Groundwater Impact Assessment

28-32 Bourke Road, Alexandria, NSW, 2015

Prepared for: Alexandria Property Development Pty Ltd c/- Johnstaff Projects (NSW) Pty Ltd ______EP2515.004_v4 | 04 July 2022





EP RISK

Groundwater Impact Assessment

28-32 Bourke Road, Alexandria, NSW, 2015

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4 July 2022

LIMITATIONS

This Groundwater Impact Assessment was prepared on behalf of Alexandria Property Development Pty Ltd c/-Johnstaff Projects (NSW) Pty Ltd for the purpose/s stated in **Section 1**.

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It is not possible in an Groundwater Impact Assessment to present all data, which could be of interest to all readers of this report. Readers are referred to any referenced investigation reports for further data.

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Executive Summary

Alexandria Property Development Pty Ltd c/- Johnstaff Projects (NSW) Pty Ltd (Alexandria Property Development c/- Johnstaff) engaged EP Risk Management Pty Ltd (EP Risk) to undertake a Groundwater Impact Assessment (GWIA) of the proposed development site located at 28-32 Bourke Road, Alexandria, NSW, 2015 (the Site). The location and boundary of the Site is shown in Figure 1. The Site is approximately 3,000 m² in area and currently consists of a disused factory / warehouse. The Site comprises three (3) lots, defined as Lots 1-3 in Deposited Plan (DP) 324707. The Site is currently zoned as B7 – Business Park, under the Sydney Local Environmental Plan (LEP) (2012).

It is understood that Alexandria Property Development are planning to redevelop the Site from its current industrial land use to the Alexandria Health Centre comprising a hospital and medical centre.

The scope of works to achieve the objectives include:

- A desktop hydrogeological study including a review of previous reports prepared for the Site and publicly available hydrogeological information.
- Development of a Groundwater Conceptual Model and an analysis of the proposed dewatering required for the development.
- An assessment of the construction and operational impacts from Proposed Development on the surrounding groundwater and surface water nearby the Site.
- Development of appropriate mitigation and monitoring measures to be implemented throughout the construction and/or operation and an assessment of their effectiveness with respect to surface and groundwater impacts.
- Preparation of this report summarising the findings of the assessment.

The average groundwater strike elevation across the Site is 6.65 m AHD and regional groundwater is inferred to flow south-west towards Botany Bay. It should be noted that the final design solution and any basement configuration is subject to a design excellence competition and separate State Significant Development application (SSDA) but may involve the construction of a semi-underground car park. This GWIA should be reviewed in following the detailed design and a monitoring well survey should be undertaken to confirm groundwater levels closer to the construction period.

The conceptual model was created using the above information and a summary of the model is presented in below.





The conceptual model is used to inform the groundwater dewatering analysis and subsequent impact assessments.

Some minor potential impacts to groundwater however with the implementation of appropriate mitigation and monitoring controls, it is expected that the impacts identified will be acceptable.

Table 1 – Potential Construction and Operation Impacts and Mitigation Measures								
Activity	Potential Imnacts	Risk	Mitigation Measures	Residual				
Activity	rotential impacts	Rating	Whitigation Measures	Risk Rating				
Chemical or hydrocarbon spill	Contamination of groundwater	Moderate	Storage of hazardous materials and refuelling to be undertaken in bunded areas. Spill kits to be kept onsite and staff informed of how to use them in an incident.	Low				
Operation of the medical centre.	Contamination of the aquifer due to the Proposed Development.	Low	Proper stormwater drainage installed and maintained to prevent groundwater infiltration onsite	Low				

A summary of the key impacts and proposed mitigation and monitoring measures are presented in **Table 1**.



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1 Introduction

Alexandria Property Development Pty Ltd c/- Johnstaff Projects (NSW) Pty Ltd (Alexandria Property Development c/- Johnstaff) engaged EP Risk Management Pty Ltd (EP Risk) to undertake a Groundwater Impact Assessment (GWIA) of the proposed development site located at 28-32 Bourke Road, Alexandria, NSW, 2015 (the Site). The location and boundary of the Site is shown in **Figure 1.** The Site is approximately 3000 m² in area and currently consists of a factory / warehouse. The Site comprises three (3) lots, defined as Lots 1-3 in Deposited Plan (DP) 324707. The Site is currently zoned as B7 – Business Park, under the Sydney Local Environmental Plan (LEP) (2012).

1.1 Background

It is understood that Alexandria Property Development c/- Johnstaff are planning to redevelop the Site from its current industrial land use to the Alexandria Health Centre comprising a hospital and medical centre.

It should be noted that the final design solution and any basement configuration is subject to a design excellence competition and separate State Significant Development application (SSDA) but may involve the construction of a semi-underground car park that may potentially intercept groundwater and hence the groundwater impact assessment is required for the Proposed Development. The concept plans are attached as **Appendix A**.

