



REVISED DEWATERING MANAGEMENT PLAN

Proposed Apartment Building

February 2026

Prepared For: The Trustee ATF WAFE Property

Lot 1 DP 781624, Lot 1 DP 419177 & Lot 2 DP 300515
12-16 Florence Street
Tweed Heads NSW

HMC2024.1001.05

RE: Lot 1 DP 781624, Lot 1 DP 419177 & Lot 2 DP 300515, 12-16 Florence Street, Tweed Heads NSW.

HMC Environmental Consulting Pty Ltd is pleased to present our report for a Revised Dewatering Management Plan for the abovementioned site.

We trust this report meets with your requirements. If you require further information, please contact HMC Environmental Consulting directly on the numbers provided.

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1 INTRODUCTION

A residential development is proposed for the site located at Lot 1 DP 781624, Lot 1 DP 419177 & Lot 2 DP 300515, 12-16 Florence Street, Tweed Heads NSW. The proposal would involve the demolition of two dwellings and a funeral home, and the construction of a 14-storey residential apartment building, with a double level basement carpark. The elevation of the site ranges from approximately RL 3.8m to RL 4.4m Australian Height Datum (AHD). The basement carpark includes a podium however the base of the general excavation would extend to an average 6.5m below the existing ground surface (BGL). During the drilling operation for the acid sulfate soil investigation the interception of seepage was recorded from approximately 2 – 2.5m BGL in this area indicating that dewatering of the basement carpark excavation would be required.

To assess groundwater elevation and quality, three (3) of the ASS boreholes were converted to groundwater bores in accordance with Water NSW requirements. Following purging, field measurements were recorded, and samples collected for laboratory analysis.

Following further advice from the proponent on the estimated dewatering period increasing from 3 months to 18 weeks, the estimated total discharge volume of extracted groundwater in Section 14.3.1 has been increased from 25.86ML to 36.2ML.

1.1 NSW DEPARTMENT OF CLIMATE CHANGE, ENERGY, THE ENVIRONMENT AND WATER (DCCEW)

Detailed advice has been provided from the DCCEW to DPHI Planning and Assessment dated 11 December 2025 relating to water supply, water take and groundwater management.

HMC has reviewed the advice, and it appears items 1.2 and 1.3 reproduced below, are able to be assessed within the Revised Dewatering Management Plan. HMC has provide comment to each item.

1.2 Recommendation - pre-determination

That DPHI request the proponent to:

- *Confirm if the basement is to be drained or tanked.*

HMC Comment: The proposed basement carpark is to be tanked. No ongoing dewatering or groundwater extraction is proposed

- *Quantify the maximum annual ongoing water take if the basement is to be drained and demonstrate sufficient entitlement can be obtained.*

HMC Comment: See above. No ongoing water take proposed

- *Identify and assess the proposed water supply works to facilitate dewatering for the operational phase if required.*

HMC Comment: No operational dewatering proposed

1.3 Recommendation - pre-determination

Should groundwater take for the operational phase of the development exceed 3 ML/year DPHI should request the proponent to assess the impacts of aquifer interference activities in accordance with the NSW Aquifer Interference Policy (NSW AIP) (2012)

HMC Comment: No operational groundwater take proposed. To provide additional information for the proposed construction stage dewatering operation, HMC has completed an Aquifer Interference Assessment

attached as Appendix15. Figures have been included showing no mapped current approved water supply works or Groundwater Dependent Ecosystems within 500m of the proposed temporary construction dewatering operation.

2 SITE INFORMATION

Table 1 - Site Details Summary

Site Address	12-16 Florence Street Tweed Heads NSW
Property description	Lot 1 DP 781624, Lot 1 DP 419177 & Lot 2 DP 300515
Report commissioned by	The Trustee ATF WAFE Property
Proposed development	Proposed Apartment Building
Site Elevation	Generally, RL 3.8 – 4.4m AHD
Groundwater depth	Standing water in installed groundwater bores - 1.31 – 2.58m below ground surface level (BGL)
Groundwater Vulnerability	High
Investigator	Mark Tunks
Local Government Authority	Tweed Shire Council
Soil investigation date	11 September 2024 and 11 October 2024

3 SITE CHARACTERISTICS

Table 2 – Site Characteristics

Acid Sulfate Soil Class <i>(NSW Legislation 1:25 000 Acid Sulfate Soil Planning Maps – ASS_001)</i>	Class 2 Any works below the ground surface or works by which the watertable is likely to be lowered
Regional Geology <i>The Surface Quaternary Geology Map (Geoscience Australia, 2016)</i> <i>Coastal Quaternary Geology Tweed Heads 1:25000 Quaternary Geology Geological Survey of NSW</i>	Cenozoic Undifferentiated Sediments/Sedimentary Rocks Unconsolidated mud, silt, sand and gravel of an uncertain age and origin. Qhef Holocene tidal-delta flat: marine sand, silt, clay, shell, gravel
Soil Landscape <i>NSW Department of Land & Water Conservation Soil Landscapes of the 1:100 000 Sheet (Morand, 1996)</i>	Kingscliff (ki) landscape: Extremely low, level to gently undulating Pleistocene sand sheets. Extensively cleared and disturbed open-heathland and forest. Soils: Deep, generally well-drained Podzols. Geology: Aeolian and marine quartz sand sheets and dunes of the Pleistocene inner barrier system.
Australian Soil Classification	Podosols (PO) Soils with B horizons dominated by the accumulation of compounds of organic matter, aluminium and/or iron.
Regional Hydrogeology	Groundwater vulnerability is mapped as High for the site. The property is located nearby to Tweed

<p><i>(Tweed Shire Council planning & mapping: Ground Water Vulnerability)</i></p>	<p>Marina, however, given the elevated site, it would not generally be expected that shallow groundwater would be present. In this circumstance, indurated sands have been recorded at shallow depths in the general location with apparent perched groundwater table.</p>
<p>Groundwater Database Search http://allwaterdata.water.nsw.gov.au/water.stm</p>	<p>The online Water NSW groundwater mapping shows the nearest mapped registered groundwater bore is GW303657 located approximately 250m east of the site. The bore is registered for domestic use.</p>

4 GEOLOGY & SOIL LANDSCAPE

According to the NSW Department of Land & Water Conservation *Soil Landscapes of the Murwillumbah - Tweed* 1:100 000 Sheet (Morand, 1996), the site is located within a Kingscliff (ki) soil landscape: extremely low, level to gently undulating Pleistocene sand sheets.

The 1:25000 *The Surface Quaternary Geology Map (Geoscience Australia, 2016)* shows the site is located within a Cenozoic Undifferentiated Sediments/Sedimentary Rocks geology unit characterised by unconsolidated mud, silt, sand and gravel of an uncertain age and origin.

A review of the NSW Department of Primary Industry (2008) *Coastal Quaternary Geology Tweed Heads 1:25000 Quaternary Geology Geological Survey of NSW* mapping shows the site is within the Estuarine Plain System Qhef geology unit described as Holocene tidal-delta flat characterised by marine sand, silt, clay, shell, gravel. This mapping also shows the old back channel (filled in the 1960s during the Greenbank reclamation work) running parallel and east of Wharf Street. Historically groundwater would be expected to flow away from the elevated Razorback area to the west towards the tidal back channel.

5 PROJECT DESCRIPTION

An apartment building development is proposed for the site located at Lot 1 DP 781624, Lot 1 DP 419177 & Lot 2 DP 300515, 12-16 Florence Street, Tweed Heads NSW. It is proposed to construct a 14-storey residential apartment building (57 units), along with a proposed double basement carpark and ancillary works including landscaping.

Currently the properties are occupied by existing dwellings on No. 12 and 14, together with a funeral home on No. 16. All existing structures are to be demolished prior to the construction of the proposed development.

6 PROPOSED EARTHWORKS

Earthworks into the existing ground surface would include excavation for the construction of the double level basement, together with the installation of the lift well and site services. The proposed ground level would be approximately RL 4.3m AHD. The floor level of the lower basement is proposed to be RL -1.9m AHD (6.2m BGL), and assuming a footing depth of 0.5m, the general minimum excavation elevation would be RL -2.4m AHD (6.7m BGL). The lift wells overruns are proposed to extend up to 1.2m beyond the basement floor level, to a minimum elevation of RL -3.1m AHD (7.4m BGL).

7 SOIL INVESTIGATION

To assess ASS within the local soil profile, 5 borehole(s) were excavated by Pacific Geotech on the 11 September 2024, 4 October 2024 and 11 October 2024, to a maximum depth of approximately 8.5m depth, with samples generally collected at 0.5m depth intervals through the soil profile. Sampling locations are shown

in Appendix 5. Boreholes BH1, BH3 and BH5 were excavated to approximately 8.5m depth, while boreholes 2 and 4 were terminated at 3.8 and 4.4m depth due to the dense indurated material.

11 September 2024

Due to difficulties with accessing parts of the site, the drilling program extended over several days with initially Pacific Geotech providing a small tracked rig on 11 September 2024 to access available areas. As very dense indurated sand was intercepted during this initial drilling program, the small rig was only able to drill to 4.0-4.4m in three of the 4 boreholes.

BH1 – 0.0-8.5m

BH2 – 0.0-4.3m terminated due to dense indurated sand

BH3 – 0.0-4.4m terminated due to dense indurated sand

BH4 – 0.0-4.0m terminated due to dense indurated sand

4 October 2024

A return to site on 4 October 2024 with a larger rig, enabled BH3 to be located immediately beside the 11 September 2024 location and extended to 8.5m depth.

11 October 2024

HMC returned to site with Pacific Geotech and, again, after exploring drilling locations, it was decided to continue BH4 in a final location near BH3. This relocation of BH4 was recorded as BH5 with ASS sampling beginning at 4m.

The soil profile was generally similar between boreholes and generally recorded grey sand overlying brown/dark brown sand to the termination depth. Groundwater seepage was encountered between 1.5– 2.5m BGL, with the soil being wet below these depths. Groundwater monitoring bores were installed in BH2, BH3 and BH5.

8 REGISTERED GROUNDWATER BORES

The nearest registered groundwater bore (GW303657) is located 250m east of the project site. The bore is registered as domestic use; however, it was installed in 1970 and may not be operational. There is also a registered groundwater bore (GW306058) south-west of the site, but this is a temporary monitoring bore to 2.5m depth, installed in 2006, and may not be operational. Both of these registered groundwater bores, are greater than 100m from the proposed development, and outside any zone of influence.

9 RECEIVING WATERS

The Tweed Shire Council TSC Utilities Network mapping

<https://experience.arcgis.com/experience/66fc06cb96e7466cab87219a8b85784e/page/All--Water%2C-Sewer-Stormwater/> shows the local street stormwater is collected on the southern side of Florence Street,

with a kerb inlet in front of No.12. The drainage then runs east to the eastern side of Wharf Street before turning south to eventually discharge into the north-eastern corner of the Tweed Marina. It is noted there are 7 other stormwater discharges into the marina in the immediate area.

During construction dewatering, the extracted and treated groundwater would be discharged to the local street stormwater system via a kerb inlet located in front of No.12 and eventually discharge into the north-west corner of the Tweed Marina near the existing *Get Hooked* restaurant, approximately 230m southeast of the site.

10 GROUNDWATER INVESTIGATION.

To assess the groundwater elevation and water quality, three (3) groundwater monitoring bores were installed to approximately 4.3m depth BGL (BH2-GW1) on the eastern part of the site on No.16 and 8m BGL (BH3 - GW2 & BH5 – GW3) depth on the northern, central part of the site on No.14.

The groundwater monitoring bores were 50mm via Class 12 UPVC with a 1.5m length machine cut screened interval from approximately 2.7m to 4.3m for GW1 and 5.0m-8.0m for GW2 and GW3. The bores were sealed with approximately 0.5m bentonite located immediately above the screened interval. A flush-mounted gatic cover was provided to GW1 and a low (0.2m) stickup for GW2 and GW3.

Bore ID	Overall Depth (mBGL)	Screen Length (m)	Bentonite Seal (mBGL)	Finish
FSGW1	4.3	2.7-4.3	2.3-2.7	Gatic
FSGW2	8.0	5.0-8.0	4.6-5.0	Stickup
FSGW3	8.0	5.0-8.0	4.5-5.0	Stickup

Following installation, a submersible pump was used to develop and purge the bores and remove any collected sediment.

