional extraction area will expand the existing pit in a westerly direction by an additional 25ha.

3.2 TOPOGRAPHY, HYDROLOGY AND WETLANDS

Drainage across the surrounding unaltered land surface is east to west towards Lake Preston. The landform comprises inwardly draining ancient dune/karstic type topography and rises rapidly from the water level in Lake Preston, which averages between -1 and 0mAHD, to hills in the middle and east of the property which are up to 35mAHD. From these hills to the eastern boundary of the property, the topography drops down to approximately 15mAHD.

There are no surface drainage lines. Drainage is internal and infiltrates into the underlying groundwater.

The property lies in the Harvey Diversion Catchment within the Harvey River Basin and does not fall within a Public Drinking Water Source Area. The property lies within a *Rights in Water Irrigation (RIWI) Act* 1914 Groundwater Proclamation Area (South West Coastal Groundwater Area) but does not fall within a RIWI Surface Water Proclamation Area (Landgate 2018).

The property is next to the eastern boundary of Lake Preston, which is listed as a Conservation wetland, a Ramsar wetland, an Environment Protection Policy (EPP) Lake, and is included in the Department of Parks and Wildlife (DPaW) managed lands and waters.

There are also a number of Multiple Use wetlands near the property (Figure 1). Three Dampland Multiple Use wetlands lie within 550 m of the properties (Landgate 2018).

3.3 GEOLOGY AND SOILS

Shallow, sandy topsoil overlies inter-bedded limestone, calcarenite, marl and shell beds of the Tamala Formation. Previous work undertaken by Commander (1988) shows that the limestone is approximately 20 to 25m thick and unconformably overlies sands, shales and siltstones of the Leederville Formation.

The westernmost third of the property has a covering of calcitic caprock which is up to one metre thick, whilst further east the limestone is covered by 0.5 to 1m of sand.

3.4 GROUNDWATER HYDROLOGY

A search of the Department of Water and Environmental Regulation (DWER) Water Information Reporting database found four bores (these are the Lake Clifton D1, D2, C4 and C5 bores), lying within the same catchment as the property, for which sufficient water level data was available to build and interpret hydrographs. Hydraulic gradients and flows in the area are heavily influenced by groundwater discharge to the eastern shore of Lake Preston. Because of the uniformity of the groundwater gradient north to south the conditions observed at these bores are considered to be representative of the groundwater conditions at the property, even though these bores are located approximately 5.5km to the south and 5.5km to the north of the property (Figure 2).

Table 1 summarises the range of water levels for DWER monitoring bores D1, D2, C4 and C5. Hydrographs for monitoring bores D1 and D2 have been included as Annexure 1.

Table 1: Summary of Ground Water Level Data for DWER Monitoring Bores (DWER 2018)

Bore Number	Season	Range (mAHD)	Period Recorded
D1	Winter High	-0.219 to 0.661*	1979 to 2001
D2	Winter High	-0.414 to 1.796	1979 to 2018
C4	Winter High	-0.105 to 0.855	1979 to 2018
C5	Winter High	0.47 to 1.888#	1979 to 2009

*The value of 1.161mAHD recorded on 17/07/84 is considered to be an error and is therefore excluded from the data range.

#The value of 2.411mAHD recorded on 21/07/82 is considered to be an error and is therefore excluded from the data range.

To estimate the historical maximum groundwater level at the proposed EIL area, the value for the highest ever water table recorded from D1, and the corresponding records for D2, C4 and C5, have been used to estimate the maximum groundwater contours (Figure 2).

Calculations have been done as follows:

- D1 and D2 are situated 272m and 1344m, respectively from the Lake Preston shore.
- The highest groundwater level for D1 (26/10/1989), and corresponding level for D2), is 0.661 and 1.796mAHD respectively.
- The hydraulic gradient that existed at the time of highest water table (calculated from above) was 1:944.
- The above was repeated for bores C4 and C5, with corresponding groundwater levels for 26/10/1989 as 0.705 and 1.25mAHD respectively.
- There was insufficient data to calculate the 0mAHD groundwater contour accurately. The estimate of the 0mAHD contour (Figure 2) is based on the above data combined with the regional water level contour mapping done by Rockwater (2009) and Commander (1988) for the area.

Figure 2 shows that on the date of the historical maximum, the groundwater level was likely to have been between the 0 and 1mAHD in a line parallel with the eastern shoreline of Lake Preston. Using these contours, it can be estimated that the highest

water table that is likely to have occurred at the proposed EIL area was 0.15mAHD at the western boundary and 0.5mAHD at the eastern boundary of the existing EIL area.