1.2 Proposed Development

Development consent is sought for a concept proposal for the 'Alexandria Health Centre' comprising medical centre uses and anchored by a mental health hospital. Specifically, the application seeks concept approval for:

- In principle arrangements for the demolition of existing structures on the site and excavation to accommodate a single level of basement car parking (partially below ground level).
- A building envelope to a maximum height of 45 m (Reduced Level (RL) height 53.41) (including architectural roof features and building plant). The podium will have a maximum height of RL 28.41.
- A maximum gross floor area of 11,442.20 m², which equates to a maximum Floor Space Ratio (FSR) of 3.85:1. The total FSR will comprise a base FSR of 2:1, a community infrastructure bonus FSR of 1.5:1 and a 10% design excellence bonus FSR (subject to a competitive design alternatives process).
- Indicative use of the building as follows:
 - Mental health hospital at levels 5-7.
 - Medical centre uses at levels 1-4; and
 - Ground level reception/lobby and pharmacy.
- Principles for future vehicular ingress and egress from Bourke Road along the site's western frontage.
- Subject to agreement on a public benefit offer submitted with this application, the proposal includes the indicative dedication of the following land to Council as envisaged by the Draft Sydney Development Control Plan 2012 Southern Enterprise Area Amendment (Draft DCP):
 - A 2.4m wide strip of land along the site's frontage to Bourke Road for the purpose of footpath widening
 - A 3m wide lane along the site's western boundary contributing towards a 6m wide lane (it is noted that the concept proposal will allocate an additional 3 m strip of land within the site along the western boundary to enable two-way vehicle movement into and out of the site).
 - A 3m wide lane along the site's southern boundary, contributing towards a 9m wide lane.



The scope of works to achieve the objectives include:

- A desktop hydrogeological study including a review of previous reports prepared for the Site and publicly available hydrogeological information.
- Development of a Groundwater Conceptual Model and an analysis of the proposed dewatering required for the development.
- An assessment of the construction and operational impacts from Proposed Development on the surrounding groundwater and surface water nearby the Site.
- Development of appropriate mitigation and monitoring measures to be implemented throughout the construction and/or operation and an assessment of their effectiveness with respect to surface and groundwater impacts.
- Preparation of this report summarising the findings of the assessment.



2 Site Condition and Surrounding Environment

2.1 Site Inspection

On 1st December 2021, EP Risk field personnel conducted an inspection of the Site and immediate surroundings. The following features were observed:

- The Site is located within a known industrial area, situated on Bourke Road between Bowden Street to the west, Wyndham Street to the east and O'Riordan Street to the south.
- The Site was accessible by vehicle and foot from Bourke Road to the north.
- The Site comprised of an industrial warehouse with internal offices on the ground and mezzanine level. The warehouse itself is divided into two adjoining rooms (western and eastern sections), accessible through an open wall at the centre of the warehouse. The Site is currently occupied by a tyre fitting and dent repair business (Sydney City Tyres).
- There was an inaccessible office space within the south-eastern portion of the Site.
- All areas were paved with concrete throughout. The concrete slab extended to a depth of approximately 0.15 m BGL throughout site. A double concrete slab was encountered at the western end of the Site The slab was observed to be in good condition.
- A sewer/stormwater drain ran underground Lot 2, approximately 0.3 m BGL, potentially the length of the site.

2.2 Surrounding Land Use

The Site is located within a primarily industrial area. Surrounding land use within a 1 km radius comprised of the following:

To the North

- Bourke Road running south-west to east.
- Australian Metal Co scrapyard.
- Fire Station (Fire and Rescue NSW Alexandria Fire Station) to the north-east.
- Rail Operations Centre (Transport NSW) to the north-east.

To the South

- Taxi Depot to the south.
- O'Riordan Street running south to north-east.
- Head Office of Australian Red Cross.

To the East

- Café Mecca.
- Green Square Train Station.
- Car repair and maintenance.



• Corner of Bourke Road and O'Riordan Street.

To the West

- Industrial Properties.
- Bowden Street running north-west off Bourke Road.

2.3 Topography and Drainage

The topography of the Site was observed to be relatively flat with a downward gradient towards the north of the Site from the south. The Site appeared consistent and level with the surrounding properties. The elevation was between approximately 8 and 9 mAHD.

2.4 Geology

The geological information provided by the Department of Regional NSW (DRNSW, 2018) indicates the area to be underlain by Coastal deposited dune facies over Triassic Age Ashfield Shale. Ashfield Shale consists of black to light grey shale and laminite.

