Groundwater Impact Assessment

New high school for Schofields and Tallawong WO05753/23

Department of Education (DoE) NSW

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ACKNOWLEDGEMENT OF COUNTRY

The Board and employees of Water Technology acknowledge and respect the Aboriginal and Torres Strait Islander Peoples as the Traditional Custodians of Country throughout Australia. We specifically acknowledge the Traditional Custodians of the land on which our offices reside and where we undertake our work.

We respect the knowledge, skills and lived experiences of Aboriginal and Torres Strait Islander Peoples, who we continue to learn from and collaborate with. We also extend our respect to all First Nations Peoples, their cultures and to their Elders, past and present.

Artwork by Maurice Goolagong 2023. This piece was commissioned by Water Technology and visualises the important connections we have to water, and the cultural significance of journeys taken by traditional custodians of our land to meeting places, where communities connect with each other around waterways.

The symbolism in the artwork includes:

- *Seven circles representing each of the States and Territories in Australia where we do our work*
- *Blue dots between each circle representing the waterways that connect us*
- *The animals that rely on healthy waterways for their home*
- *Black and white dots representing all the different communities that we visit in our work*
- *Hands that are for the people we help on our journey*

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1 INTRODUCTION

This Groundwater Impact Assessment has been prepared to support a Review of Environmental Factors (REF) for the Department of Education (DoE) for the construction and operation of the new Schofields - Tallawong High School (the activity).

The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&I SEPP) as “development permitted without consent” on land carried out by or on behalf of a public authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37A of the T&I SEPP.

This document has been prepared in accordance with the Guidelines for Division 5.1 assessments (the Guidelines) by the Department of Planning, Housing and Infrastructure (DPHI). The purpose of this report is to understand the impacts of the proposed high school works on surface water across and in proximity to the site.

1.1 Objective

Water Technology has been engaged by SINSW to prepare a Groundwater Impact Assessment to assess any the impact of the proposed high school works on groundwater.

1.2 Site Description

The site is known as 201 Guntawong Road, Tallawong, NSW, 2762 (the site), and is legally described as part of Lot 1 in Deposited Plan 1283186. The site is located at the corner of Guntawong Road and Clarke Street, Tallawong and is approximately 4 hectares in area. The site has an approximate 100-metre-long frontage to Guntawong Road along its northern boundary. Nirmal Street provides a partial frontage along the eastern boundary of the site with plans to extend Nirmal Street to provide a future connection to Guntawong Road.

The site is predominantly cleared land and consists of grassland with several patches of remnant native vegetation particularly within the northern portion of the site. As a result of precinct wide rezonings, the surrounding locality is currently transitioning from a semi-rural residential area to a highly urbanised area with new low to medium density residential development with supporting services. The site is located approximately 1.5km to the north west of Tallawong Metro Station and is also serviced by an existing bus stop along Guntawong Road.

Figure 1-1 below provides an aerial image of the site.