Since the proposed extraction depth is 6mAHD, no groundwater will be intercepted.

3.5 RAINFALL

The closest rainfall recording station is Bunbury (Station 9965) and it has a mean annual rainfall of 726.1 mm. The wettest months are June, July and August and the driest months are December, January and February. The highest recorded annual rainfall was 996mm in 1999 and the lowest was 484mm in 2010. Table 2 shows the average monthly and annual rainfall for Bunbury.

Table 2: Mean Rainfall Data (mm) for Bunbury for Period (Station 9965) 1995 to 2017

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
12.2	7.2	18.9	36.4	99	132.2	141.5	120.4	83.6	31.9	23	18.2	726.1

Rainfall intensity has been calculated using the Bureau of Meteorology (BoM) Rainfall Intensity-Frequency-Duration (IFD) data system (BoM 2018), which yields the two-hour 10-year average recurrence interval rainfall intensity for Lots 4 and 5 Ludlow Road as 17.5mm/hr or 38.1mm 2hr 10% Annual Exceedance Probability (AEP) IFD. The DoW recommends that surface water runoff produced within the mined area from this rainfall event should be contained within the pit (DoW 2014). This aspect is discussed later in this document.

4. THE DEVELOPMENT PROPOSAL

It is proposed to mine limestone from the proposed 25ha extraction area using a front-end loader and bulldozer. The approximate annual limestone extraction volume will be 59,300m^3, but this will be dependent on demand.

Batters of 1:6 will be maintained throughout the operation.

Proposed mining actions are as follows:

- The extraction of limestone from the proposed 25ha extraction area.
- Within the active cell, a bulldozer will rip and blade material to a stockpile.
- A mobile crushing and screening plant will be used for approximately eight weeks per annum on site.
- Trucks will enter the pit via Ludlow Road to be loaded from the stockpile by a front-end loader.
- Excavation will proceed until a level of 6mAHD has been reached.
- The base of the pit and some of the 1:6 batters will be sown to pasture grasses after extraction has been completed. An area of batter slopes will be revegetated using native vegetation species.

Dust management will be undertaken using a water cart to damp down areas that may generate dust from time to time. This will be the main water requirement for the operation.

4.1 REHABILITATION AND FINAL LAND SURFACE LEVELS

Rehabilitation of the area will be undertaken on completion of extraction. The following steps will be implemented:

- Topsoil and overburden retained on site will be used during rehabilitation.
- Most of the area will be returned to pastures with the exception of the area which will be revegetated with native vegetation species as per consultation with Department of Water and Environmental Regulation and the Permit to Clear Native Vegetation (*Environmental Protection Act 1986*).

The post rehabilitation floor level is estimated to be approximately 6mAHD, which is well above the estimated maximum winter water table level of between 0.15mAHD and 0.5mAHD west to east. The proposed final land surface is shown in Figure 4.

5. WATER MANAGEMENT

In all extraction operations the potential exists for impacts to be incurred on surrounding water resources, or by stormwater erosion of exposed areas. The water management strategies outlined below will ensure the mitigation of potential impacts.

5.1 SURFACE WATER MANAGEMENT

Lake Preston runs along the western boundary of Lots 4 and 5 Ludlow Road (Figure 1). No surface drainage lines have been identified within the property, drainage is internal and infiltrates into the underlying groundwater.

The DoW guidelines (DoW 2014) recommend a buffer distance of 200m from sensitive water resources such as conservation wetlands like Lake Preston. The proposed extraction area and associated activities remains outside of the buffer and hence activities will not directly impact this conservation area.

Due to the very permeable nature of the limestone in the region, it is unlikely that any long-lived expression of surface water will exist within the extraction area, even after heavy winter rains.

The stormwater management measures described below will ensure that there will be no surface runoff from the extraction area into Lake Preston.

5.2 STORMWATER MANAGEMENT

Stormwater management issues are not anticipated for the extraction area due to high permeability of the ground/soil materials. This has been the case for the existing extraction area. The depression created by extraction will protect Lake Preston and associated vegetation from runoff and sediments that may be generated from high intensity rainfall events.

5.3 GROUND WATER MANAGEMENT

No dewatering activities will be undertaken. No groundwater will be exposed by this development since the final land surface will be 6mAHD, which is well above the maximum winter high groundwater table, and is in keeping with the DoW recommended minimum separation depth of 300 mm between the base of the pit and the likely maximum seasonal groundwater level (DoW 2014).