11 SAMPLING METHODOLOGY AND QUALITY CONTROL

11.1 GROUNDWATER

On 17 October 2024 samples were collected from the groundwater bores located at 12-16 Florence Street, Tweed Heads NSW.

- The monitoring bores (GW1, GW2 and GW3) were pumped using a low flow peristaltic pump with dedicated tubing, set at mid screen to initially purge until steady state conditions were recorded.
- Field measurements were recorded including pH, electrical conductivity, dissolved oxygen, temperature and ORP using a calibrated Hanna multi-parameter meter.
- A primary sample was collected from each bore, and a QA/QC duplicate sample was also collected. The samples were collected in the following laboratory –supplied sample containers:

- Metals (field filtered) 60mL plastic (acidified to pH<2 using HNO₃)
- General Chemical 250mL plastic unpreserved
- Nutrients 60mL plastic H₂SO₄ preserved

- Samples were stored in coolers on ice (<4°C) and delivered directly to the HMC offices for storage in secure refrigeration (<4°C) prior to delivery to ALS Environmental in Brisbane via courier.
- Chain of custody documentation was completed and is attached in the Appendices.

12 ASSESSMENT CRITERIA

Release criteria have been sourced from the local *Dewatering in the Tweed* guidelines as shown in Table 2. The discharge would eventually enter Terranora Creek via the local drainage network and outlet of the Tweed Marina. For the purposes of this assessment, the estuary criteria have been adopted to Terranora Creek water quality.

Table 3 - Receiving Environment Release Criteria (Toxicants)

Parameter ^b (µg/L)	Default Guideline Values ^a							
	Freshwater level of protection (%species) ^c				Marine water level of protection (%species) ^c			
	99%	95%	90%	80%	99%	95%	90%	80%
Aluminium (pH>6.5)	27	55	80	150	-	-	-	-
Arsenic	0.8	13	42	140	-	-	-	-

Cadmium	0.06	0.2	0.4	0.8	0.7	5.5	14	36
Chromium	0.01	1.0	6	40	0.14	4.4	20	85
Copper	1.0	1.4	1.8	2.5	0.3	1.3	3	8
Iron ^d	-	-	-	-	-	-	-	-
Lead	1.0	3.4	5.6	9.4	2.2	4.4	6.6	12
Mercury	0.06	0.6	1.9	5.4	0.1	0.4	0.7	1.4
Nickel	8	11	13	17	7	70	200	560
Zinc	2.4	8.0	15	31	7	15	23	43

Table 4 - Receiving Environment Release Criteria (Physico-chemical)

Parameter ^b	Default Guideline Values ^a					
	Upland river	Lowland river	Freshwater lakes & Reservoirs	Wetlands ^d	Estuaries	Marine
Ammonia (NH ₄ ⁺) (µg/L)	13	20	10	-	15	20
Total nitrogen (TN) (µg/L)	250	350	350	-	300	120
Chl-a (µg/L)	NA	3	5	-	4	1
Total Phosphorous (TP) (µg/L)	20	25	10	-	30	25
Dissolved Oxygen (DO) (% saturation)	90-100	85-110	90-110	-	80-110	90-110
Turbidity (NTU)	2-25	6-50	1-20	-	0.5-10	0.5-10
pH	6.5-8.0	6.5-8.5	6.5-8.0	-	7.0-8.5	8.0-8.4
Suspended solids (SS) (mg/L)	25	6	NA ^d	-	6-22	0.5-12
Salinity (µS/cm)	30-350	125-2200	20-30	-	-	-

^aThis guideline will be updated from time to time as industry standards change and new Default Guideline Values (DGVs) from the ANZG 2018 Guidelines (ANZECC revised) become available. The DGVs should be used in accordance with the detailed guidance provided on the Australian and New Zealand Guidelines for Fresh and Marine Water Quality website. Ambient receiving water quality conditions must be taken into account before applying the release criteria in Table 1.

^bFor further values refer to ANZECC/ARMCANZ 2000 and ANZG 2018 Guidelines.

^cSee ANZG 2018 for guidance on applying the different toxicant levels (%) to different ecosystem conditions.

^dSite-specific guideline values should be derived as per the ANZG 2018 guidance.

Note: Where site assessment has identified particular contaminants in addition to the above e.g. TPH or BTEX, additional parameters will require inclusion in the monitoring regime and council may require the monitoring frequency to be increased.

13 GROUNDWATER QUALITY MONITORING

Groundwater field measurements and laboratory analysis were completed, and a summary of results is shown in Table 4. A copy of the laboratory report is attached as **Appendix 13** of this report.

Table 5 –Groundwater Results Summary

ANALYTE	Sample ID - Groundwater		
	FSGW1	FSGW2	FSGW3
FIELD RESULTS			
Depth (mBTOP)	1.29	1.45	2.78
pH	5.36	4.65	4.45
Electrical Conductivity (µS/cm)	171	237	251
Dissolved Oxygen (mg/L (%sat))	3.11 (36.1%)	0.91 (10.5%)	0.91 (10.6%)

Temperature (°C)	22.6	22.7	22.4
Oxidation Reduction Potential (mV)	99	38	90
Turbidity (NTU)	398	291	54
PHYSICAL & GENERAL CHEMISTRY			
Total Suspended Solids	423	224	317
Acidity (mg/L CaCO ₃)	6	15	17
Total Alkalinity (mg/L CaCO ₃)	39	25	9
Sulfate (mg/L)	8	16	16
Chloride (mg/L)	19	34	43
Chloride: Sulfate ratio	2.4	2.1	2.7
METALS (mg/L)			
Aluminium	0.03	0.60	0.46
Arsenic	0.003	<0.001	<0.001
Cadmium	<0.0001	<0.0001	<0.0001
Chromium	<0.001	0.002	<0.001
Copper	0.001	<0.001	<0.001
Lead	<0.001	<0.001	<0.001
Nickel	<0.001	0.001	0.002
Zinc	0.024	0.085	0.070
Mercury	<0.0001	<0.0001	<0.0001
Iron	<0.05	0.59	1.15
NUTRIENTS (mg/L)			
Ammonia	2.29	0.11	0.15
Total Nitrogen	5.2	1.4	1.1
Total Phosphorous	0.44	0.17	0.16
Nitrite	0.03	<0.01	<0.01
Nitrate	1.57	0.01	<0.01
Total Kjeldahl Nitrogen	3.6	1.4	1.1

13.1 FIELD MEASUREMENTS

The groundwater standing water level ranged from 1.31-2.58m depth BGL. With the elevation of the site (3.8m-4.4m AHD), it appears the shallow groundwater may be perched on the underlying dense, indurated sand.

The pH results (4.45-5.36) show the groundwater is acidic, and typical of coastal backswamp sand areas. The presence of organic acids, iron oxides associated with the shallow intercepted dense indurated sand may be an acidity source. Some acidity generated from acid sulfate soils may also be present. The electrical conductivity results show the groundwater is fresh (<1500 uS/cm). Dissolved oxygen results were very low, and below discharge criteria as expected with limited interface with the atmosphere. The groundwater recorded oxidising conditions in the shallow groundwater, although reducing conditions were expected.

13.2 LABORATORY RESULTS

13.2.1 Physico-chemical

The alkalinity results are low and range from 9 – 39 mg/L CaCO₃ to show some buffering capacity is present. The acidity results range from 6 – 17 mg CaCO₃ and is not indicative of acute acid generation from ASS oxidation. Sulfate results range from <8 – 16 mg/L and chloride ranges from 19 – 43 mg/L and confirm the low electrical conductivity results. The chloride:sulfate ratio is low (2.1-2.7) however as it is above 2 it is unclear if this is indicative of ASS oxidation.

13.2.2 Metals

Very slightly elevated metals including aluminium, chromium and zinc were recorded exceeding the criteria for estuaries. pH adjustment to meet this criteria objective, would also likely reduce the soluble metal concentrations to meet discharge criteria.

13.2.3 Nutrients

Both nitrogen and phosphorus were recorded in the groundwater samples, both in low concentrations, however exceeding the discharge criteria. This nutrient load is likely associated with local fertiliser applications to lawn areas and animal droppings. It is likely first flush stormwater from the numerous discharge points from runoff during rainfall events, collecting garden fertiliser and animal droppings, would contribute significant nutrient concentrations to water quality in the local Tweed marina. Treatment for nutrients in high flow dewatering discharge is generally not practical using any biological control. Following steady state conditions, it is likely concentrations would reduce especially with treatment reducing turbidity and suspended solids.

13.3 GROUNDWATER MONITORING SUMMARY

The groundwater quality shows slightly acidic, turbid, discharge water with dissolved oxygen, metals and nutrients not meeting discharge criteria.

It is likely that once steady state conditions were achieved, nutrient concentrations would be expected to reduce as no significant contributors other than local gardens & fertilisers were noted. As the pH would need to be adjusted with an alkaline agent, soluble metals would also be less mobile. Adding alkaline agent would also reduce any acidity and increase the alkalinity. Dissolved oxygen would increase with pumping, turbulence, and additional mechanical aeration, as required. A number of commercial treatment options are available.

14 EXTRACTED GROUNDWATER MANAGEMENT

14.1 PREDICTED DRAWDOWN

The proposed ground level would be approximately RL 4.3m AHD. The floor level of the lower basement is proposed to be RL -1.9m AHD. The existing ground level ranges from 3.8-4.4m AHD, and assuming a footing

depth of 0.5m, the general minimum excavation elevation would be RL -2.4m AHD (6.2-6.8m BGL). The lift wells overruns are proposed to extend up to 1.2m beyond the basement floor level, to a minimum elevation of RL -3.1m AHD (7.4m BGL).

Assuming a groundwater depth of 1.5m, an average excavation depth of 6.5m BGL, and a 1m buffer to groundwater, the general drawdown would be approximately 6m. This appears very conservative as the groundwater elevation indicates the groundwater may be perched on the dense indurated material, above the expected local groundwater regime. There is also some significant differences in groundwater elevation with the GW2 and GW3 results showing approximately 1m variation over a 4-6m lateral distance on the level site.

14.2 DEWATERING AND OFF-SITE IMPACTS

The construction of the basement carpark would require the installation of sheet piles/secant piling to provide support to the sandy soil excavation on the boundaries of the site. With the dense to very dense indurated material intercepted on the site lateral and vertical seepage into the excavation may be reduced especially if the piling can be effectively locked into the indurated material. The limited drilling program for the acid sulfate soil investigation has shown the indurated material generally extends to below the depth of the excavation however the vertical and lateral extent of the dense to very dense material cannot be confirmed. The final engineering design has not been determined at the time of preparation of this report.

The dewatering would be undertaken via perimeter wellpoints, deep wells or a combination of both. Extracted groundwater would be pumped to a commercial treatment system that would comprise filtration, inline dosing, detention and an aeration system. The final configuration would be determined on site. Dosing is able to be fitted with feedback loops to control discharge quality, and modular systems that are able to be retrofitted, if required. With the proposed excavation extending to the site boundaries, the treatment system may require support especially during the initial excavation.

The zone of influence would extend outside the site however no registered bores have been identified in the impacted area.

14.3 ZONE OF INFLUENCE & DISCHARGE

The soil profile appeared to be similar across the site with shallow dark brown silty sand over pale grey/brown sand overlying dense to very dense dark brown indurated sand material. There was some variation in density noted, especially in borehole BH1 where the dense dark brown indurated material was able to be excavated using the small drilling rig, however, boreholes BH2 to BH4 were initially terminated due to the dense material, with later drilling to meet nominated depth required a larger drilling rig. There was also evidence of confining conditions, with the seepage recorded during the initial drilling operation, with drier soil conditions, being below the standing groundwater table recorded later, following installation of the associated groundwater bore.

14.3.1 Discharge Calculations

Assumptions

- Excavation size: 28 m x 43 m
- Excavation depth: 7.5 m
- Groundwater level: 1.5 m below ground
- Drawdown: 6 m (from 1.5 m to 7.5 m)
- Soil: Fine to medium sand over dense indurated sand
- Hydraulic conductivity (K):
 - Fine to medium sand: $K = 10^{-4}$ m/s
 - Dense indurated sand: $K = 10^{-6}$ m/s
- Assumed effective K: 5×10^{-5} m/s
- Excavation area: $28 \times 43 = 1204$ m²

The pumping rate (Q) was calculated using the Dupuit-Thiem equation for steady-state flow:

$$Q = (2\pi K H \Delta h) / \ln(R/r_w)$$

Where:

- Q: Pumping rate (m³/s)
- K: Hydraulic conductivity (5 x 10⁻⁵ m/s)
- H: Initial saturated thickness (6 m)
- Δh: Drawdown (6 m)
- R: Radius of influence (assume 30 m beyond excavation)
- r_w: Radius of well (assume 1 m)

Results

1. Pumping Rate:

- Q = 0.00333 m³/s (cubic meters per second)
- Q = 3.33 L/s (liters per second)
- Q = 11,971 L/hr (liters per hour)
- Q = 287,299 L/day (liters per day)

2. Total Extracted Groundwater Over 18 Weeks:

- 36.2 ML

As the expected volume is >3ML in 12 months a **Water Access License** in addition to a **Water Supply Works Approval** would be required.