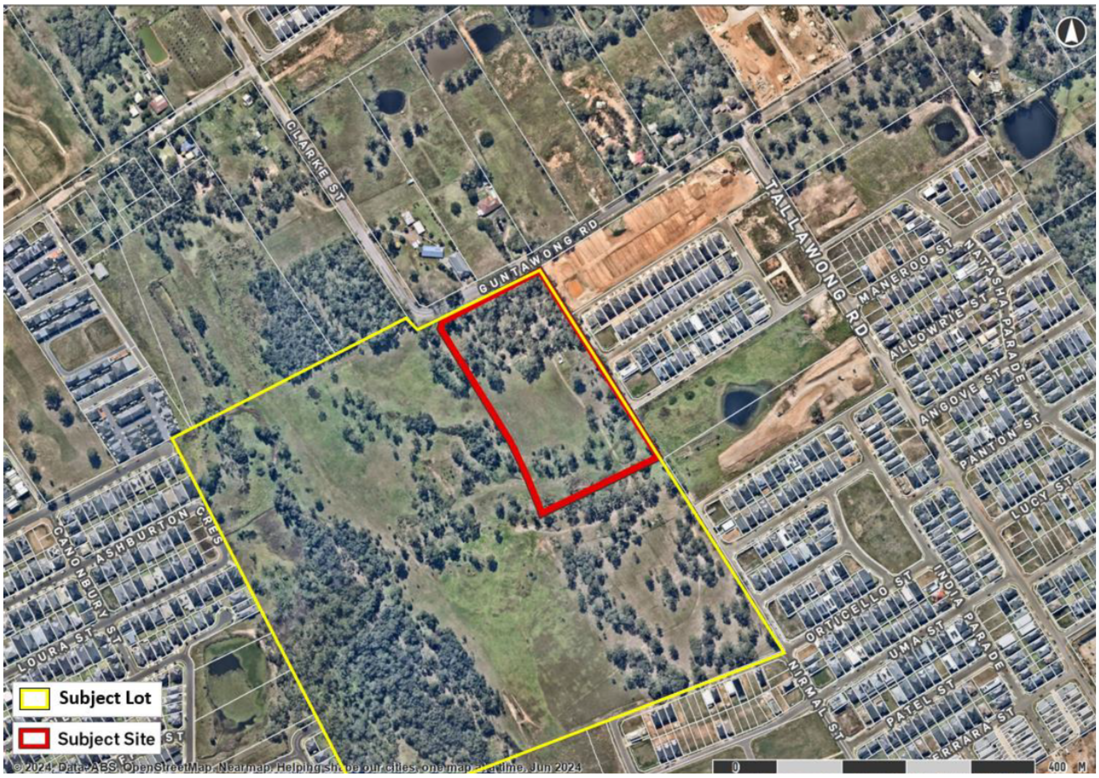

Figure 1-1 Aerial Photograph of Site Source: Urbis, 2024

1.3 Proposed Activity Description

The proposed activity is for the construction and operation of a new high school known as Schofields - Tallawong High School. The new high school will accommodate up to 1,000 students. The school will provide 49 permanent teaching spaces (PTS), and 3 support teaching spaces (STS) across three buildings.

The buildings will be three-storey in height and will include teaching spaces, specialist learning hubs, a library, administrative areas and a staff hub. Additional core facilities are also proposed including a standalone school hall, a carpark, a pick up and drop off zone along Nirmal Street, two sports courts and a sports field.

Specifically, the proposal involves the following:

- Three learning hubs (three-storeys in height) accommodating 49 general teaching spaces and 3 support learning units (SLUs).
- Other core facilities including amenities, library, staff hub and administrative areas.
- Standalone school hall.
- Separate carpark with 72 spaces.
- Kiss and drop zone along Nirmal Street.
- Open play space including sports courts and sports field.
- Public domain works.

The proposed site access arrangements are as follows:

- Main pedestrian entrance to be located off Nirmal Street.
- Kiss and drop zone proposed along Nirmal Street.
- Onsite parking access via Nirmal Street.

2 GROUNDWATER ASSESSMENT

The Schofields Tallawong High School development will comply with the Water Management Act 2000 (NSW) and Water Management (General) Regulation 2018 (NSW), notably adhering to the NSW Aquifer Interference Policy, and the NSW Construction Dewatering Guideline.

5.1 Contextual Information

5.1.1 Site details

The proposed new high school is described in section 1.3. There are no proposed basements in the general learning spaces (GLS), however the building foundations are likely to be piled down to bedrock to resist lateral loads. Topography slopes towards the southwest from an elevation of approximately 46 m AHD in the north-eastern corner to approximately 37-38 m AHD along the south-western boundary (Previous site investigations

PSM previously conducted a geotechnical investigation of the site for Landcom in September 2022, which saw five boreholes drilled to depths of between 0.7 m to 7.1 m, and fifteen (15) test pits excavated to depths of between 0.65 to 3.0 m.

More recently, PSM undertook further fieldwork in October 2024 including the drilling of five boreholes to depths of between 8.66 m and 11.1 m, in which piezometers were installed in three boreholes: BH06, BH08 and BH09 (Figure 2-2).

). There is a short (approx. 50 m) reach of an unnamed tributary of First Ponds Creek located in the southeast corner of the site. First Ponds Creek itself is located about 250 m to the southwest of the site, and the topography flattens considerably in this area.

The entire site covers approximately four hectares and includes auxiliary facilities such as a hall, assembly area, car park, sports field, and five multi-sport courts. Accordingly, more than 50% of the site will be either roofed or have impermeable paved surfaces.