Due to the small-scale nature of the operations, no groundwater contamination is anticipated. No fuel or lubricant storage will occur on the site. Refuelling will take place using a mobile refuelling vehicle which is equipped with a “snap-on snap-off, fast-fill and auto shut-off” facility. Plant will be refuelled each morning, leaving the vehicles almost empty overnight. No major servicing, which could lead to fuel and oil spills, will take place on the site. B & J Catalano have a Safety Practice document for Hydrocarbon Spill Response outlining their procedures for controlling, recovering, treating and reporting hydrocarbon spills (Annexure 2) and this will be implemented in the unlikely event of a spill occurring.

The use of fertilisers will be necessary during the rehabilitation process. At this time, the Department of Agriculture and Food will be consulted as to the appropriate levels of fertiliser requirement. The correct application of these products will serve to control leaching of nutrients into the groundwater.

Herbicides will be used only as required for weed control and their use is expected to reduce as vegetation is established. In choosing herbicides, preference will be given to substances that strongly adsorb to soil and have low potential to leach into groundwater.

5.4 MONITORING AND MANAGEMENT MEASURES

During the extraction and early rehabilitation phase, the extraction area will be inspected after every significant rainfall event to check erosion damage. If any repairs are required, this will be attended to immediately.

After pit closure the areas sown with pasture grasses will be monitored ensure that any areas requiring remedial work are identified. Monitoring will be carried out on an annual basis to assess:

- The physical stability of the landform in the rehabilitated areas.
- Evidence of concentrated sheet flow rather than infiltration.
- The emergence of weeds requiring control.

Maintenance procedures will be carried out where necessary and may include:

- Repair of any erosion damage.
- Replanting/seeding areas that may not have regenerated sufficiently.
- Weed control.

6. ACID SULPHATE SOILS

A search of the CSIRO's Australian Soil Resource Information System (ASRIS) database identified the area as having an extremely low probability of occurrence for acid sulphate soils (CSIRO 2011). This is further supported by the main soil type in the area being identified as deep sandy soils with limestone outcrops.

7. REFERENCES

Bureau of Meteorology (BoM) (2018). Rainfall records for Bunbury (9965). Website: www.bom.gov.au

CSIRO (2011). ASRIS - Australian Soil Resource Information System. http://www.asris.csiro.au. Accessed: February 2018.

Commander, D.P. (1988). Geology and Hydrogeology of the Superficial Formations and Coastal Lakes Between Harvey and Leschenault Inlets (Lake Clifton Project). Western Australia Geological Survey, Report 23, pp. 37-50.

Department of Water (DoW) (2014). South West Region Guideline, Water Resource Considerations for Extractive Industries.

Department of Water and Environmental Regulation (DWER) (2018). Monitoring bore data accessed from website: http://wir.water.wa.gov.au/SitePages/SiteExplorer.aspx.