2.5 Acid Sulfate Soil

The Sydney Local Environment Plan (LEP) (2012) identified the Site to be within a Class 3 acid sulfate soil classification, where acid sulfate soils are likely to be found beyond 1 metre below the natural ground surface. A map showing the acid sulfate soil zones are presented in **Figure 2.5.1**.





Figure 2.5.1 – Acid Sulfate Soil Risk Map

2.6 Meteorology

Average monthly and annual rainfall data from the closest meteorological station at the Sydney Airport AMO weather station (Station ID 066037) is presented in **Table 2**.

Table 2 – Rainfall data (mm)													
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	93.9	117.2	124.7	106.5	95.2	124.5	68.9	75.7	59.6	70.1	80.2	72.9	1080.4

A graph showing cumulative residual rainfall (or rainfall departure) over the period from 1929 to 2022 is presented as **Figure 2.6.1** below.





Figure 2.6.1 – Cumulative Residual Rainfall Graph for Sydney Airport AMO Station

The cumulative rainfall departure is calculated as the difference in actual rainfall and average rainfall. The sum of the difference in actual in average rainfall is calculated daily and presented over time to show areas of relatively high and low rainfall periods. Negative values represent dry periods while positive values represent wet periods. As shown above, periods of above average rainfall include in 1930 to 1939 and from 1975 to 2006. Periods of below average rainfall include 1939 to 1963 and from 2006 to present. More recently from 2021, the area has seen a significant increase in rainfall in a relatively short period of time (as shown by the steep line from December 2021 to present) and it's considered that recent groundwater levels are relatively high compared to the average.

2.7 Hydrogeology

Aquifer Units

The Site is located within the unconfined Botany Sands aquifer. The Botany Sand Beds dominate the sedimentary column of the geological Botany Basin and comprise up to 30 m of uniformly graded, well-sorted, clean and poorly cemented fine- to medium-grained quartz sands, with an average of 15 m saturated sand (Hatley, 2004). These sand beds are underlain by clay and clay-rich quartz sand lenses and a basal unit consisting of fluvial and aeolian medium-grained sands with gravel lenses, together having a maximum thickness of around 45 m (Hatley, 2004). This sequence of unconsolidated sands of the geological Botany Basin generally makes for a productive aquifer.

Groundwater recharge to the Botany Sands is primarily from rainfall and averages approximately 22 and 44 ML/day for dry and wet periods, respectively (Badenhop and Timms, 2009).

Groundwater flow in the Botany Sands follows the topographic gradient and is mainly inward towards Botany Bay. Water levels vary between 0 and 25 m depth below the surface, with the majority of the geological Botany



Basin showing a mean depth of around 9 m. The groundwater flow direction is from the recharge areas in the north-east towards Botany Bay at a rate of about 150 m/year (Badenhop and Timms, 2009).

The Botany Sands has a mean thickness of about 20 m, with up to 53 m depth in paleochannels incised in the basement rocks. Hydraulic gradients range from 0.003 to 0.01; hydraulic conductivities range between 1.4 and 85 m/day; porosities range between 0.33 and 0.40; transmissivities vary between 230 and 630 m²/day; and the storage coefficient varies between 0.17 and 0.26 (Hatley, 2004).

Water Allocations

A summary of the water allocations for the aquifer is presented in **Table 3**.

Table 3 – Recharge, Water Requirements and Extraction Limits of the Botany Sands Aquifer (ML/year)									
Average	Environmental	Basic	Water Utility	Other Utility	Extraction				
Annual	Water from	Landholder	Share	Share	Limit				
Recharge	Recharge	Rights	Components	Components					
15,500	775	1,849 ¹	0	11,156	14,684				

The location of the Botany Sands aquifer is presented in Figure 2.7.1 and Figure 2.7.2.

¹ The Botany Sands Groundwater Source is affected by inherent water quality issues and, in some areas, water extracted from the Botany Sands Groundwater Source is unsuitable for domestic consumption or stock watering. The taking of water from the Botany Sands Groundwater Source was restricted by Order made under section 323 of the Water Management Act 2000 dated 24 August 2006 and published in the NSW Government Gazette number 111 at page 7774 on 1 September 2006.





Figure 2.7.1 – Location of the Greater Metropolitan Region Groundwater Sources



Figure 2.7.2 – Location of the Botany Sands Aquifer

A cross section of the Botany Sands aquifer adopted from Bedenhop and Timms (2009) is presented in Figure 2.7.3





Figure 2.7.3 – Cross-section of the Botany Sands Aquifer (Bedenhop and Timms, 2009).

Licensed Groundwater Information

No registered groundwater bores were identified at the Site. However, approximately 340 bores were identified within 2 km of the Site. Of the approximately 340 bores, 33 of the bores are within 500 m of the Site. A map showing the location of the licensed bores surrounding the Site is presented in **Figure 2.7.4**.