14.4 TREATMENT

Based on the results of the groundwater monitoring, treatment would be required prior to discharge including:

Table 6 – Dewatering Treatment Summary

Parameter	Treatment	Amendment
Acidity	Alkaline dosing	Hydrated lime, soda ash or similar
Low dissolved oxygen	Aeration	Physical (pumping, flow forms) Mechanical (aerator) or Chemical (hydrogen peroxide)
Nutrients (Nitrogen and Phosphorus)	Impractical with high flows This is a very short term operation with low flows expected (retaining wall footings only).	After steady state conditions are achieved, the local contributions by gardens (fertilisers) in the shallow groundwater is not likely to be as significant. Removal of any sediment via filtering would also reduce particulate contributing to the slightly elevated nutrients.
Soluble Metals	Aeration and pH adjustment	Physical (pumping, flow forms) Mechanical (aerator) or Chemical (hydrogen peroxide) Alkaline amendment

A number of commercial treatment plants are available that would provide filtration, pH adjustment and monitoring feedback with alarms to ensure extracted groundwater meets the discharge criteria.

Initially operators return discharge into the excavation until treatment facilities are adjusted to meet extracted groundwater discharge quality. Groundwater monitoring provides a snapshot and final, steady state, extracted groundwater quality may significantly vary from groundwater monitoring results.

15 ODOUR CONTROL

Dewatering operations may be associated with odour emissions. As the site bounds a number of residential properties, if odour problems are recognised, deodorising measures would be implemented. A number of commercial filters are available to minimise odour emissions. In situ bio-control with amended soil and other media is also an option.

16 NOISE CONTROL

Pumping associated with dewatering operations may generate offensive noise. In-fill development is common in residential areas, and a number of controls are available to minimise noise emissions.

Diesel generators may exceed noise criteria and the location of generators and pumps is critical. Depending on the final configuration, pumps would be located to maximise physical buffers to residential properties. Other measures may include:

- acoustic barriers and screens;
- use of electric submersible pumps;
- ensuring best practice and innovative pumping technology;
- ongoing pump maintenance/replacement.

17 DILAPIDATION SURVEY

Ground vibrations due to basement excavations and construction operations may result in settlement and lateral ground movements on adjacent properties, and beyond these properties. In addition, dewatering can influence the water table of surrounding sites and has the potential to induce settlements, and it is recommended a drawdown analysis be carried out to assess if such effects may occur. This will be assisted depending on the basement wall construction.

At the time of investigation, the immediate neighbouring properties were occupied by commercial operations, residential developments. A dilapidation survey of surrounding structures and in-ground services should be carried out by a suitably qualified engineer, and any retention systems be designed for the support requirements of these surrounding structures.

18 COMPLAINTS REGISTER

A complaints register shall be kept on the site to record any complaints relating to dewatering operations particularly relating to odour, noise and discharge. Any action/controls implemented to respond to verified complaints are to be recorded.

19 CONCLUSION

Groundwater would be intercepted during the proposed double basement excavation.

Collected samples indicate generally good groundwater quality, however, some treatment would be required to meet discharge criteria. Commercial groundwater treatment systems are available to treat extracted groundwater to meet discharge criteria.

A monitoring schedule has been developed to ensure acidic, metal-laden water with low dissolved oxygen concentrations is not discharged off-site.

20 REFERENCES

- Acid Sulfate Soil Management Advisory Committee, "Acid Sulfate Soil Manual", Wollongbar, 1998.
- Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*
- White, I. et al, "Fixing Problems Caused By Acid Sulphate Estuarine Soils", *In* C. Copeland, C. (Ed.) *Ecosystem Management: the Legacy of Science*, Halstead Press, Sydney 1995.

21 LIMITATIONS

Any conclusions presented in this report are relevant to the site condition at the time of inspection and legislation enacted as at date of this report. Actions or changes to the site after time of inspection or in the future will void this report as will changes in relevant legislation.

The findings of this report are based on the objectives and scope of work outlined in Section 1. HMC Environmental has performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties or guarantees expressed or implied, are given. This report does not comment on any regulatory issues arising from the findings, for which a legal opinion should be sought. This report relates only to the objectives and scope of work stated and does not relate to any other works undertaken for the client. The report and conclusions are based on the information obtained at the time of the assessment.

The results of this assessment are based upon site inspections and fieldwork conducted by HMC Environmental personnel and information provided by the client. Four (4) boreholes were drilled on the site under HMC supervision, and this small but recognised sampling intensity has been used to establish site conditions. Very small variations in the underlying soil profile from those intercepted can result in significant variations in the movement/quality of groundwater. Rainfall/drought conditions would also influence the presence/quality of groundwater impacting on final; discharge/treatment.

All conclusions regarding the property area are the professional opinions of the HMC Environmental personnel involved with the project, subject to the qualifications made above. HMC Environmental assume no responsibility or liability for errors in any data obtained from regulatory agencies, information from sources outside of HMC Environmental, or developments resulting from situations outside the scope of this project.

22 SIGNATURE

This report has been prepared by Mark Tunks of HMC Environmental Consulting Pty Ltd



Mark Tunks
Principal

11 February 2026
Completion Date

23 APPENDICES

See following pages.

APPENDIX 1 - LOCATION MAPS





Figure 1 - Surrounding Area (Source: Nearmap 2024)



Figure 2 – Subject Site (Source: Nearmap 2024)

APPENDIX 2 - GROUNDWATER MONITORING SCHEDULE



Groundwater Monitoring Schedule

- NAME(S) OF PERSON(S) RESPONSIBLE FOR MONITORING TO BE FORWARDED TO TWEED SHIRE COUNCIL PRIOR TO COMMENCEMENT OF DEWATERING OPERATIONS
- SITE MANAGER CONTACT DETAILS TO BE FORWARDED TO TWEED SHIRE COUNCIL PRIOR TO COMMENCEMENT OF DEWATERING OPERATIONS
- GROUNDWATER TREATMENT SYSTEM TO BE INSTALLED TO COLLECT/TREAT GROUNDWATER PRIOR TO DISCHARGE TO THE STORMWATER SYSTEM (IF MEASURED GROUNDWATER QUALITY FAILS DISCHARGE CRITERIA)
- ALL MONITORING TO BE CARRIED OUT AT:
 - THE POINT OF DISCHARGE TO THE COUNCIL STORMWATER SYSTEM

Parameter	Objective	Frequency(during discharge)	Action Threshold (median)	Action ⁽²⁾
Elevation	Minimise off-site groundwater drawdown below seasonal elevation	Monitor groundwater elevation in monitoring bores Daily during initial installation and weekly after steady state conditions achieved.	Ongoing off-site drawdown below seasonal groundwater elevation. Maximum groundwater elevation >1.5m below base of excavation	<ul style="list-style-type: none"> ● Inform site manager ● Investigate cause ● If ongoing groundwater maximum elevation >1.5m below base of excavation reduce pumping rate/depth of wellpoints until groundwater elevation 1-1.5m below base of excavation. ● Record monitoring results and any actions
pH	pH 7.0 – 8.5	Continuous inline pH monitoring and dosing required ⁽³⁾	pH < 7.0 or > 8.5	<ul style="list-style-type: none"> ● Inform site manager ● Investigate cause ● Apply hydrated lime Calcium hydroxide or other approve amendment to holding tank or other facility at appropriate rate to maintain pH 6.5 – 8.5 ● If problem persists temporarily cease discharge until rectified ● Record monitoring results and any actions
Electrical conductivity		Daily		<ul style="list-style-type: none"> ● Inform site manager ● Investigate cause ● If problem persists temporarily cease discharge until rectified ● Record monitoring results and any actions
Suspended Solids	< 50 mg/L	Weekly ⁽¹⁾	> 50 mg/L	<ul style="list-style-type: none"> ● Inform site manager ● Investigate cause ● Apply flocculent to holding tank and/or modify sedimentation/ filtration process ● If problem persists temporarily cease discharge until rectified ● Record monitoring results and any actions
Turbidity	<50NTU ⁽⁴⁾	Daily	>80 NTU ⁽⁴⁾	<ul style="list-style-type: none"> ● Inform site manager ● Investigate cause ● Apply flocculent to holding tank and/or modify sedimentation/ filtration process ● If problem persists temporarily cease discharge until rectified ● Record monitoring results and any actions
Dissolved oxygen	>6 mg/L 80-110% sat'n	Daily ⁽¹⁾	<6mg/L <80% sat'n	<ul style="list-style-type: none"> ● Inform site manager ● Investigate cause ● Check equipment configuration to maximise turbulence ● Increase aeration via flowforms or mechanical aerators ● Check dissolved metal concentration as Fe & Al oxidation may reduce DO levels ● If problem persists temporarily cease discharge until rectified ● Record monitoring results and any actions

Oil and Grease	No residue/film visible	Daily	Visible residue/film	<ul style="list-style-type: none"> ● Inform site manager ● Investigate cause including spills/equipment leak ● Remove source ● Contain and clean up ● Record monitoring results and action
Dissolved metals				<ul style="list-style-type: none"> ● Inform site manager ● Provide additional treatment aeration, pH adjustment or flocculation/coagulation as required ● If problem persists temporarily cease discharge until rectified ● Record monitoring results and action
Iron	<1 mg/L	Monthly (1)	>1 mg/L (aesthetic only)	
Aluminium	<0.15mg/L	Monthly (1)	>0.15mg/L	

- (1) Frequency may be reduced after steady state conditions and 2 weeks monitoring confirm ongoing compliance with discharge criteria
- (2) A suitable electronic monitoring device to detect a failure in the dewatering system is to be provided. This device would include a facility to report any failure automatically back to a nominated person
- (3) Continuous online pH monitoring and dosing required to meet Water NSW requirements.
- (4) Turbidity criteria may be difficult to achieve where indurated (coffee rock) material present with associated dark colour. True/apparent colour monitoring may help confirm source.

The following general requirements would also apply:

1. The applicant shall arrange for a site inspection to be carried out with Council's Environmental Health Officer and all representatives involved in the dewatering activity including consultants and personnel responsible under the Dewatering Management Plan. Such site inspection shall be arranged and carried out prior to the commencement of any offsite dewatering activity occurring.
2. No offsite dewatering shall commence until Council's Environmental Health Officer is satisfied that the quality of water to be discharged will comply with any agreed water quality criteria.
3. Prior to the commencement of de-watering operations an examination of the quantity of pre-existing sediment within the stormwater drainage network that is intended to receive the de-watering discharge shall be undertaken by methods considered acceptable to Council's Stormwater Maintenance Engineer.
4. Prior to the commencement of de-watering operations the applicant or their nominated representative shall consult with Council's Stormwater Maintenance Engineer in respect to the most appropriate method of connection of the de-watering system to Council's stormwater drainage system. The applicant or their nominated representative shall comply with any and all directions as may be provided by Council's Stormwater Maintenance Engineer.
5. Hourly inspections of the stormwater discharge network that is receiving dewatering discharge are to occur for rain events during working hours. If the combined stormwater and dewatering flows are exceeding the capacity of the stormwater network, dewatering must temporarily cease until the peak flows from the catchment have subsided. Pumps are to be scaled down/decommissioned where possible during periods where the site is unattended and high rainfall events are forecast.
6. Upon completion of the dewatering operations, the applicant shall arrange for an inspection of any dewatering connection point to Council's stormwater system with Council's Stormwater Maintenance Engineer. The applicant shall comply with any directions issued by Council's Stormwater Maintenance Engineer in respect to the dewatering connection point.
7. No dewatering to occur until Water Supply Works Approval and, if required, Water Access Licence obtained from Water NSW