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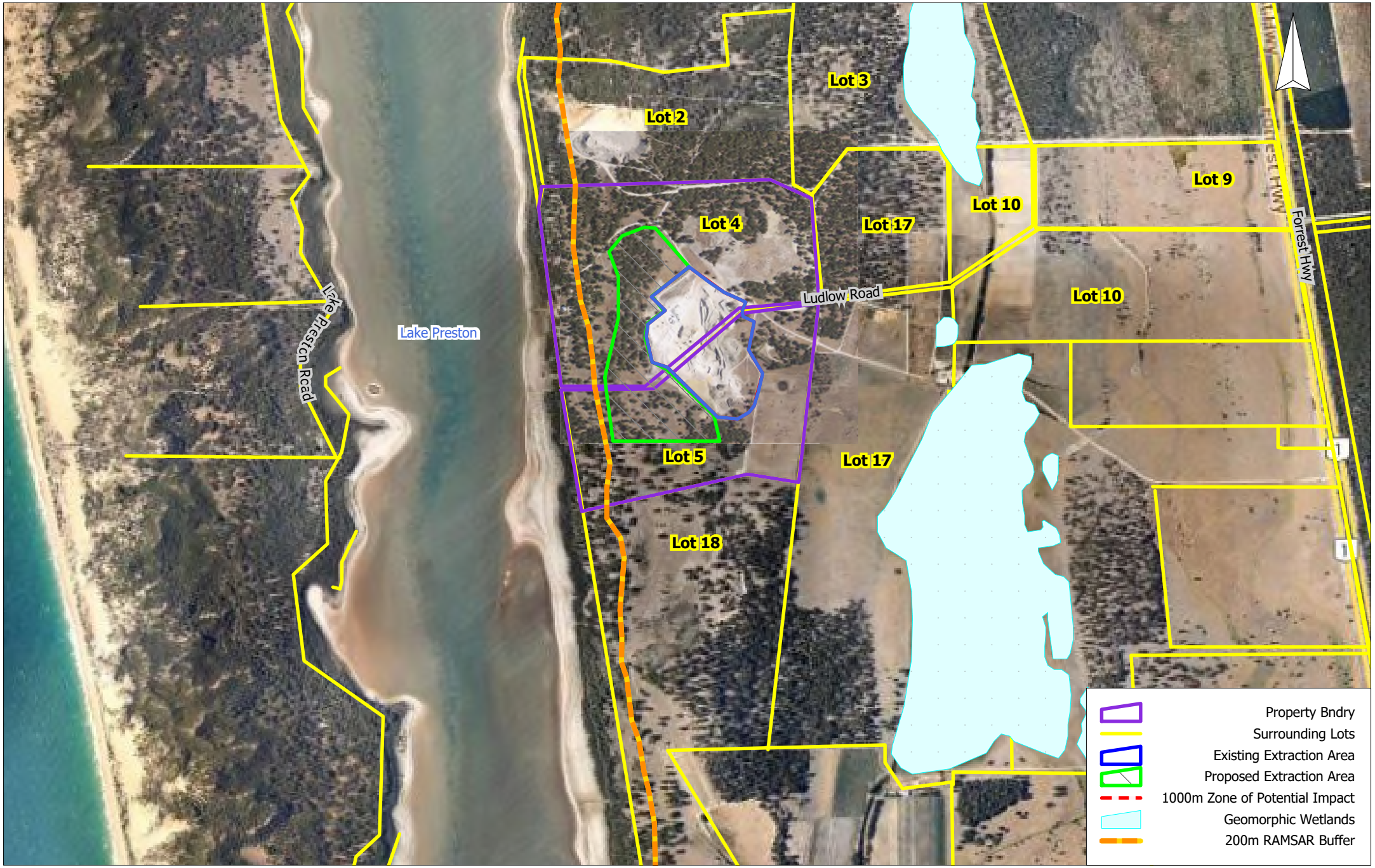
Rockwater (2009). Dawesville to Binningup Technical Environmental Studies, Hydrogeology Study. Jolimont, Western Australia.