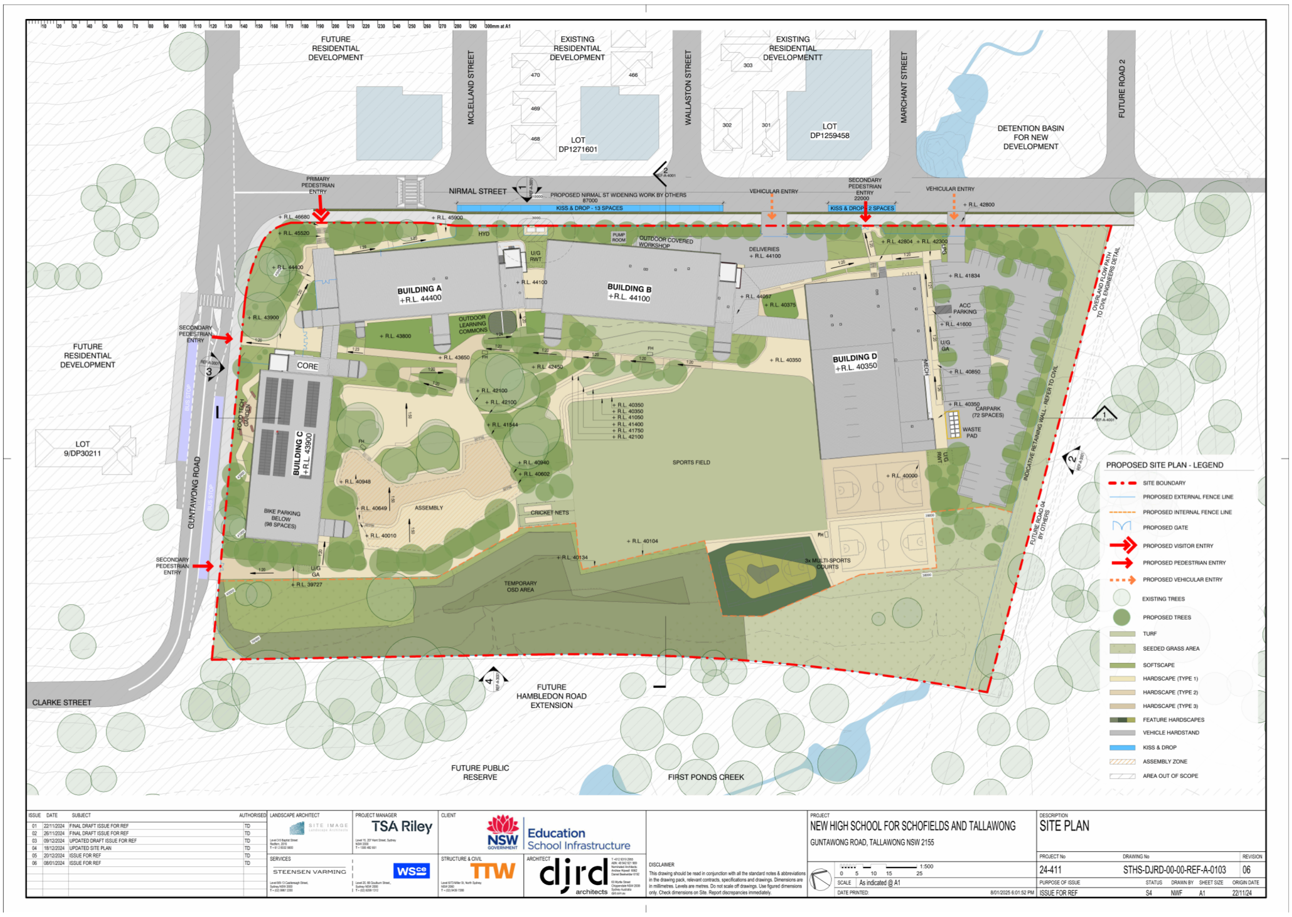

Figure 2-1 Site Plan

Previous site investigations

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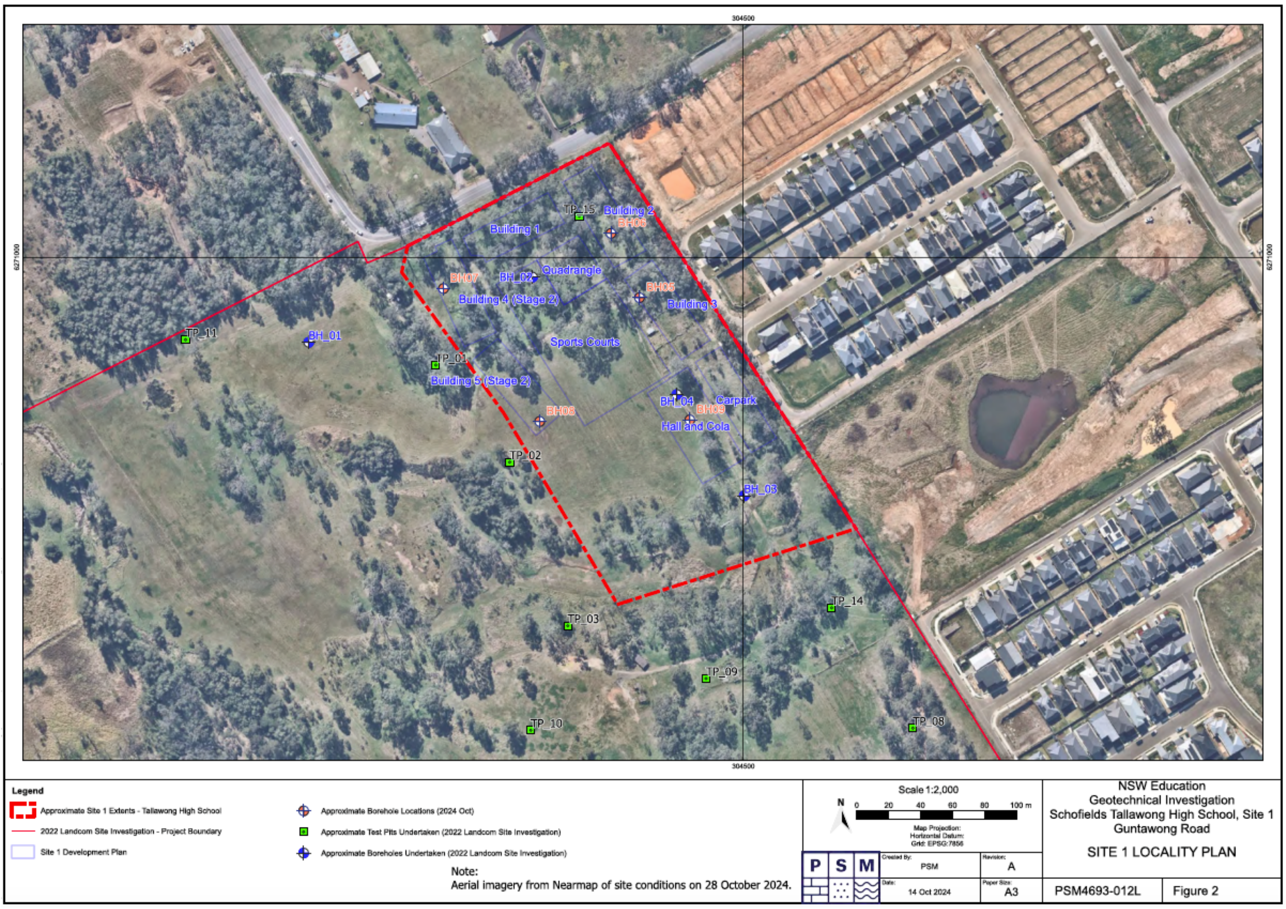

Figure 2-2 Borehole Locations

5.1.3 Geological setting

The local geology comprises Permian-Triassic sedimentary rocks of the southern Sydney Basin, including the extensive Hawkesbury Sandstone that outcrops throughout Sydney and along the northern beaches. This site itself is mapped as Bringelly Shale of the Wianamatta Group, which consists of shale, carbonaceous claystone, claystone, laminite, fine to medium-grained lithic sandstone, rare coal and tuff. The Bringelly Shale overlies thin Minchinbury Sandstone and Ashfield Shale, although these deeper units have likely not been intersected through previous drilling at the site.