APPENDIX 3 - STORMWATER DISCHARGE & RECEIVING WATER

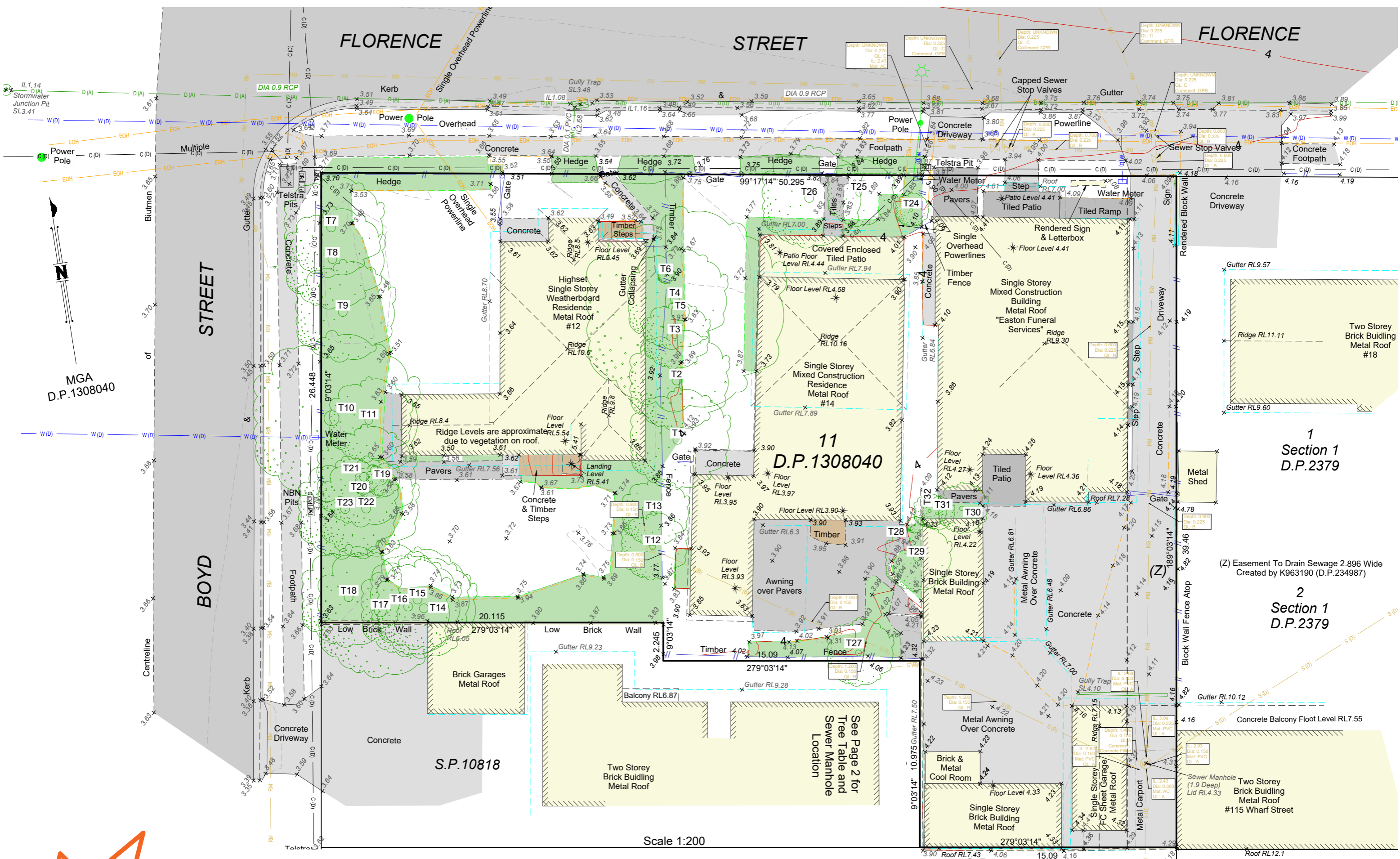




Figure 3 – Stormwater discharge Location (TSC)

APPENDIX 4 - PROPOSED DEVELOPMENT - SITE PLAN





MGA
D.P.1308040

11
D.P.1308040

1
Section 1
D.P.2379

2
Section 1
D.P.2379

S.P.10818

S.P.11042

Scale 1:200

CLIENT
DREAMBUILD
6/37A KING ROAD,
HORNSBY NSW 2077

LEGEND

AMENDMENTS
REV DESCRIPTION

DRAWN CHK DATE

NORTH



PROJECT NAME
2408A - 12-16F
12-16 FLORENCE STREET,
TWEED HEADS NSW 2485
BUNDJALUNG COUNTRY

STATUS
PRELIMINARY DESIGN

SCALE
1:1 @ A3

DRAWING NUMBER
DA-001-001

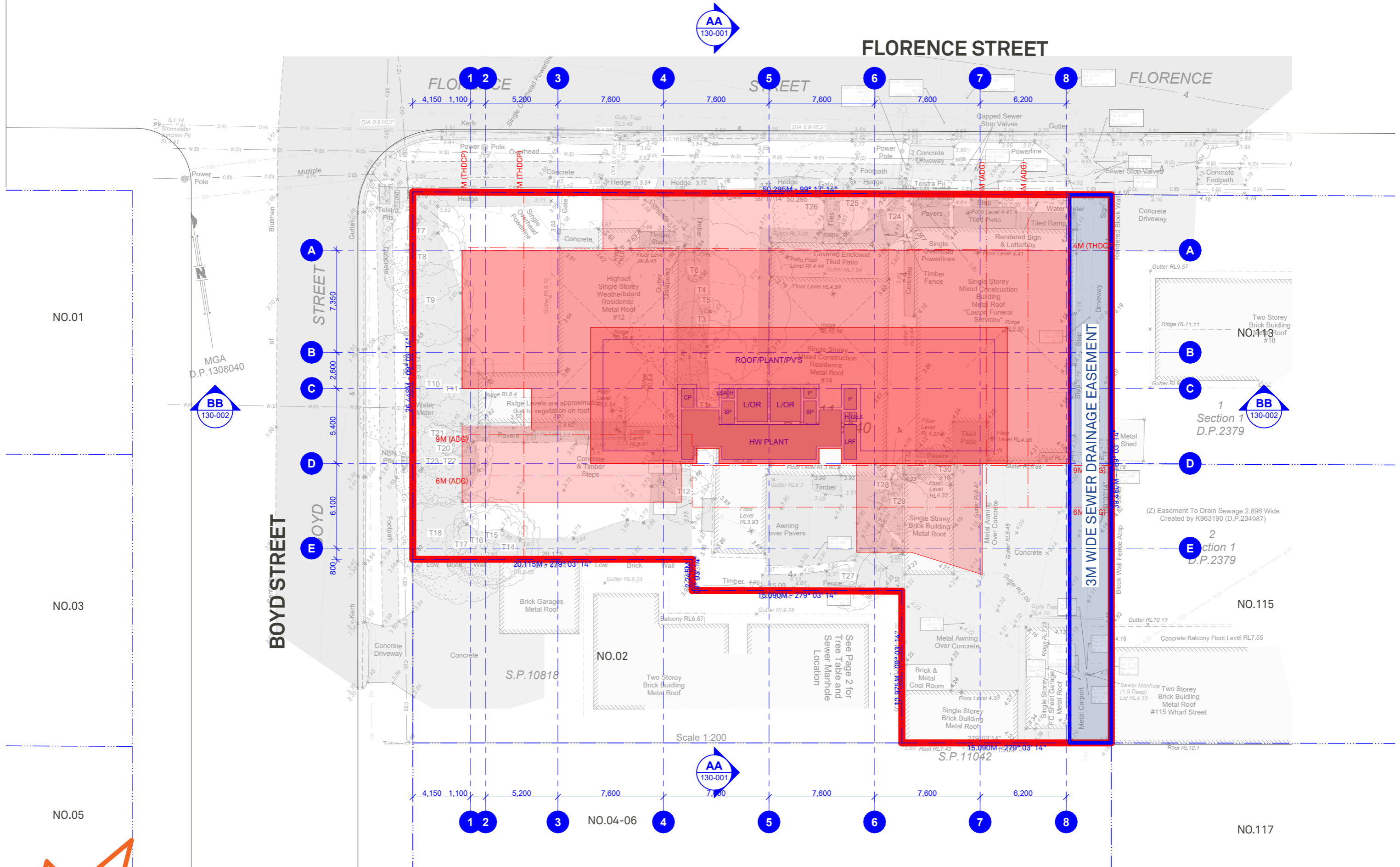
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G. MCCORMACK ARB NSW 7536, ARB 20415

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AA
130-001

FLORENCE STREET

MGA
D.P.1308040
BB
130-002

BB
130-002

AA
130-001

CLIENT
DREAMBUILD
6/37A KING ROAD,
HORNSBY NSW 2077

LEGEND

AMENDMENTS
REV DESCRIPTION DRAWN CHK DATE



PROJECT NAME
2408A - 12-16F
12-16 FLORENCE STREET,
TWEED HEADS NSW 2485
BUNDJALUNG COUNTRY

STATUS PRELIMINARY DESIGN SCALE 1:1.25, 1:250 @ A3

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SITE INFORMATION
Site Plan

NO.01

NO.03

NO.05

NO.02

NO.04-06

NO.13

NO.115

NO.117

S.P.10818

S.P.11042

Section 1
D.P.2379

Section 1
D.P.2379

Scale 1:200

BOYD STREET

3M WIDE SEWER DRAINAGE EASEMENT



BB
130-002

BB
130-002

AA
130-001

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6/37A KING ROAD,
HORNSBY NSW 2077

LEGEND

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REV DESCRIPTION DRAWN CHK DATE



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2408A - 12-16F
12-16 FLORENCE STREET,
TWEED HEADS NSW 2485
BUNDJALUNG COUNTRY

STATUS PRELIMINARY DESIGN SCALE 1:1.25, 1:250 @ A3

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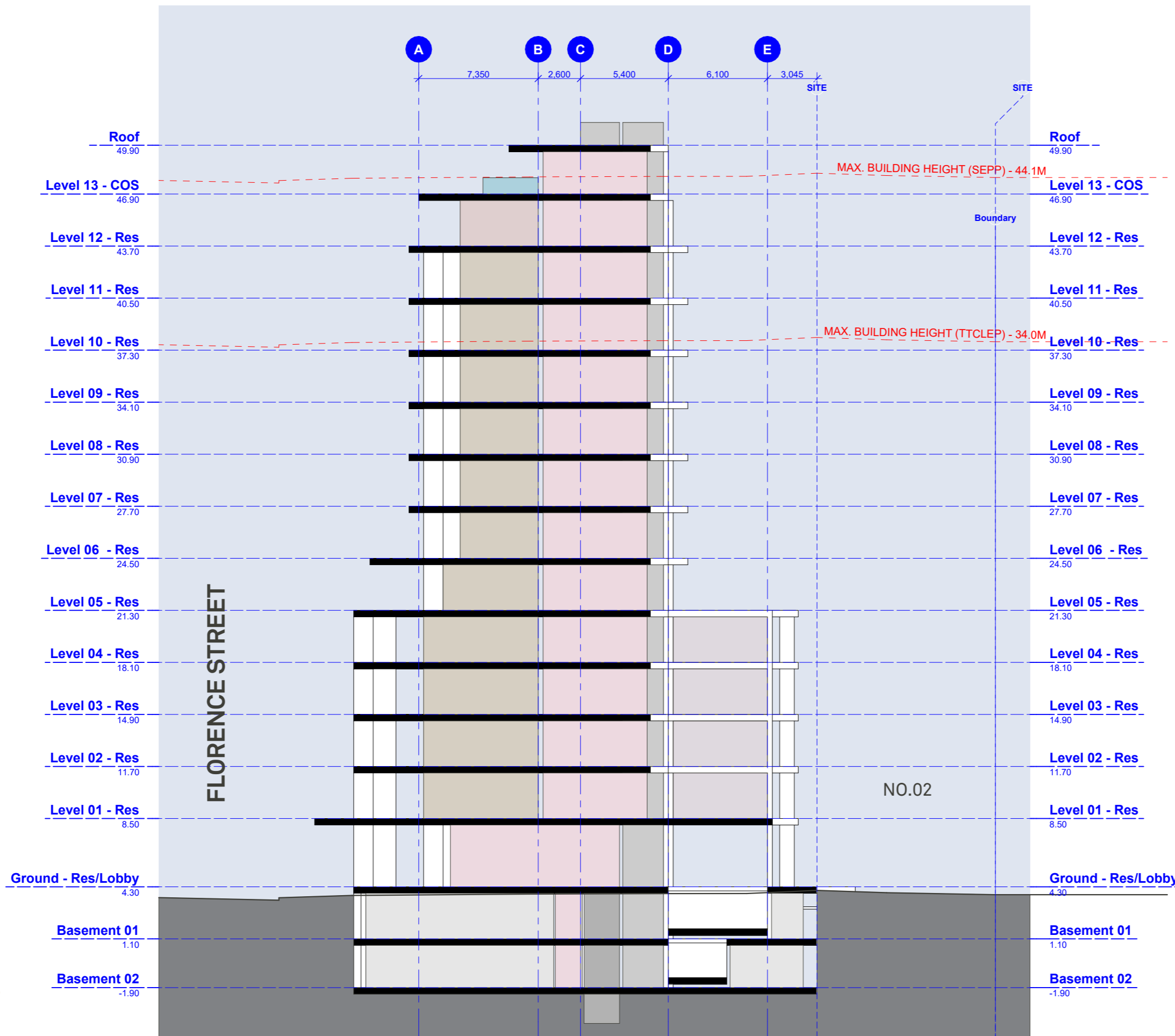
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SITE INFORMATION
Site Plan