Figures



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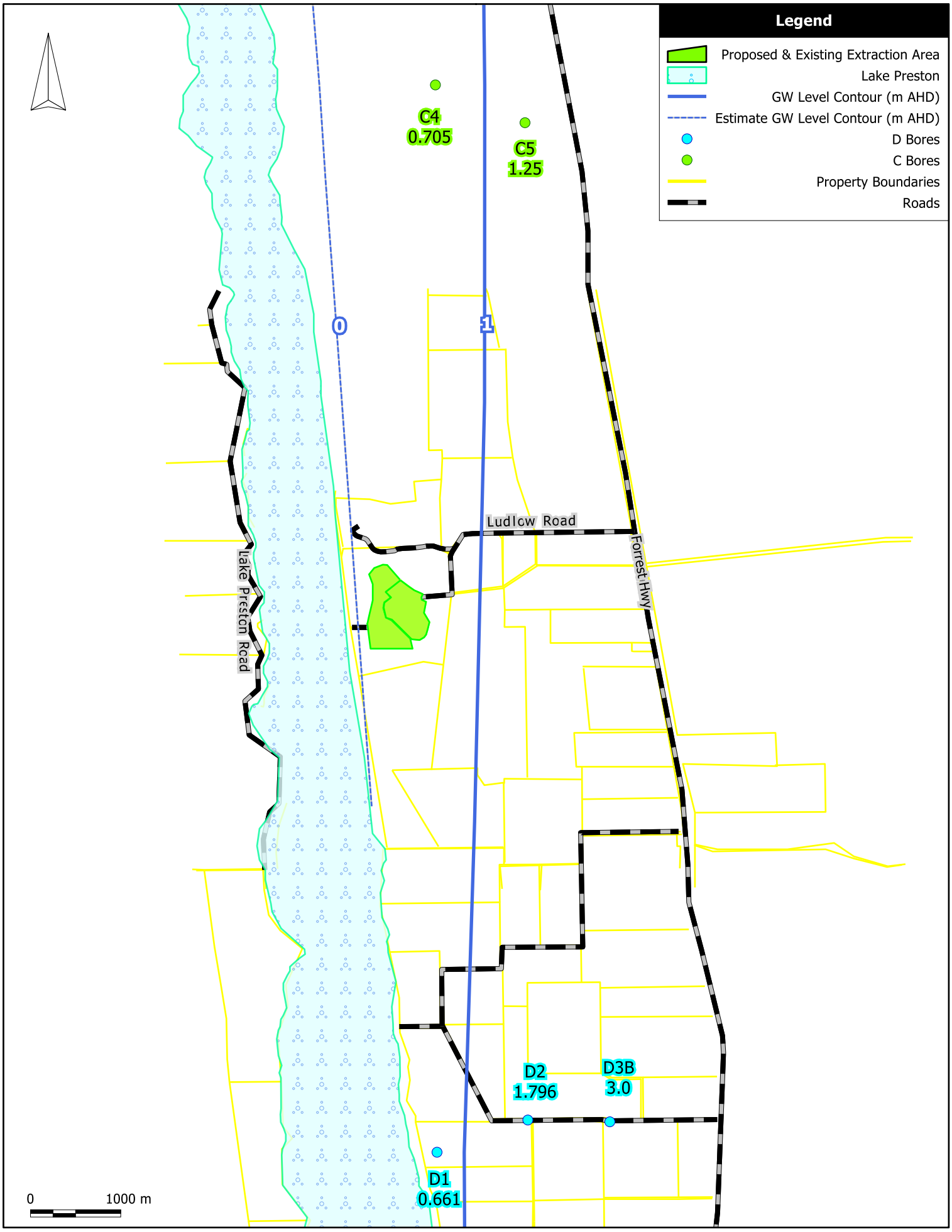
Air Photo Date: Nearmap Jan 2018
Datum: Australian Geocentric 1994 (GDA94)

B&J Catalano Pty Ltd
Lots 4 & 5 Ludlow Rd
Limestone Extraction

Property & Surrounds

Figure 1

Z:\Catalano\Lot 4 Ludlow Road\2018 Application\Report\Appendices\F1 Site & Surrounds_Weed MP.map 5/31/2018 Layout



Lundstrom Environmental Consultants Pty Ltd **21 Sellen Ct Leeming WA 6149** **Mobile: 0417934863** **mikelund1@bigpond.com**	Scale: 1:53000 Original Size: A4 Datum: Australian Geocentric 1994 (GDA94)	**B&J Catalano Pty Ltd** **Lots 4 & 5 Ludlow Rd** **Limestone Extraction**	**Groundwater Level Contours 26th October 1989** **Figure 2**

Z:\Catalano\Lot 4 Ludlow Road\2018 Application\Report\Management Plans\Water Management Plan\Drawings\GW Contrs.map 2/07/

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Lots 4 & 5 Ludlow Rd
Limestone Extraction