Boreholes and test pits constructed by PSM (2024) reveal several areas near access tracks, and in the north of the site where Building 2 is proposed, that have foreign fill materials in the form of gravelly clay and sand, and concrete slabs and brick structures, respectively. Otherwise, most investigation sites were characterised by a thin veneer (0.2-0.6 m) of clay and silty clay topsoil overlying stiff clay and gravelly clay with trace sand to between 1.6-7.2 m depth. Weathered bedrock comprising predominantly shale (80-90%) and fine-medium grained sandstone (10-20%), ranging from highly weathered to slightly weathered with increasing depth, extended to depths between 7.0-9.8 m. Competent bedrock of slightly weathered to fresh shale (60-90%) and fine-medium grained sandstone (10-40%) was encountered to total drilled depths of between 8.66-11.1 m below ground level.

5.1.4 Hydrogeology

This part of the Sydney Basin has no regional aquifers with suitable storage, groundwater quality or bore yield for large-scale economic development; however, the Hawkesbury Sandstone, which would exist at considerable depth below the site, may provide local aquifers for small-scale use.

Upper sections of the Wianamatta Group comprise floodplain alluvium, colluvium derived from the shales, and weathered and fractured shales. Thickness is generally between 3-10 m and hydraulic conductivity is highly variable (10-5 to 0.01 m/day) depending on the extent of fracturing (Herron et al., 2018). Deeper sections of the Bringelly Shale are generally less permeable due to typically less fracturing; however, the range of hydraulic conductivities is even more variable (10-8 to 0.001 m/day).

Bore yields in the Wianamatta Group are typically less than 1 L/s and groundwater salinity is generally brackish to saline in the range 5,000 to 50,000 mg/L as Total Dissolved Solids (McNally, 2004), although shallow bores around Camden have slightly lower salinity around 2500 mg/L TDS (AGL, 2013).

Groundwater has been observed at the site by PSM (2024) in all three piezometers with depth to water level at BH06, BH08 and BH09 being 3.5, 1.0 and 1.2 m below ground level (BGL) respectively.

Water table contours are likely to reflect a subdued form of the topography (Figure 2-3); hence groundwater flow direction is westwards to First Ponds Creek.

5.1.5 Surface water – groundwater interactions

Despite the shallow depth to groundwater beneath the site, and an inferred flow direction towards First Ponds Creek, the possibility of direct groundwater exchange to the creek is limited due to the very low permeability of the aquifer (section 5.1.4). Whilst some discharge may occur seasonally in winter, and thus offer minor baseflow to the creek, the duration of such discharge would be short.

5.1.6 Groundwater Dependent Ecosystems

The presence of potential groundwater dependent ecosystems (GDEs) near the site was investigated through the SEED Initiative (https://www.seed.nsw.gov.au), specifically the GDE Probability layer for Hawkesbury Nepean. This identified all High Ecological Values Aquatic Ecosystems (HEVAE) in the area as having ‘High’ probability of being a GDE. The HEVAE is defined locally as “Cumberland Red Gum Riverflat Forest”, which have an overall category of Medium for most polygons mapped near the site (Figure 2-3). The Medium category is derived through a combination of scores for three key attributes, namely Medium-High DIVERSITY, Very High DISTINCTIVENESS and Very Low-Low Naturalness. These assets reflect the riparian and valley bottom vegetation along First Ponds Creek and more distant waterways.