FLORENCE STREET

NO.02

CLIENT
DREAMBUILD
 6/37A KING ROAD,
 HORNSBY NSW 2077

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PROJECT NAME
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 12-16 FLORENCE STREET,
 TWEED HEADS NSW 2485
 BUNDJALUNG COUNTRY

STATUS
 PRELIMINARY DESIGN

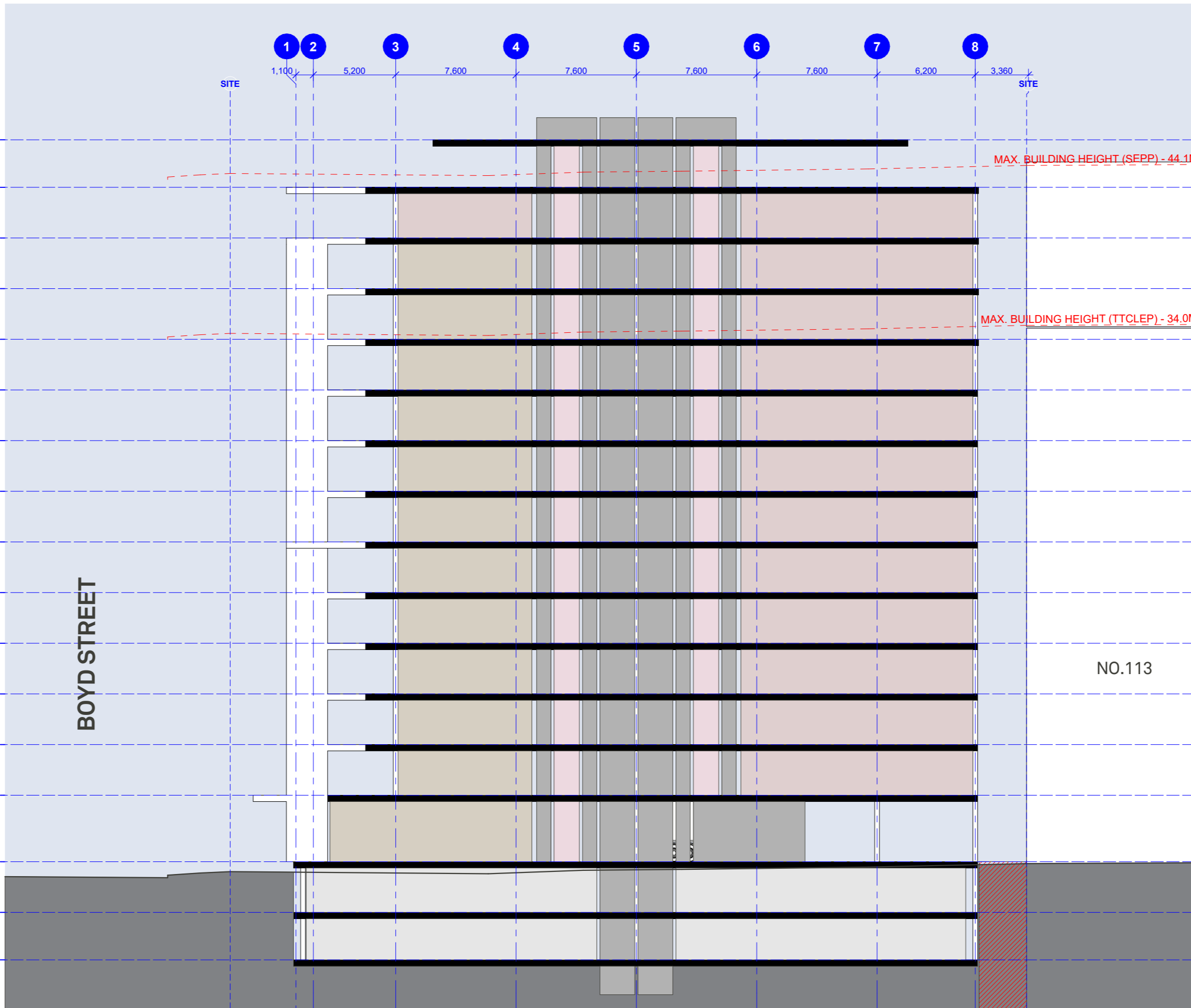
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SCALE
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REVISION

GENERAL ARRANGEMENT SECTIONS
Section AA





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DREAMBUILD
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 HORNSBY NSW 2077

LEGEND

AMENDMENTS
 REV DESCRIPTION DRAWN CHK DATE

PROJECT NAME
2408A - 12-16F
 12-16 FLORENCE STREET,
 TWEED HEADS NSW 2485
 BUNDJALUNG COUNTRY

STATUS
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DRAWING NUMBER
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SCALE
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REVISION

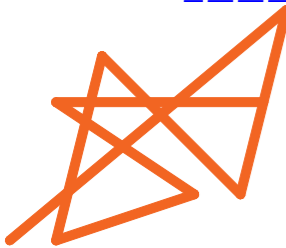
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GENERAL ARRANGEMENT SECTIONS
Section BB

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**APPENDIX 5 - SITE PLAN - SITE
INVESTIGATION SAMPLING
LOCATIONS**



**DEWATERING
MANAGEMENT
PLAN**

SAMPLING LOCATIONS

 HMC Sampling
Locations



Lot 1 DP781624, Lot 1 DP419177
& Lot 2 DP 300515
12-14 Florence Street
Tweed Heads NSW

HMC2024.1001
DATE: November 2024
VERSION: 05/11/2024
DRAWN: MF
BASE: Nearmap 2024



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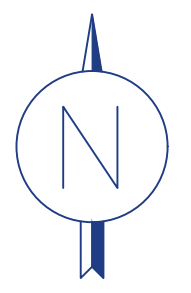


APPENDIX 6 - SITE PLAN - DEWATERING MANAGEMENT LAYOUT



DEWATERING MANAGEMENT PLAN

- Staged well points around perimeter of excavation at 20m increments during construction of retaining walls
- Deep well points (if required)

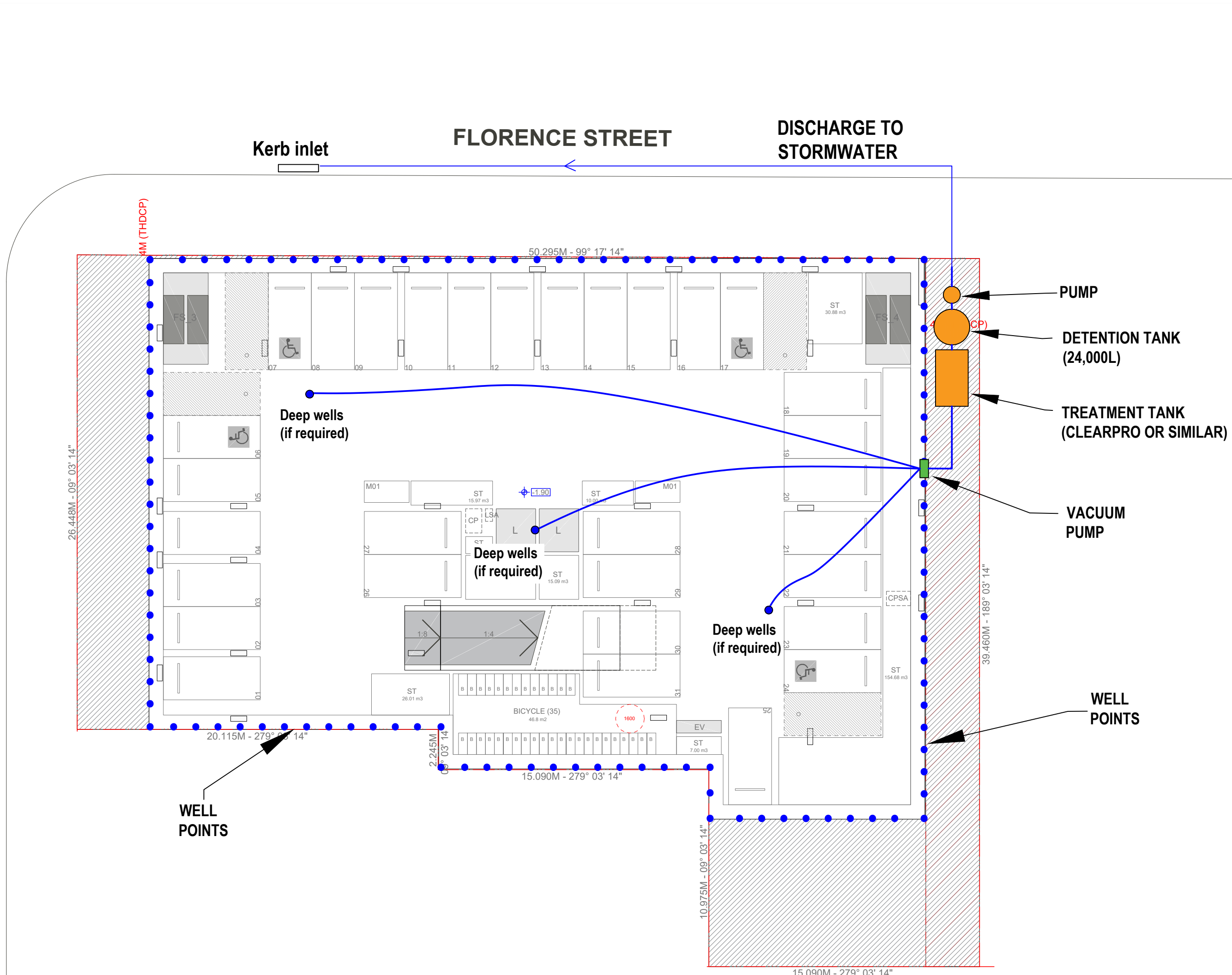


NOTE: CONFIGURATION IS GENERAL ONLY AND IS TO BE CONFIRMED ON SITE BY SITE MANAGER

Lot 1 DP781624, Lot 1 DP419177 & Lot 2 DP 300515
12-14 Florence Street
Tweed Heads NSW

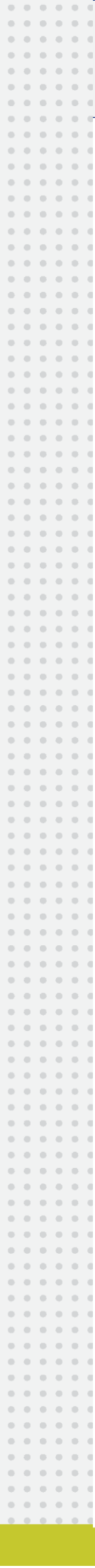
HMC2024.1001
DATE: November 2024
VERSION: 06/11/2024
DRAWN: MF
BASE: Benson McCormack
Architecture - Basement 2 GA

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APPENDIX 7 - PACIFIC GEOTECH

BORELOG



Project No.: PG-12432

Client: HMC Environmental Consulting Pty Ltd
 Project Name: Proposed Highrise Development
 Hole Location: 12-16 Florence Street, Tweed Heads
 Hole Position:

Commenced: 04/10/2024
 Logged By: JF
 Checked By:

Drill Model and Mounting: RH400
 Hole Diameter:

RL Surface: No survey
 Datum: AHD Operator: JF

Drilling Information						Soil Description			
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
AD/T		▽				0.20		SM	NATURAL Silty SAND (SM) Loose, medium grained, dark brown, dry.
								SP	SAND (SP) Dense, fine grained, pale grey white, dry.
WB			SPT 5.50-5.95 m 10,14,19 N=33			1.20		SP	SAND (SP) Dense, fine grained, grey brown, wet to moist.
						1.50		SM	Silty SAND (SM) Dense to very dense, fine grained, dark brown, wet.
						2			
WB			SPT 7.00-7.45 m 11,13,22 N=35			4			
						6			
						8			
			SPT 8.50-8.95 m 5,8,12 N=20			8.50			Hole Terminated at 8.50 m

<p>Method</p> <p>AS - Auger RR - Rock Roller WB - Washbore</p> <p>Support</p> <p>C - Casing</p>	<p>Water</p> <p> Level (Date) Inflow</p>	<p>Samples and Tests</p> <p>U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample</p> <p>Classification Symbols and Soil Descriptions</p> <p>Based on Unified Soil Classification System</p>	<p>Remarks</p> <p>1. Groundwater encountered at 1.50m.</p>
---	---	---	---

ER PACGEO 1.01.2.LIB.GLB Log PACGEO BOREHOLE PG-12432.GPJ <-DrawingFile>> 03/12/2024 10:47 10.03.00.09 Daiged Lab and In Situ Tool - DGD [Lib: pacgeo 1.01.2.2022-05-25 Proj: Precise 1.01.2016-11-23]

APPENDIX 8 - BORELOGS





PROJECT:
HMC2024.1001

BORING ID:
ASS

LOCATION:
12-16 Florence Street

WELL ID:
BH1

DRILLING CONTRACTOR:
Pacific Geotech

NORTHING:
68833183.73 S

EASTING:
553081.29E

GROUND SURFACE ELEV.: **4.2m AHD** TOC ELEVATION:

TOTAL DEPTH: **8.5m** DEPTH TO WATER: **8.5m**

LOGGED BY:
MT

DATE STARTED:
11.9.24

DATE COMPLETED:
11.9.24

Depth (feet)	USCS	Graphic Log	Description	Sampling Interval
0	SM		SAND Silty, loose, medium grained, dark brown, dry	
1			SAND Dense fine grained, pale grey, dry	
2	SP			
3	SP		SAND, Dense, fine grained, grey brown, moist to wet	
4			SAND Dense to very dense, dark brown fine grained, wet	
5	SM			
6				
7	SM		SAND Dense, light brown, wet	
7			SAND Dense, brown, wet	
8	SM		SAND Dense, light brown, wet	
9			Hole terminated at 8.5m	

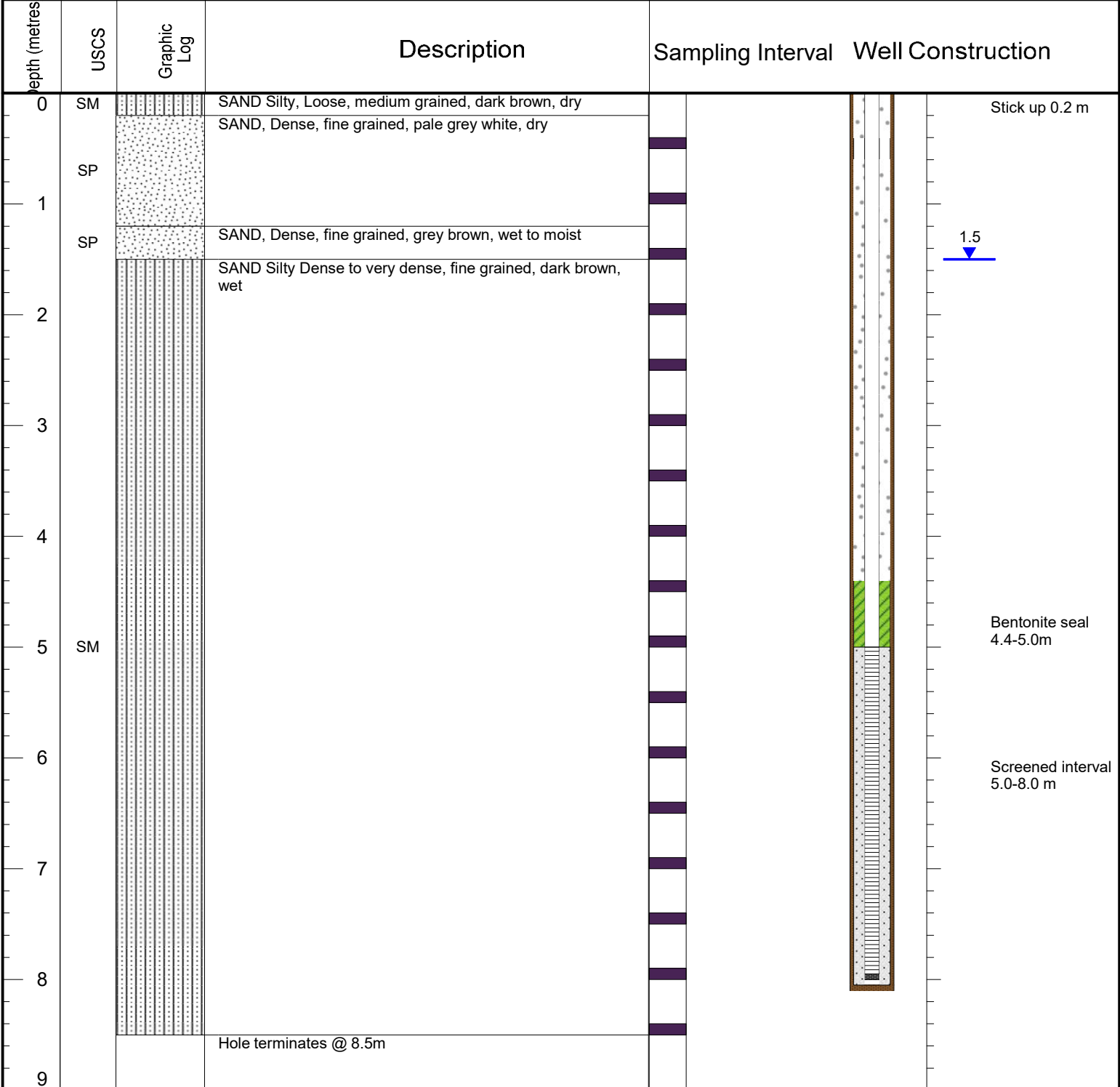
2.5

NOTES:


NOTES:



PROJECT: HMC2024.1001	BORING ID: ASS		
	LOCATION: 12-16 Florence Street		
	DRILLING CONTRACTOR: Pacific Geotech		
	NORTHING: 6883215.11 S	EASTING: 553081.29 E	
	GROUND SURFACE ELEV.: 3.6m AHD	TOC ELEVATION: 	
LOGGED BY: JF		TOTAL DEPTH: 9	DEPTH TO WATER: 1.5 m
		DATE STARTED: 4.10.24	DATE COMPLETED: 4.10.24



NOTES:



PROJECT:
HMC2024.1001

BORING ID:
ASS

LOCATION:
12-16 Florence Street

WELL ID:
BH4

DRILLING CONTRACTOR:
Pacific Geotech

NORTHING:
6883213.77

EASTING:
553063.35 E

GROUND SURFACE ELEV.: **3.6m AHD** TOC ELEVATION:

TOTAL DEPTH: **4** DEPTH TO WATER: **2.5m**

LOGGED BY:
MT

DATE STARTED:
11.09.24

DATE COMPLETED:
11.09.24

depth (metres)	USCS	Graphic Log	Description	Sampling Interval
0	SM		SAND Silty, Loose, medium grained, dark brown, moist	
1	SP		SAND, Dense, fine grained, pale grey white, moist	
2	SP		SAND, Dense, fine grained, grey, moist to wet	
3	SM		SAND Dense to very dense, dark brown fine grained, wet	
4			Hole terminated at 4m very dense indurated sand	

2.5
▼

NOTES:



PROJECT:
HMC2024.1001

BORING ID:
ASS

LOCATION:
12-16 Florence Street

WELL ID:
BH5

DRILLING CONTRACTOR:
Pacific Geotech

NORTHING:
6883213.77

EASTING:
553063.35 E

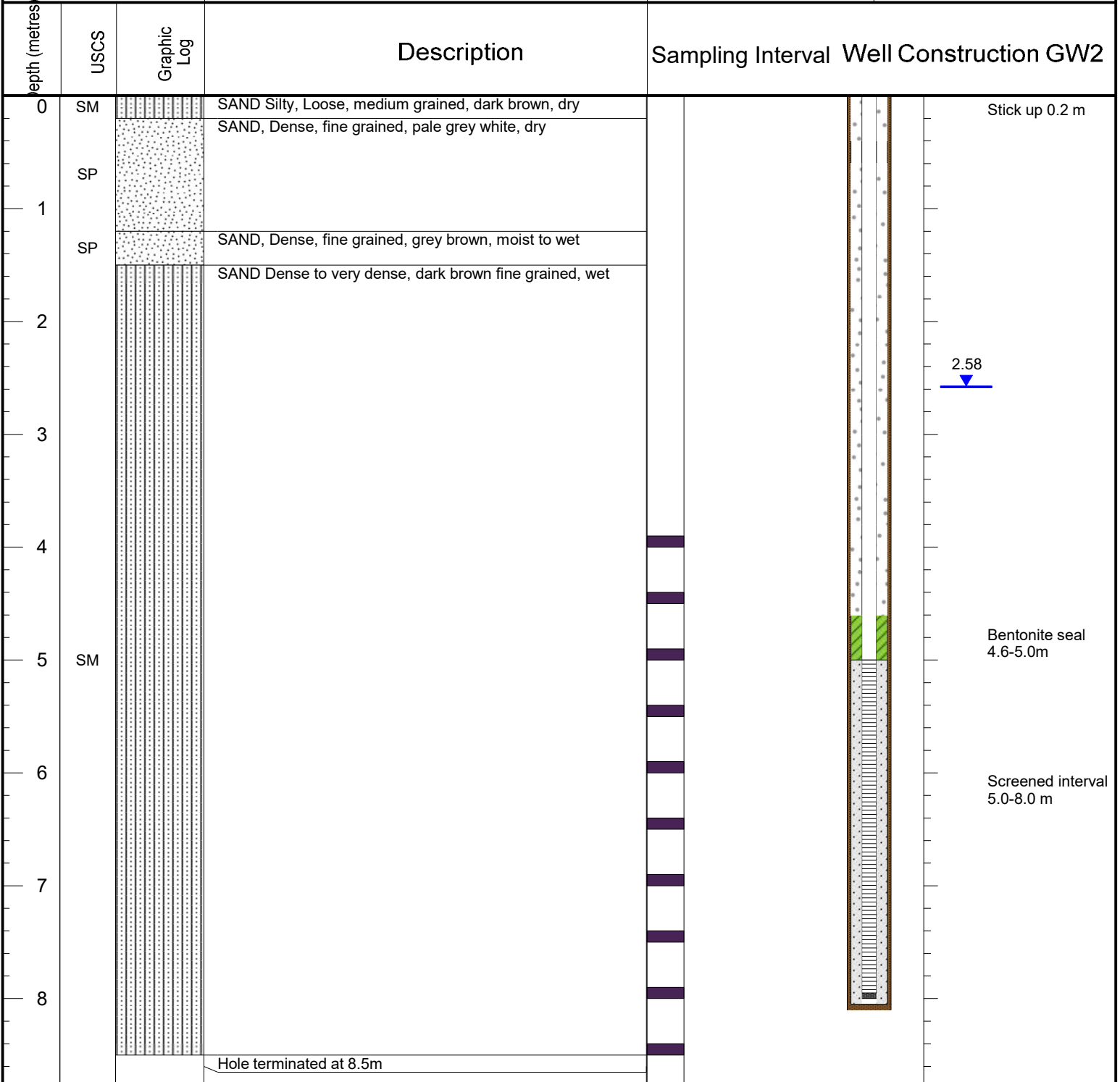
GROUND SURFACE ELEV.: **3.6m AHD** TOC ELEVATION:

TOTAL DEPTH: **8.5** DEPTH TO WATER: **2.58**

LOGGED BY:
MT

DATE STARTED:
11.10.24

DATE COMPLETED:
11.10.24



NOTES:

APPENDIX 9 - PHOTOGRAPHIC LOG



Photo No.	Date
1	11/9/24
Description: BH1	



Photo No.	Date
2	11/9/24
Description: BH2	



Photo No.	Date
3	4/10/24
Description: BH5	



APPENDIX 10 - COMMERCIAL TREATMENT SYSTEM EXAMPLE





Containerised Water Treatment Plants

- ⊕ Potable and non-potable water treatment plants made to order
- ⊕ Treatment capacities of 4 – 6 L/sec
- ⊕ Autonomously provides pH adjustment and turbidity control
- ⊕ Able to be operated remotely with data logging and alarm functions.
- ⊕ Can be configured to automatically shut-down when discharge water quality does not comply with the relevant criteria
- ⊕ Removes common dissolved metals and suspended solids
- ⊕ Optional filtration attachments for improved water quality

APPENDIX 11 - WA DER ZONE OF INFLUENCE CALCULATOR



<https://www.der.wa.gov.au/your-environment/acid-sulfate-soils/66-cone-of-depression>

Calculator

Input

Length of excavation:	<input type="text" value="60"/>	metres
Width of excavation:	<input type="text" value="20"/>	metres
Drawdown required:	<input type="text" value="1.8"/>	metres
Aquifer thickness ⁽¹⁾ :	<input type="text" value="5"/>	metres
Hydraulic conductivity:	<input type="text" value="0.0000949"/>	metres/second

Calculate

Results

Effective pumping radius, R_e :	20 metres
Cone of depression radius, R_0 :	53 metres
Total pumping rate:	4 litres/second
Pumping time required:	112 hours

Calculator

Input

Length of excavation:	<input type="text" value="60"/>	metres
Width of excavation:	<input type="text" value="20"/>	metres
Drawdown required:	<input type="text" value="3.5"/>	metres
Aquifer thickness ⁽¹⁾ :	<input type="text" value="5"/>	metres
Hydraulic conductivity:	<input type="text" value="0.00000463"/>	metres/second

Calculate

Results

Effective pumping radius, R_e :	20 metres
Cone of depression radius, R_D :	23 metres
Total pumping rate:	2 litres/second
Pumping time required:	907 hours

Tools for calculating the radius of influence and pumping rates and times for dewatered excavations

In the absence of site-specific hydraulic data, default hydraulic conductivity values (K) listed below for a variety of Western Australian soil types may be used ⁽²⁾.

Lithology	Hydraulic conductivity (metres/day)	Hydraulic conductivity (metres/second)
Sand		
Very coarse to gravel	246	0.002847
Very coarse	204	0.002361
Coarse	73	0.000845
Medium to coarse (moderately sorted)	50	0.000579
Fine to gravel (poorly sorted)	10	0.000116
Medium	16.5	0.000191
Fine to medium	8.2	0.0000949
Fine	4.1	0.0000475
Fine to very fine	1.7	0.0000197
Very fine	0.8	0.00000926
Silty	4	0.0000463
Clayey	1	0.0000116
Clay	0.4	0.00000463
Sand and limestone: Ascot Formation	8	0.0000926
Limestone and calcarenite: Tamala Limestone	100–1000	0.001157 to 0.011574
Peat⁽³⁾		
Sapric peat (highly decomposed, few visible fibres)	0.00864 (approx.)	0.0000001 (approx.)
Fibric peat (least decomposed, lots of visible fibres)	1.728 (approx.)	0.00002 (approx.)

Notes

1. In the absence of site-specific information, the saturated thickness of superficial aquifers may be obtained from [Perth Groundwater Map](#) for sites in the Perth metropolitan region.
2. Adapted from Davidson, W.A., 1995, *Bulletin 142: Hydrogeology and Groundwater Resources Of The Perth Region*, Western Australia, Geological Survey Of Western Australia.
3. Hemond, H.F. and Goldman, J.C., 1985, On non-Darcian water flow in peat. *Journal of Ecology*, 73, 578-584.

APPENDIX 12 - GROUNDWATER QUALITY MONITORING FILED SHEETS





Project Name <u>12-16 Florence St Toward Hunt</u>	Purge Date <u>11.9.2024</u>
Project Number <u>2024.1001</u>	Date Sampled <u>17.10.2024</u>
Client <u>Dreamland P/L</u>	Depth of well (mBTOC)
Well Casing Diameter <u>50mm</u>	Depth to product (mBTOC) <u>—</u>
Casing height above groundwater level (m) <u>-0.08</u>	Depth to Groundwater (mBTOC) <u>1.29</u>
Odour when opening well <u>NIL</u>	Depth to be purged (m)
PID when opening Well <u>NIL</u>	Field Consultant <u>MT</u>
Monument <input type="checkbox"/>	Gatic Covered <input checked="" type="checkbox"/>
	Stand Pipe <input type="checkbox"/>

Groundwater Purging Information

Purge until field parameters stabilise OR 3-5 casing volumes OR until "dry", whichever comes first

1 casing volume = 0.5L/m for wells of 25mm ø 1 casing volume + 2L/m for wells of 50mm ø 1 casing volume = 8L/m for wells of 100mm ø	Method/pump type: Bailer <input type="checkbox"/> Submersible Pump <input checked="" type="checkbox"/> Other <input type="checkbox"/>			
Recovery	Time (24 hr)	SWL (mBTOC)	Purge Start Time (2400 hr)	
			Purge Stop Time (2400 hr)	
			Estimated Purge Volume	litres (3-5) well volumes
			Actual Purge Volume:	litres
			Did well Purge Dry? No <input type="checkbox"/> Yes <input type="checkbox"/> if so when?	Litres

Field Results

	Time (24hr)	pH	EC (µS/cm)	Redox (mV)	DO (mg/L/%)	Turbidity (NTU)	Temp (°C)
After 1 purge	<u>16.11</u>	<u>5.30</u>	<u>278</u>	<u>77.8</u>	<u>3.83 (33)</u>	<u>901</u>	<u>22.7</u>
After 2 purge	<u>16.15</u>	<u>5.37</u>	<u>162</u>	<u>91.2</u>	<u>3.23 (37)</u>	<u>869</u>	<u>22.6</u>
After 3 purge	<u>16.20</u>	<u>5.33</u>	<u>164</u>	<u>96.5</u>	<u>3.07 (36)</u>	<u>603</u>	<u>22.6</u>
After 4 purge	<u>16.26</u>	<u>5.36</u>	<u>171</u>	<u>98.8</u>	<u>3.11 (36)</u>	<u>398</u>	<u>22.6</u>
After 5 purge							
Acceptable variation	n/a	+/- 0.1	+/- 10%	+/- 10%	+/- 10%	+/- 10%	+/- 0.5

Are field results acceptable to allow sampling? Yes No if no why?

Sampling Details

Laboratory Analysis Details

Method: Bailer <input type="checkbox"/> Submersible Pump: <input checked="" type="checkbox"/> Other: <u>PERISTALTIC LOW FLOW</u>	Sample ID:	Dup ID:	Trip ID:
Equipment: Dedicated/Disposable: <input type="checkbox"/> Decontaminated <input checked="" type="checkbox"/>	TPH's <input type="checkbox"/>	PAH	Metals <input checked="" type="checkbox"/>
Hydrocarbon Sheen? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	BTEX <input type="checkbox"/>	VOCs	SVOCs
Water Colour: <u>DARK BROWN</u> Odour:	Other <u>General chemistry</u>		
Turbidity: Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input checked="" type="checkbox"/>	<u>Nutrients</u>		

General Environmental Conditions

Temp: Cold (<5°C) <input type="checkbox"/> Cool (<15°C) <input type="checkbox"/> Warm (<35°C) <input checked="" type="checkbox"/> Hot (<45°C) <input type="checkbox"/>	Air: Dry <input type="checkbox"/> Medium <input type="checkbox"/> Humid <input checked="" type="checkbox"/> Rain <input type="checkbox"/>
Wind: Still <input type="checkbox"/> Slight Breeze <input checked="" type="checkbox"/> Windy <input type="checkbox"/> Strong Wind <input type="checkbox"/>	Sky: Clear <input type="checkbox"/> Scattered <input type="checkbox"/> Cloudy <input type="checkbox"/> Barometric Press:

Other comments:

Sampler Name: <u>M TUNICKS</u>	Purger Name: <u>M TUNICKS</u>
--------------------------------	-------------------------------



Project Name <u>12-16 Advance St Tweed Heads</u>		Purge Date	
Project Number <u>2024.1001</u>		Date Sampled	
Client <u>Deerland P/L</u>		Depth of well (mBTOC) <u>8m</u>	
Well Casing Diameter <u>50mm</u>		Depth to product (mBTOC) <u>-</u>	
Casing height above groundwater level (m) <u>0.2</u>		Depth to Groundwater (mBTOC) <u>1.45</u>	
Odour when opening well <u>NIL</u>		Depth to be purged (m)	
PID when opening Well <u>NIL</u>		Field Consultant <u>MT</u>	
Monument <input type="checkbox"/>		Gatic Covered <input type="checkbox"/>	
Stand Pipe <input checked="" type="checkbox"/>			
Groundwater Purging Information			
Purge until field parameters stabilise OR 3-5 casing volumes OR until "dry", whichever comes first			
1 casing volume = 0.5L/m for wells of 25mm ø 1 casing volume + 2L/m for wells of 50mm ø 1 casing volume = 8L/m for wells of 100mm ø		Method/pump type: Bailer <input type="checkbox"/> Submersible Pump <input type="checkbox"/> Other <input type="checkbox"/>	
Recovery	Time (24 hr)	SWL (mBTOC)	Purge Start Time (2400 hr)
			Purge Stop Time (2400 hr)
			Estimated Purge Volume
			Actual Purge Volume:
			Did well Purge Dry? No <input type="checkbox"/> Yes <input type="checkbox"/> if so when?
			litres (3-5) well volumes
			litres
			Litres
Field Results			
	Time (24hr)	pH	EC (µS/cm)
			Redox (mV)
			DO (mg/L%)
			Turbidity (NTU)
			Temp (°C)
After 1 purge	<u>15.37</u>	<u>4.76</u>	<u>361</u>
After 2 purge	<u>15.38</u>	<u>4.76</u>	<u>282</u>
After 3 purge	<u>15.42</u>	<u>4.75</u>	<u>265</u>
After 4 purge	<u>15.50</u>	<u>4.65</u>	<u>237</u>
After 5 purge			
Acceptable variation	n/a	+/- 0.1	+/- 10%
			+/- 10%
			+/- 10%
			+/- 10%
			+/- 0.5
Are field results acceptable to allow sampling? Yes <input type="checkbox"/> No <input type="checkbox"/> if no why?			
Sampling Details		Laboratory Analysis Details	
Method: Bailer <input type="checkbox"/> Submersible Pump: <input checked="" type="checkbox"/> Other: <u>PERISTALTIC LOW FLOW</u>		Sample ID:	Dup ID:
Equipment: Dedicated/Disposable: <input type="checkbox"/> Decontaminated <input checked="" type="checkbox"/>		TPH's <input type="checkbox"/>	PAH <input type="checkbox"/>
Hydrocarbon Sheen? Yes <input type="checkbox"/> No <input type="checkbox"/>		BTEX <input type="checkbox"/>	VOCs <input type="checkbox"/>
Water Colour: <u>DARK BROWN</u> Odour: <u>'</u>		Other <u>General Chemistry</u>	
Turbidity: Low <input type="checkbox"/> Medium <input checked="" type="checkbox"/> High <input type="checkbox"/>		<u>Nutrients</u>	
General Environmental Conditions			
Temp: Cold (<5°C) <input type="checkbox"/> Cool (<15°C) <input checked="" type="checkbox"/> Warm (<35°C) <input type="checkbox"/> Hot (<45°C) <input type="checkbox"/>		Air: Dry <input type="checkbox"/> Medium <input type="checkbox"/> Humid <input checked="" type="checkbox"/> Rain <input type="checkbox"/>	
Wind: Still <input type="checkbox"/> Slight Breeze <input checked="" type="checkbox"/> Windy <input type="checkbox"/> Strong Wind <input type="checkbox"/>		Sky: Clear <input type="checkbox"/> Scattered <input type="checkbox"/> Cloudy <input type="checkbox"/> Barometric Press:	
Other comments:			
Sampler Name:		Purger Name:	