Proposed Extraction Area

Figure 3

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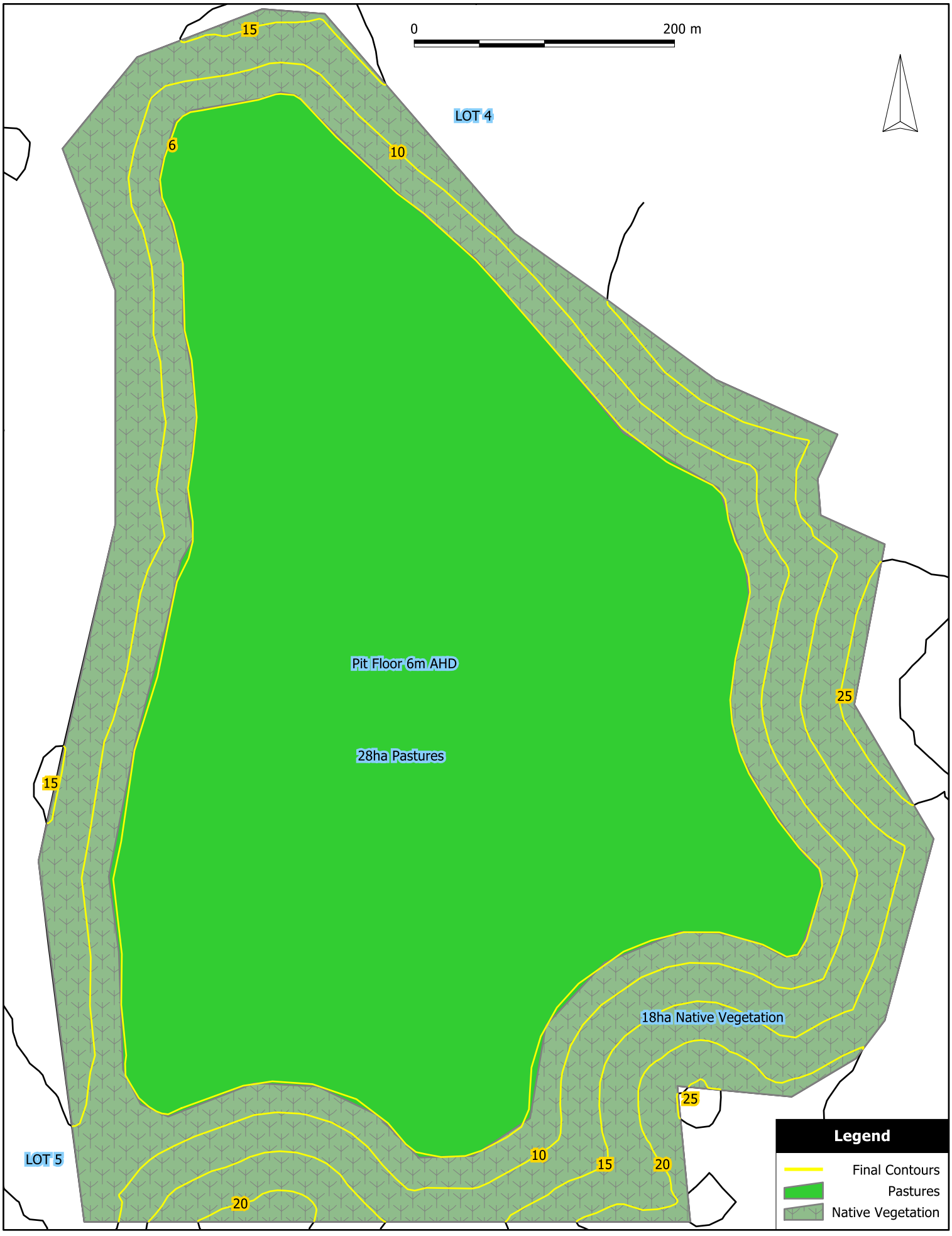
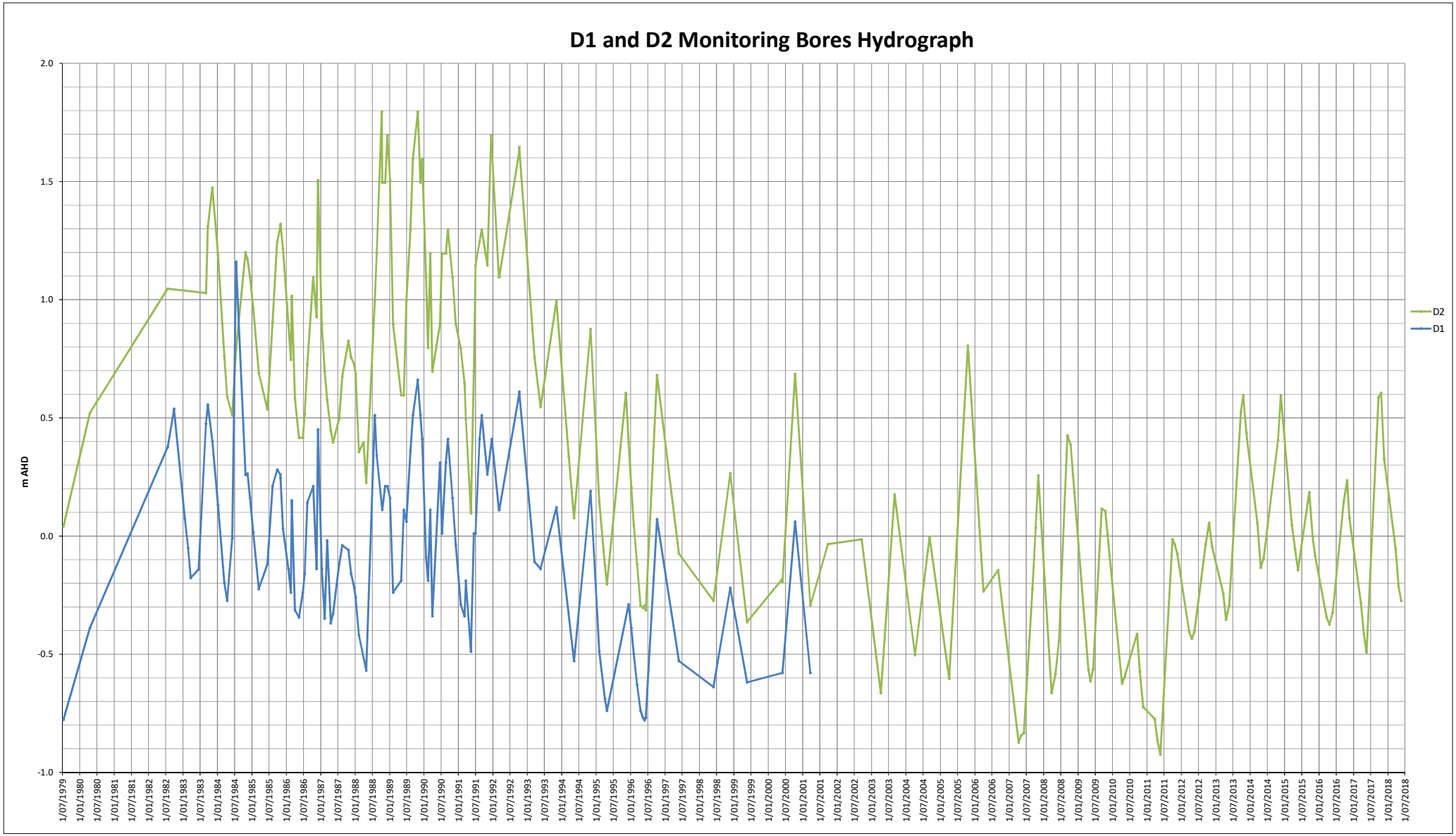