Figure 2.7.4 – Licensed Groundwater Bores Nearby the Site

A summary of the 33 bores within 500 m of the Site is presented below.

- The bores are mainly used for monitoring with two bores used for industrial purposes and were installed in the 1940s.
- The total depth of the bores range between 4.0 and 15.5 m BGL.
- The standing water levels of the bores range between 0.79 and 5.50 m BGL.
- The salinity ranges between 369 mg/L and 613 mg/L indicating the aquifer is relatively fresh and low salinity.



Graphs of water level over time were available for four bores within 5 km of the Site within the Botany Sands Aquifer. Graphs of the depth to water over time and rainfall are presented in **Figures 2.7.5 – 2.7.8**.







Figure 2.7.6 – Water Level Over Time in a Nearby Monitoring Well (GW075023)



Figure 2.7.7 – Water Level Over Time in a Nearby Monitoring Well (GW075024)



Figure 2.7.8 – Water Level Over Time in a Nearby Monitoring Well (GW075025)

Figures 2.7.5 – 2.7.8 show that the water table in the Botany Sands aquifer fluctuates anywhere from 1 m - 6 m between wet and dry periods over time. It should be noted that these fluctuations may also be impacted by nearby extraction and since 2006 domestic extraction was restricted by the NSW Government in the majority of the Botany Sands Aquifer due to contamination concerns.

Site Specific Hydrogeological Information

Three groundwater monitoring wells were installed at the Site to a maximum depth of 5 m BGL. The stabilised groundwater details provided in **Table 4**.

Table 4 – Onsite Monitoring well details									
Well ID	Latitude	Longitude	Well depth (m BGL)	Surface RL ²	Observed Water Strike Level (m BGL)	Groundwater strike RL (m AHD)			
MW01	-33.906625°	151.199728°	8.5	8.85	2.30	6.55			
MW02	-33.906828°	151.199721°	8.2	8.90	2.40	6.50			
MW03	-33.906381°	151.199800°	7.0	8.70	1.80	6.90			
MW04	-33.906732°	151.199632°	7.6	8.90	-	-			

The average groundwater strike elevation across the Site is 6.65 m AHD and regional groundwater is inferred to flow south-west towards Botany Bay. Standing water levels in the installed wells ranged between ~6.95 to 7.06 mAHD.

Botany Sands Restricted Groundwater Source Areas

According to the Botany Sands Restricted Groundwater Extraction Area Map, the Site is located in an area of restricted domestic and stock groundwater extraction due to historical contamination associated with the Botany Sands Aquifer. A map showing the restricted groundwater extraction areas is presented in **Figure 2.7.9**.

² Surface RL taken from concept plans as no monitoring well survey has been undertaken. The measurements are considered accurate to approximately +- 0.1 m.





Figure 2.7.9 – Figure Showing the Restricted Domestic Groundwater Use Areas.

According to Orica (2018) domestic use includes:

- Drinking water for humans or animals;
- Cooking;
- Watering gardens—including watering vegetable patches or other plants that may be eaten;
- Washing and cleaning—for example, windows, cars or clothing;
- Bathing; or
- Filling swimming pools.

The current Order also restricts the extraction of groundwater for industrial purposes in Area 1 and Area 2. The purpose of these restrictions is to minimise the risk from exposure to potentially contaminated groundwater and prevent the movement of contaminated water through pumping. Under the Order, water extracted for purposes other than remediation, temporary construction dewatering, testing or monitoring purposes, must be fit for purpose. To be fit for purpose, the water extracted must be:

- Sampled, tested and treated in accordance with a certified water testing plan; and
- Certified in writing by a consultant as being safe and suitable for its intended use.

2.8 Hydrochemistry

Groundwater sampling was undertaken in the EP Risk DSI (2022) at the four onsite monitoring wells. Groundwater was generally light grey to brown/red in colour and light to moderately turbid. A strong sulphur odour was identified in MW03. A review of the stabilised groundwater field quality parameters prior to sampling indicated the following ranges:



- Temperature = 21.6°C to 23.3°C.
- Oxidation-reduction reaction (Redox) = _-154.1 to -45.5 mv.
- Electrical conductivity (EC) = 12.6 mS/cm to 74.8 mS/cm.
- Dissolved oxygen (DO) = 6.55mg/L to 10.55 mg/L.
- pH = 6.22 to 6.8.

The groundwater parameters indicate the groundwater across the Site was fresh to saline. pH was reported to be neutral throughout the Site. Dissolved oxygen is considered to be high.

2.9 Groundwater Dependent Ecosystems

There are no records of groundwater dependent ecosystems mapped within 2 km of the Site.



3 Groundwater Conceptual Model

A groundwater conceptual model was prepared for the Site in order to inform potential dewatering calculations and subsequent impact assessment.