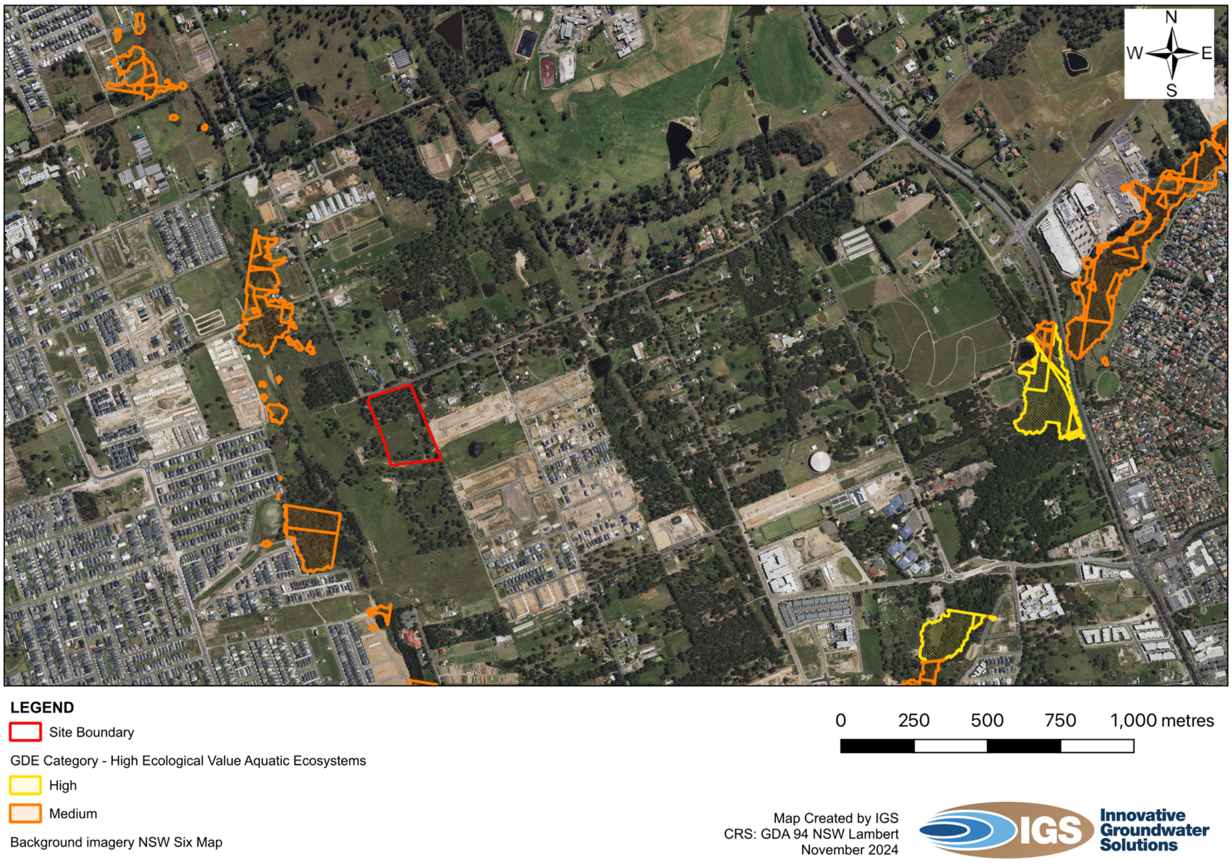

Figure 2-3 Groundwater Dependent Ecosystems

5.2 Groundwater Vulnerability Assessment

A groundwater vulnerability assessment was undertaken to investigate the likelihood of groundwater contamination, potential impacts on groundwater-dependent ecosystems (GDEs), and cumulative impact on the groundwater system including impacts to nearby bores for potable water supply.

Because there are no proposed basements for the GLS, and more specifically no permanently drained basements or structures, there will be no long-term effects to groundwater levels and thus the NSW Aquifer Interference Policy is not relevant for this assessment.

It is also understood that irrigation of gardens and the sports field post construction will come from mains water supply, rather than bores, further avoiding any potential for long-term drawdown/aquifer interference impacts.

5.2.1 Likelihood of Groundwater Contamination and Possible Mitigation Measures

Potential sources of groundwater contamination include minor fuel, oil or hydraulic fluid leaks from construction vehicles and equipment, which are likely to have a volume of less than 100 L per event.

Mitigation measures are focused primarily on preventing chemical spills from reaching the shallow water table in the unlikely event of leakage. Mitigation measures include:

- Regular maintenance and inspection of vehicles used during construction.

- Development of site management plans that detail responses to leaks such as spill kits, removal and appropriate testing and disposal of impacted soils, and options for installing groundwater monitoring bores in the case of an unexpected leak.

Groundwater monitoring is not required during the construction of the buildings or ancillary infrastructure; however, should groundwater monitoring bores be required in the future due to a significant contamination event, then bores should be installed both upgradient and downgradient of the known/perceived source.

5.2.2 Potential Impacts to Groundwater Dependent Ecosystems

It is understood that water for construction purposes will not be drawn from any current or future bore on the site; instead, it will be derived from mains water supply. Therefore, the only potential drawdown impact from the development is that required to dewater excavations for piling/foundation emplacement.