Lundstrom Environmental Consultants Pty Ltd 21 Sellen Court, Leeming, WA 6149 Mob 0417934863 mikelund1@bigpond.com	Scale: 1:3700 Original Size: A4 Air Photo Date:Landgate February 2012 Datum: Australian Geocentric 1994 (GDA94)	**B & J Catalano Pty Ltd** **Lots 4 & 5 Ludlow Rd, Myalup Limestone Extraction**	Final Land Surface Figure 4

Z:\Catalano\Lot 4 Ludlow Road\2018 Application\Drawings\F5 Final Landsurface.map 2/07/2018 Layout

Annexure 1

Hydrograph for DWER Monitoring Bores D1 and D2


D1 and D2 Monitoring Bores Hydrograph
m AHD
2.0
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Annexure 2

Hydrocarbon Spill Response

Safety Practice

SAF-SP-029 HYDROCARBON SPILL RESPONSE

PURPOSE

This procedure summarises the safety practice of B & J Catalano to control the personal and environmental hazard posed by hydrocarbon spills. It outlines the correct procedure for controlling, recovering and reporting hydrocarbon spills to ensure compliance with West Australian legislative requirements.

SCOPE

This safety practice will apply to all B & J Catalano areas and employees.

DEFINITIONS

MSDS: Material Safety Data Sheet - A document which describes the properties and use of a substance, i.e., its identity, chemical and physical properties, health hazard information, precautions for use and safe handling information.

Hydrocarbon: An organic compound containing only carbon and hydrogen including diesel, oil, petrol, grease, solvent-based degreasers, hydraulic fluids and transformer oils.

Hydrocarbon Spill: Any uncontrolled release of hdyrocarbon products.

Bund: An embankment or wall that may form part or the entire perimeter of a compound. Usually made of concrete, bunds are placed around storage tanks to contain spills.

INFORMATION

Under the general and specific provision of duty of care an employer shall, so far as is practicable, provide and maintain a working environment in which his employees are not exposed to hazards existing in the workplace. This requirement includes the hazards associated with hydrocarbons spills.

It is the responsibility of ALL employees and contractors to manage hydrocarbon spills as they occur. Supervisors are accountable if their immediate areas are found to have poor hydrocarbon management practices (this includes the clean-up of minor spills).

Spills involving hydrocarbons have the potential to produce adverse consequences to human health and/or the environment. Environmental spills can lead to contamination of water (both surface and aquifers), soil and habitats. The effect is higher closure costs, loss of a potable resource, death of flora and fauna, requirement for remediation, classification into Western Australia's Contaminated Sites database and prosecution by the Department of Environment and Conservation (DEC).