3.1 Hydrostratigraphy

Based on previous intrusive investigations, the Site is underlain by:

- SAND/Clayey SAND/FILL: fine to coarse sand, low to medium plasticity clay, sub-angular gravels to 30mm size, moist to wet. Encountered from the surface to approximately 6-7 m below ground level.
- Sandy CLAY: Dark brown pale grey, moist to wet, low to medium plasticity clay. Encountered below the sand to approximately 7.5-8 m BGL.
- SANDSTONE: extremely weathered (XW) at the bedrock surface, quickly becoming slightly weathered (SW) and high strength fresh (FR), medium to coarse grained, grey-pale grey-red, wet. Encountered from approximately 8 m BGL.

3.2 Aquifer Properties

A summary of the aquifer properties based on literature values is presented in Table 5.

Table 5 – Aquifer Properties								
Aquifer Property	Unit 1 - Sand	Unit 2 - Clay	Unit 3 - Sandstone					
Thickness (m) ³	6.5 m (1.6 m AHD to 8.1 M AHD)	1.6 m (0 m AHD to 1.6 M AHD)	> 4 m (encountered to below -4 m AHD to 0 m AHD)					
Hydraulic Conductivity ⁴ (m/s)	3 x 10 ⁻⁴ m/s	5 x 10 ⁻⁶ m/s	1 x 10 ⁻⁶ m/s					
Porosity ⁵	0.3	0.2	0.2					

3.3 Conceptual Boundaries

The horizontal boundaries of the model include only the site boundary. It was considered that the Site is located in a relatively flat low-lying area and sufficient distance from any hydrogeological features (approximately 900 m from the nearest surface water body) therefore for the purposes of the analytical solution the immediate surrounds of the Site only were considered.

The vertical boundaries were set at the low permeability clay strata encountered below the botany sands and above the sandstone layer. It's considered that given the potential relatively shallow dewatering expected (if any) the vertical boundary of 0 m AHD is appropriate for the model boundary.

3.4 Recharge and Discharge Points

Recharge and discharge points vary throughout the Botany Sands Aquifer however it's noted there isn't likely to be recharge or discharge areas within a few hundred metres of the Site given the commercial/industrial land use

³ EP Risk Detailed Site Investigation (2021)

⁴ Hatley (2004)

⁵ Hatley (2004)



surrounding the Site and absence of natural water courses. No recharge and discharge points where therefore considered in the model.

3.5 **Proposed Development**

Development consent is sought for a concept proposal for the 'Alexandria Health Centre' comprising medical centre uses and anchored by a mental health hospital. Specifically, the application seeks concept approval for:

- In principle arrangements for the demolition of existing structures on the site and excavation to accommodate a single level of basement car parking (partially below ground level).
- A building envelope to a maximum height of 45 m (Reduced Level (RL) height 53.41) (including architectural roof features and building plant). The podium will have a maximum height of RL 28.41.
- A maximum gross floor area of 11,442.20 m², which equates to a maximum Floor Space Ratio (FSR) of 3.85:1. The total FSR will comprise a base FSR of 2:1, a community infrastructure bonus FSR of 1.5:1 and a 10% design excellence bonus FSR (subject to a competitive design alternatives process).
- Indicative use of the building as follows:
 - Mental health hospital at levels 5-7.
 - Medical centre uses at levels 1-4; and
 - Ground level reception/lobby and pharmacy.
- Principles for future vehicular ingress and egress from Bourke Road along the site's western frontage.
- Subject to agreement on a public benefit offer submitted with this application, the proposal includes the indicative dedication of the following land to Council as envisaged by the Draft Sydney Development Control Plan 2012 Southern Enterprise Area Amendment (Draft DCP):
 - A 2.4m wide strip of land along the site's frontage to Bourke Road for the purpose of footpath widening
 - A 3m wide lane along the site's western boundary contributing towards a 6m wide lane (it is noted that the concept proposal will allocate an additional 3 m strip of land within the site along the western boundary to enable two-way vehicle movement into and out of the site).
 - A 3m wide lane along the site's southern boundary, contributing towards a 9m wide lane.

The concept development plans indicate the basement carpark extends below ground to an elevation of 7.41 m AHD and covers the majority of the Site (approximately 60 m x 45 m). Consultation with the design geotechnical engineer indicated that the basement will likely need to be extended to at least 0.5 m below the final basement design level (6.91 m AHD) to allow for the concrete and subbase.

It's understood pile foundations will be used however it is assumed that piles will be installed as 'wet piles' and no dewatering is required for pile installation.

3.6 Conceptual Model Summary

The conceptual model was created using the above information and a summary of the model is presented in **Figure 3.6.1**.