Piles will likely be founded in Class III bedrock (PSM 2024), which was encountered below depths of between 5.4-8.7 m. Given measured water table depths of 1.0-3.5 m at the site, it will be necessary to temporarily remove several meters of water depth (and up to 8 m depth) from excavations via conventional sump and pump systems. The drawdown caused by this pumping will propagate away from the excavations with the extent and magnitude governed by the hydraulic properties of the predominantly shale and minor sandstone strata as well as the duration of pumping.

The nearest HEVAE are located between 240 m to 270 m southwest and west of the site boundary, respectively, and even further from the nearest building sites requiring excavation for foundations (Figure 2-3). If one adopts a highly conservative (i.e., worst case) set of aquifer hydraulic properties, including a transmissivity of 1 m2/day (cf. hydraulic conductivity <0.001 m/day noted in section 5.1.4) and a specific yield of 0.01, the estimated drawdown at the HEVAE due to dewatering of excavations by up to eight metres depth will be on the order of several millimetres (Figure 2-4). This estimate is based on the 1-D analytical solution for tidal response in an aquifer (Jacob, 1950) and assumes the excavation takes up to one month (30 days). It can be concluded that the low magnitude and short duration of any potential drawdown impact will not present a risk to the deep-rooted vegetation communities.

The other potential pathway for impact to GDEs is recharge interception as a result of roofing and paved surfaces. Whilst more than 50% of the site area will have such impenetrable surfaces, the runoff will be directed to the ODB, which will be allowed to leak slowly to the water table. This functionality, as well as the fact the school site occupies a very small fraction of the entire surface water catchment, means that recharge interception does not present a risk of nearby GDEs.

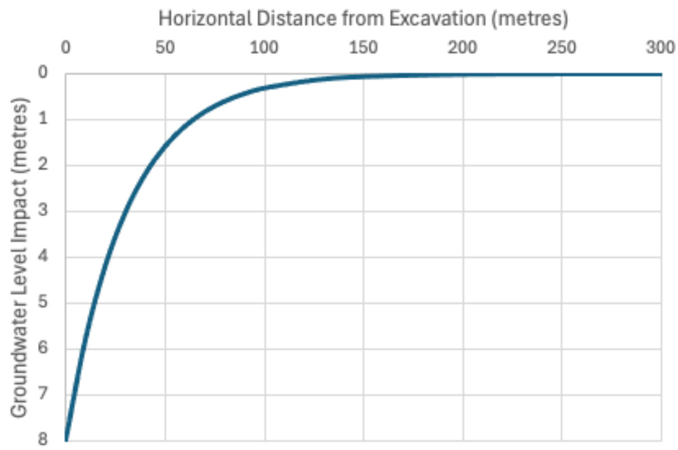

Figure 2-4 Estimated magnitude of drawdown impact in a worst case of excavation and dewatering 30 days.

5.2.3 Cumulative Impact of the Development on Groundwater

There is not expected to be any prolonged drawdown impact to groundwater from the development, nor is there any significant impact to aquifer recharge. Accordingly, any potential impacts to existing groundwater users are expected to be immeasurable.

3 CONCLUSION

The groundwater vulnerability assessment has demonstrated low to negligible risk of deleterious impact to the underground water resource, nearby high ecological value dependent ecosystems, or existing groundwater users. This finding is primarily based on the small magnitude and short duration of predicted drawdown caused by dewatering excavations for building foundations. The only low risk is contamination of the water table aquifer with small hydrocarbon leaks from construction machinery, however this can be easily mitigated through regular maintenance and inspections of equipment, and immediate application of spill kits should a leak be detected.

4 RECOMMENDATION

Table 1 Mitigation Measures

Mitigation Number/Name	Aspect/Section	Mitigation Measure	Reason for Mitigation Measure
Groundwater Contamination	Prior to commencement of any construction work	Prior to the commencement of any construction work, emergency spill kits should be made available on site, and all plant and equipment should receive daily maintenance and inspections for potential leakages of fuel, oil and hydraulic fluid.	To ensure there is no contamination of the water table aquifer with hydrocarbon leaks from construction machinery.

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