This safety practise outlines:

- Action required when a spill is identified
- Techniques to restrict the extent of the contamination
- Techniques to collect spilled material
- Techniques to collect and dispose of contaminated material
- Techniques to treat soils contaminated by hydrocarbon
- Reporting requirements in regard to hydrocarbon spills

REQUIREMENTS

1 Action required when a spill is identified

1.1 Isolate the spill area

1.2 Identify the spilt substance

1.3 Identify hazards and PPE requirements – consult the appropriate MSDS.

1.4 If safe to do so, the source of the spill should be restricted or stopped (i.e. shutdown machinery, switch off pumps, close valves).

1.5 If suitable equipment is readily available and can be operated in a safe manner, the extent of the spill is to be contained.

1.6 Contact immediate Supervisor as soon as possible and advise of spill.

2 Techniques to restrict the extent of the contamination

2.1 If possible restrict the source of the spill to ensure the flow of hydrocarbon is stopped.

2.2 If the spill is occurring outside a containment bund, use earthmoving equipment to construct additional earthen bunds to contain the extent of the flow.

2.3 Isolate drains.

2.4 On advice of Environmental Department, pump source material from either or both of the source container or the bunded containment into a safe container.

3 Techniques to collect spilled hydrocarbon

3.1 On advice of Environmental Department, pump source material from either or both of the source container or the bunded containment into a safe container.

3.2 Use absorbent materials to soak up residual hydrocarbon.

3.3 If the spill occurs in an area where a water body has become contaminated, use mini air booms to contain the spread of hydrocarbon on the surface of the water.

3.4 Use a skimmer to collect contained hydrocarbon in a triple oil separator or retain on the surface of the water body and pump to a waste oil tank or other safe container.

3.5 Hydrocarbon absorbents are to be collected and disposed of as decided by the Environmental Department and according to site requirements.

4 Techniques to treat soils contaminated by hydrocarbon

4.1 Dependent on site requirements and on advice from the Environmental Department, contaminated soils may be treated in the following ways:

- Collected and disposed of
- Encapsulated in the waste dump
- Collected or remain in situ and treated by bioremediation to breakdown the hydrocarbon.

4.2 On completion of the rehabilitation program the Environmental Department must inspect and verify that the spill has been successfully remediated.

5 Reporting requirements in regard to hydrocarbon spills

5.1 All incidents of hydrocarbon spills are to be reported to the immediate Supervisor as soon as possible and followed up with the completion of the B&J Catalano Incident Report Form which requires an incident investigation to determine root cause and assists in the prevention of a reoccurrence.

5.2.1 The immediate Supervisor must then report the incident to the Environmental Department to determine what reporting to external departments is required i.e. Department of Conservation.

Table 1: Suggested Spill Equipment

Type of Spill	Recommended Spill Equipment
Spill on rocks / dirt	• Use earthen bunds or booms to contain spill • Polypropylene pads to mop up excess oil at the outset • Global Peat or Enretec to treat contaminated soil in-situ
Spill on concrete / hardstand area e.g. workshop	• Polypropylene pads (easiest and quickest) • Floorsorb / kitty litter if pads not available (this must be swept up and disposed of in hydrocarbon bins immediately, as these products are not hydrophobic and will not contain the spill if they become wet)
Spill in containment bund	• Polypropylene pads or pillows • Bund can be drained or sucked out to waste oil receptacle if the spill is large
Spill occurs when raining or on a water body	• Polypropylene pads

RELATED DOCUMENTS

a. B&J Catalano Incident Report Form

REFERENCES

a. Occupational Safety and Health Act (WA) 1984
b. Occupational Safety and Health Regulations (WA) 1996
c. Mines Safety and Inspections Act (WA) 1994
d. Mines Safety and Inspections Regulations (WA) 1995
e. Environmental Protection Act 1986
f. Environmental Protection (Unauthorised Discharges) Regulations 2004
g. AS 1940 : 2004 Storage and handling of flammable and combustible liquids

DOCUMENT CONTROL

Approval		
Role	**Name**	**Date**
General Manager	Nunzio Giunta	Sept 2011
HSE/HR Manager	Doriann Walls	Sept 2011

Revision Events			
Rev.	**Author**	**Changes**	**Date**
1.0	Nic Henley		May 2011
2.0	Ian Prosser	Definitions / Table 1	March 2012