 North 						South →		
-	L		Proposed Bas RL 7.41	ement Footp m AHD	rint		-RL 8.0 -RL 7.0	
GW Str	ike - 6.65 m A	HD					-RL 6.0	
Sand							-RL 5.0	
							-RL 4.0	
							-RL 2.0	
Clay							-RL 1.0	
	1	1	1	1	1	1		
0 m	10 m	20 m	30 m	40 m	50 m	60 m	70 m	

Figure 3.6.1 – Groundwater Conceptual Model Developed for the Site

The conceptual model is used to inform the any potential groundwater dewatering analysis and subsequent impact assessments.



4.1 NSW Legislation

4.1.1 **Protection of the Environment Operations Act 1997**

The Proposed Development consists of the demolition of the existing warehouses, on-site remediation of the soil within the Site for off-site disposal and construction ten (10) storey commercial / industrial building, including a partially submerged basement level extending approximately 1 mBGL. The Proposed Development construction is likely to include but not be limited to, the following:

4.1.2 **Protection of the Environment Administration Act 1991**

The Protection of the Environment Administration Act 1991 is NSW legislation that establishes the EPA, Board of the EPA and community consultation forums. The objectives of the Act are to protect, restore and enhance the quality of the environment and to reduce risks to human health. It sets out obligations and responsibilities for managing activities that may cause environmental harm and allows the Board to determine whether the EPA should institute proceedings for serious environmental protection offences. Under the Act, any discharges into water of substances likely to cause harm to the environment as a consequence of the proposal activities must be reduced to harmless levels.

4.1.3 Water Act 1912 and Water Management Act 2000

The Water Act 1912 and the Water Management Act 2000 (WM Act) are the two major pieces of legislation for the management of water in NSW and contain provisions for the licencing of water access and use. The Water Act 1912 has historically been the main legislation for managing water resources in NSW, however, is currently being progressively phased out and replaced by water sharing plans (WSPs) under the WM Act.

The aim of the WM Act is to ensure that water resources are conserved and properly managed for sustainable use benefiting both present and future generations. It is also intended to provide formal means for the protection and enhancement of the environmental qualities of waterways and in-stream uses as well as to provide for protection of catchment conditions.

Water sharing plans

Water sources in NSW are managed via WSPs under the WM Act. Provisions within WSPs provide water to support the ecological processes and environmental needs of groundwater dependent ecosystems and waterways. WSPs also regulate how the water available for extraction is shared between the environment, basic landholder rights, town water supplies and commercial uses. Key rules within the WSPs specify when licence holders can access water and how water can be traded.

Water access licences (WAL) entitle licence holders to specified share components in the available water that may be sustainably extracted from a particular water source. The actual volume of water available to be extracted may vary, dependent on available water determinations made under the WM Act. Available water determinations are made for each WAL category in each water source and are generally made at the start of a water year, although may be altered at any time.

The Proposed Development is within the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Sources 2011 and the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011.

Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011



The proposal development is within the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Sources 2011 (NSW Government 2018) and is located in the Botany Sands Groundwater Source. This plan applies to groundwater sources and includes rules for environmental water provisions, long term average extraction limits and access, trading and works approvals.

Water Access Licences

Under Schedule 4, Part 1, clause 17A of the Water Management (General) Regulation 2018, extraction of > 3 ML of water from the Botany Sands aquifer for the purposes of excavation dewatering is exempt from requiring a Water Access Licence (WAL).

And under Schedule 4, Part 1, clause 7 of the Water Management (General) Regulation 2018, extraction of < 3 ML of water from any aquifer for the purposes of excavation dewatering is exempt from requiring a WAL.

Water Supply Work Approval

Under the Water Management Regulations (2018), to construct a bore or 'work' to facilitate the dewatering. A water supply work approval must be granted. There are currently no exemptions to this requirement that apply to the Site.

4.2 Policies and Guidelines

The following policies and guidelines are relevant to this impact assessment.

4.2.1 General Policies and Guidelines

National Water Quality Management Strategy

Since 1992, the National Water Quality Management Strategy (NWQMS) (ARMCANZ & ANZECC 1994) has been developed by the Australian and New Zealand Governments in cooperation with state and territory governments. The NWQMS aims to protect the nation's water resources, by improving water quality while supporting the businesses, industry, environment and communities that depend on water for their continued development.

The NWQMS consists of three major elements: policy, process and guidelines. The main policy objective of the NWQMS is to achieve sustainable use of water resources, by protecting and enhancing their quality, while maintaining economic and social development. The process strives to form a nationally consistent approach to water quality management through the development of high-status national guidelines. The guidelines provide the point of reference when issues are being determined on a case-by-case basis. These include guidance on regulatory and market-based approaches to managing water quality as well as regional water quality criteria.

The Australian and New Zealand Environment and Conservation Council (ANZECC) guidelines are relevant to this assessment.

Australian and New Zealand Guidelines for Fresh and Marine Water Quality

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000b) (hereforth referred to as the ANZECC guidelines) are based on the policies and principles of the NWQMS. The main objective of the guidelines is to provide an authoritative guide for setting water quality objectives required to sustain current or likely future environmental values for natural and semi-natural water resources in Australia and New Zealand. The guidelines provide a set of tools to enable the assessment and management of ambient



water quality in a wide range of water resource types and define the recommended limits to acceptable changes in water quality.

It should be noted that these guidelines have not been designed specifically for direct application in activities such as discharge consents, recycled water quality or stormwater quality. They have been derived to apply to ambient waters that receive effluent or stormwater discharges and protect the environmental values they support. However, the ANZECC guidelines have been used as the basis for the groundwater quality assessment presented in this report.

Using the ANZECC Guidelines and Water Quality Objectives in NSW

The document Using the ANZECC Guidelines and Water Quality Objectives in NSW (DEC 2006) provides guidance on applying the ANZECC guidelines (2000b) framework for assessing water quality, including the use of water quality objectives for NSW.

Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales

The Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales (DEC 2004) document lists the sampling and analysis methods to be used when complying with a requirement to test for the presence or concentration of matter in water and the volume, depth and flow of water or wastewater.

4.2.2 Groundwater Policies and Guidelines

NSW Aquifer Interference Policy

The NSW Aquifer Interference Policy requires that potential impacts on groundwater sources, including their users and groundwater dependant ecosystems, be assessed against the minimal impact considerations outlined in the policy. If the predicted impacts of the proposal are less than the minimal impact considerations, then the potential groundwater impacts of the proposal are acceptable.

The NSW Aquifer Interference Policy (NOW, 2012) was finalised in September 2012 and clarifies the water licencing and approval requirements for aquifer interference activities in NSW. Many aspects of this policy will be given legal effect in the future through an Aquifer Interference Regulation. Stage 1 of the Aquifer Interference Regulation started on 30 June 2011.

This policy outlines the water licensing requirements under the Water Act 1912 and WM Act. A water access licence is required whether water is taken for consumptive use or whether it is taken incidentally by the aquifer interference activity (such as groundwater filling a void) even where that water is not being used consumptively as part of the activity's operation.

Sufficient access licences must be held to account for all water taken from a groundwater or surface water source as a result of an aquifer interference activity, both for the life of the activity and after the activity has ceased. This take of water continues until an aquifer system reaches equilibrium and must be licensed.

The NSW Aquifer Interference Policy requires that potential impacts on groundwater sources, including their users and groundwater dependant ecosystems, be assessed against the minimal impact considerations outlined in the policy. If the predicted impacts of the proposal are less than the minimal impact considerations, then the potential groundwater impacts of the proposal are acceptable.

NSW State Groundwater Policy Framework Document



The objective of the NSW State Groundwater Policy Framework Document (DLWC 1997) is to manage the State's groundwater resources so that they can sustain environmental, social and economic uses for the people of NSW. The policy has three component parts:

- NSW Groundwater Quantity Management Policy (DLWC 1998a)
- NSW Groundwater Quality Protection Policy (DLWC 1998b)
- The NSW State Groundwater Dependent Ecosystem Policy (DLWC 2002).

NSW Groundwater Quality Protection Policy

The NSW Groundwater Quality Protection Policy (DLWC 1998b) is a component of the NSW State Groundwater Policy. The focus of this policy is to protect from pollution water below the ground surface in aquifers, and ecosystems from which these waters are recharged or into which they discharge. It provides a framework for the sustainable management of groundwater quality.

The NSW State Groundwater Dependent Ecosystems Policy

The NSW State Groundwater Dependent Ecosystems Policy (DLWC 2002) is a component of the NSW State Groundwater Policy. It is designed to protect valuable ecosystems which rely on groundwater for survival and provides guidance on how to protect and manage these natural systems in a practical sense.

Guidelines for groundwater quality protection in Australia

The Guidelines for groundwater quality and protection in Australia (DAWR 2013) are designed to support the objectives of the NWQMS as they relate to groundwater. They provide currently known principles and key methods for maximising groundwater quality protection under the three following frameworks:

- Groundwater management which deals with groundwater entitlements and allocations
- Land-use planning which controls decisions on land development
- Environmental protection which deals with environmental maintenance and hazardous activities.

Risk Assessment Guidelines for Groundwater Dependent Ecosystems

The Risk Assessment Guidelines for Groundwater Dependent Ecosystems (OEH 2012) document assists in support of the requirements of the Water Management Act 2000 in relation to groundwater dependent ecosystems (GDEs). It provides guidance on the methods to identify and value GDEs and risk assessment framework.

Minimum Requirements for Building Site Groundwater Investigations and Reporting

The minimum requirements for building site groundwater investigations and reporting (NSW DPIE 2021) assists in support of the requirements of the Water Management Act 2000 in relation to groundwater dewatering and the assessment framework.



5 Dewatering Assessment

It was considered that dewatering won't be required for the bulk earthworks based on the measured groundwater levels at the Site. This section should be updated during the detailed design stage.



6 Construction Impact Assessment

6.1 Groundwater Level Impacts

6.1.1 Excavation Intercepting groundwater

Excavation for the building foundations (including boreholes for piling foundations) and the construction of the basement is likely to intercept groundwater. However, this should be confirmed following the detailed design.

Installation of pile foundations (excluding pile walls) is expected to have negligible impact on groundwater flow paths due to their small size in comparison to the building footprint.

No predicted groundwater dewatering was required and therefore this meets the Level 1 minimal impact considerations specified in the NSW Aquifer Interference Policy and are considered acceptable.

6.1.2 Changes to Groundwater Recharge

The existing Site is covered in hardstand completely and the Proposed Development will reduce the hardstand area so it's considered that the development won't reduce the recharge of the aquifer contributed from the Site.

Based on this it is predicted that the groundwater impacts from the proposal would be less than the Level 1 minimal impact considerations specified in the NSW Aquifer Interference Policy and are therefore considered acceptable.

6.2 Water Quality Impacts

If dewatering is required any dewatering should be undertaken in accordance with the acid sulfate soil management plan prepared for the Site.



7 Operational Impact Assessment

7.1 Groundwater Level Impacts

The proposed basement will sit above the water table and therefore minimal impact to groundwater. Pile foundations will likely intercept groundwater however will have minimal impact on groundwater flow and quality surrounding the Site.

7.2 Water Quality Impacts

There is no proposed extraction of groundwater during operation, and it's understood rainfall will be directing to the stormwater network rather than reinfiltrating to the groundwater. Based on this there is no operational impacts to groundwater quality from the Proposed Development.



8 Mitigation and Management Measures

8.1 Construction

An assessment of the groundwater risks and potential impacts associated with the construction of the Proposed Development and mitigation measures is summarised in **Table 6**.

Table 6 – Potential Construction Impacts and Mitigation Measures								
Activity	Potential Impacts	Risk Rating	Mitigation Measures	Residual Risk Rating				
Chemical or hydrocarbon spill during construction	Contamination of groundwater	Moderate	Storage of hazardous materials and refuelling to be undertaken in bunded areas. Spill kits to be kept onsite and staff informed of how to use them in an incident.	Low				

8.2 Operation

An assessment of the surface water and groundwater risks and potential impacts associated with the operation of the Proposed Development and mitigation measures is summarised in **Table 7**.

Table 7 – Potential Operational Impacts and Mitigation Measures							
Activity	Potential Impacts	Risk Rating	Mitigation Measures	Residual Risk Rating			
Operation of the medical centre.	Contamination of the aquifer due to the Proposed Development.	Low	Proper stormwater drainage installed and maintained to prevent groundwater infiltration onsite	Low			



9 Conclusion

A summary of the findings of the impact assessment are presented below. Some potential impacts have been listed during construction and operation however they are considered to be low and acceptable.

The Proposed Development is located in a commercial/industrial land use setting in a historically highly disturbed area where historical groundwater contamination has taken place.

Potential construction stage impacts include contamination from chemical or hydrocarbon spills during construction.

Table 8 – Potential Construction and Operation Impacts and Mitigation Measures							
Activity	Potential Impacts	Risk Rating	Mitigation Measures	Residual Risk Rating			
Chemical or hydrocarbon spill	Contamination of groundwater	Moderate	Storage of hazardous materials and refuelling to be undertaken in bunded areas. Spill kits to be kept onsite and staff informed of how to use them in an incident.	Low			
Operation of the medical centre.	Contamination of the aquifer due to the Proposed Development.	Low	Proper stormwater drainage installed and maintained to prevent groundwater infiltration onsite	Low			

A summary of the key impacts and proposed mitigation and monitoring measures are presented in Table 8.



10 References

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Figures





Groundwater Impact Assessment 28-32 Bourke Road, Alexandria, NSW, 2015

Job No: EP2515 Date: 08/03/2022 Drawing Ref: EP2515.001 Fig. 1 Version No: v1

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Approximate Scale Only

Figure 1 - Site Location and Boundary







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2	11/02/22	Revised Scheme J	
3	15/02/22	Issue for SEARs Request	
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Bourke Road Feasibility

28-32 Bourke Road, Alexandria, NSW 2015

for

at

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Drawing Title Existing Site Plan





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