Project Name <u>12-16 Florence St Tread Head</u>		Purge Date					
Project Number <u>2024.1001</u>		Date Sampled <u>17.10.2024</u>					
Client <u>Deamland P/L</u>		Depth of well (mBTOC) <u>8m</u>					
Well Casing Diameter <u>50mm</u>		Depth to product (mBTOC) <u>-</u>					
Casing height above groundwater level (m) <u>0.2</u>		Depth to Groundwater (mBTOC) <u>2.78</u>					
Odour when opening well <u>NIL</u>		Depth to be purged (m)					
PID when opening Well <u>NIL</u>		Field Consultant <u>MT</u>					
Monument <input type="checkbox"/>		Gatic Covered <input type="checkbox"/>					
Stand Pipe <input type="checkbox"/>							
Groundwater Purging Information							
Purge until field parameters stabilise OR 3-5 casing volumes OR until "dry", whichever comes first							
1 casing volume = 0.5L/m for wells of 25mm ø 1 casing volume + 2L/m for wells of 50mm ø 1 casing volume = 8L/m for wells of 100mm ø		Method/pump type: Bailer <input type="checkbox"/> Submersible Pump <input type="checkbox"/> Other <input type="checkbox"/>					
Recovery	Time (24 hr)	SWL (mBTOC)	Purge Start Time (2400 hr)				
			Purge Stop Time (2400 hr)				
			Estimated Purge Volume				
			Actual Purge Volume:				
			Did well Purge Dry? No <input type="checkbox"/> Yes <input type="checkbox"/> if so when?				
			litres (3-5) well volumes				
			litres				
			Litres				
Field Results							
	Time (24hr)	pH	EC (µS/cm)	Redox (mV)	DO (mg/L%)	Turbidity (NTU)	Temp (°C)
After 1 purge	<u>15.15</u>	<u>4.35</u>	<u>270</u>	<u>186</u>	<u>15.7 (1.38)</u>	<u>153</u>	<u>22.5</u>
After 2 purge	<u>15.17</u>	<u>4.41</u>	<u>255</u>	<u>101</u>	<u>14.2 (1.25)</u>	<u>66</u>	<u>22.5</u>
After 3 purge	<u>15.21</u>	<u>4.45</u>	<u>251</u>	<u>90</u>	<u>10.6 (0.91)</u>	<u>54</u>	<u>22.4</u>
After 4 purge							
After 5 purge							
Acceptable variation	n/a	+/- 0.1	+/- 10%	+/- 10%	+/- 10%	+/- 10%	+/- 0.5
Are field results acceptable to allow sampling? Yes <input type="checkbox"/> No <input type="checkbox"/> if no why?							
Sampling Details				Laboratory Analysis Details			
Method: Bailer <input type="checkbox"/> Submersible Pump: <input checked="" type="checkbox"/> Other: <u>PERISTALTIC LOW FLOW</u>				Sample ID:	Dup ID:	Trip ID:	
Equipment: Dedicated/Disposable: <input type="checkbox"/> Decontaminated <input type="checkbox"/>				TPH's <input type="checkbox"/>	PAH	Metals <input checked="" type="checkbox"/>	
Hydrocarbon Sheen? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>				BTEX <input type="checkbox"/>	VOCs	SVOCs	
Water Colour: <u>Slightly Turbid</u> Odour: <u>NIL</u>				Other <u>General Chemistry</u>			
Turbidity: Low <input checked="" type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/>				<u>Nutrients</u>			
General Environmental Conditions							
Temp: Cold (<5°C) <input type="checkbox"/> Cool (<15°C) <input type="checkbox"/> Warm (<35°C) <input checked="" type="checkbox"/> Hot (<45°C) <input type="checkbox"/>				Air: Dry <input type="checkbox"/> Medium <input type="checkbox"/> Humid <input checked="" type="checkbox"/> Rain <input type="checkbox"/>			
Wind: Still <input type="checkbox"/> Slight Breeze <input checked="" type="checkbox"/> Windy <input type="checkbox"/> Strong Wind <input type="checkbox"/>				Sky: Clear <input type="checkbox"/> Scattered <input type="checkbox"/> Cloudy <input type="checkbox"/> Barometric Press:			
Other comments:							
Sampler Name: <u>M TUNKS</u>				Purger Name: <u>M TUNKS</u>			

APPENDIX 13 - CHAIN OF CUSTODY AND LABORATORY RESULTS





CHAIN OF CUSTODY

ALS Laboratory, please tick →

LABORATORY: 111 Sturtan Road, Tweed Heads NSW 2455
Ph: 08 8102 9430 E: als@als.com.au

LABORATORY: 2 Bygon Street, Shellharbour NSW 2515
Ph: 07 5242 7222 E: als@als.com.au

LABORATORY: 48 Catherine Street, Gladstone QLD 4685
Ph: 07 4978 7544 E: als@als.com.au

LABORATORY: 2120 Caldera Drive, Pigeon Creek QLD 4740
Ph: 07 4612 5751 E: als@als.com.au

LABORATORY: 2-4 Woodall Road, Springvale VIC 3171
Ph: 03 8919 5600 E: als@als.com.au

LABORATORY: 129 Sydney Road, Mulgrave NSW 2850
Ph: 02 6372 6736 E: als@als.com.au

LABORATORY: 5655 Marston Road, Murrumbidgee NSW 2584
Ph: 02 4314 2500 E: als@als.com.au

LABORATORY: 4/13 Geary Place, North Sydney NSW 2060
Ph: 02 4423 2055 E: als@als.com.au

LABORATORY: 10 Wood Way, Naretha WA 2090
Ph: 08 9209 7555 E: als@als.com.au

LABORATORY: 111 Sturtan Road, Tweed Heads NSW 2455
Ph: 08 8102 9430

LABORATORY: 2 Bygon Street, Shellharbour NSW 2515
Ph: 07 5242 7222

LABORATORY: 48 Catherine Street, Gladstone QLD 4685
Ph: 07 4978 7544

LABORATORY: 2120 Caldera Drive, Pigeon Creek QLD 4740
Ph: 07 4612 5751

LABORATORY: 2-4 Woodall Road, Springvale VIC 3171
Ph: 03 8919 5600

LABORATORY: 5655 Marston Road, Murrumbidgee NSW 2584
Ph: 02 4314 2500

LABORATORY: 4/13 Geary Place, North Sydney NSW 2060
Ph: 02 4423 2055

LABORATORY: 10 Wood Way, Naretha WA 2090
Ph: 08 9209 7555

Environmental Division
Brisbane

Work Order Reference

EB2435960

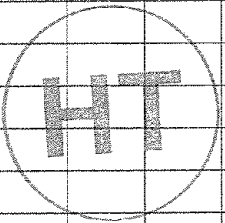


Telephone: + 61-7-3552-8686

CLIENT: HMC Environmental Consulting Pty Ltd		TURNAROUND REQUIREMENTS: <input checked="" type="checkbox"/> Standard TAT (List due date):		FOR LABO	
OFFICE: Tweed Heads		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)		Custody Seal	
PROJECT: Florence Street Tweed Heads		PROJECT NO.:		Free ice / fro. receipt?	
ORDER NUMBER: HMC2024.1001		PURCHASE ORDER NO.:		Random San	
PROJECT MANAGER: Mark Tunks		CONTACT PH: 0755368863		Other comm	
SAMPLER: Mark Tunks		SAMPLER MOBILE: 0481279212		RECEIVED BY: <i>ET</i>	
COC Emailed to ALS? (YES / NO)		EDD FORMAT (or default):		RELINQUISHED	
Email Reports to (will default to PM if no other addresses are listed): admin@hmcenvironment.com.au		RELINQUISHED BY: <i>Mark Tunks</i>		DATE/TIME: <i>18.10.24</i>	
Email Invoice to (will default to PM if no other addresses are listed): admin@hmcenvironment.com.au		DATE/TIME: <i>18/10/2024 @ 11am</i>		DATE/TIME: <i>1400</i>	

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information	
	LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	NI-2	EG2020F (Soluble Iron & Aluminium)	NI-2	NI-3	ED033 - TOTAL ACIDITY	EA028H - TSS		EG005T - LEAD
1	FSGW1	17/10/2024 0:00	W	N,SP,P	3	X	X	X	X	X	X	X		
2	FSGW2	17/10/2024 0:00	W	N,SP,P	3	X	X	X	X	X	X	X		
3	FSGW3	17/10/2024 0:00	W	N,SP,P	3	X	X	X	X	X	X	X		
4	FSGWDUP	17/10/2024 0:00	W	N	1	X								
5	FSGWTRIP	17/10/2024 0:00	W	N	1	X							INTERLAB SYDNEY	
6	FSL1	17/10/2024 0:00	S	ST	1							X		
7	FSL2	17/10/2024 0:00	S	ST	1							X		
8	FSL3	17/10/2024 0:00	S	ST	1							X		
9	FSL4	17/10/2024 0:00	S	ST	1							X		
10	FSL5	17/10/2024 0:00	S	ST	1							X		
11	FSL6	17/10/2024 0:00	S	ST	1							X		
12	FSL7	17/10/2024 0:00	S	ST	1							X		
13	FSL8	17/10/2024 0:00	S	ST	1							X		
14	FSL9	17/10/2024 0:00	S	ST	1							X		
15	FSL10	17/10/2024 0:00	S	ST	1							X		
16	FSLDUP	17/10/2024 0:00	S	ST	1							X		
17	FSLTRIP	17/10/2024 0:00	S	ST	1							X	INTERLAB SYDNEY	
18	FSLRS1	17/10/2024 0:00	W	N	1							X		
TOTAL					24	5	3	3	3	3	3	3	13	



Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airtight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisphosphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airtight Unpreserved Vial; SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugio's Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles



CERTIFICATE OF ANALYSIS

Work Order	: EB2435960	Page	: 1 of 7
Client	: HMC ENVIRONMENTAL	Laboratory	: Environmental Division Brisbane
Contact	: MARK TUNKS	Contact	: Customer Services EB
Address	: SUITE 29, LEVEL 2 75-77 WHARF STREET TWEED HEADS 2485	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: 07 5536 8863	Telephone	: +61-7-3552-8685
Project	: FLORENCE STREET TWEED HEADS	Date Samples Received	: 18-Oct-2024 14:00
Order number	: HMC2024.1001	Date Analysis Commenced	: 19-Oct-2024
C-O-C number	: ----	Issue Date	: 24-Oct-2024 10:27
Sampler	: MARK TUNKS		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 16		
No. of samples analysed	: 16		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Beatriz Llarinas	Senior Chemist - Inorganics	Brisbane Inorganics, Stafford, QLD
Vincent Muller	Chemist - Inorganics	Brisbane Inorganics, Stafford, QLD
Vincent Muller	Chemist - Inorganics	Brisbane Soil Preparation, Stafford, QLD



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	FSL1	FSL2	FSL3	FSL4	FSL5
Sampling date / time				17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	
Compound	CAS Number	LOR	Unit	EB2435960-005	EB2435960-006	EB2435960-007	EB2435960-008	EB2435960-009	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%	19.9	28.4	14.9	10.0	10.6	
EG005(ED093)T: Total Metals by ICP-AES									
Lead	7439-92-1	5	mg/kg	183	208	174	205	166	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	FSL6	FSL7	FSL8	FSL9	FSL10
				Sampling date / time	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00
Compound	CAS Number	LOR	Unit		EB2435960-010	EB2435960-011	EB2435960-012	EB2435960-013	EB2435960-014
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		21.1	1.0	10.1	8.2	8.7
EG005(ED093)T: Total Metals by ICP-AES									
Lead	7439-92-1	5	mg/kg		175	329	620	325	359



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	FSLDUP	----	----	----	----
Sampling date / time				17-Oct-2024 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	EB2435960-015	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%	9.4	----	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Lead	7439-92-1	5	mg/kg	173	----	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FSGW1	FSGW2	FSGW3	FSGWDUP	FSLRS1
Sampling date / time				17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	
Compound	CAS Number	LOR	Unit	EB2435960-001	EB2435960-002	EB2435960-003	EB2435960-004	EB2435960-016	
				Result	Result	Result	Result	Result	
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L	423	224	317	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	39	25	9	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	39	25	9	----	----	
ED038: Acidity									
Acidity as CaCO3	----	1	mg/L	6	15	17	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	8	16	16	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	19	34	43	----	----	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.03	0.60	0.46	----	----	
Arsenic	7440-38-2	0.001	mg/L	0.003	<0.001	<0.001	<0.001	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	
Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	<0.001	<0.001	----	
Copper	7440-50-8	0.001	mg/L	0.001	<0.001	<0.001	<0.001	----	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.002	0.002	----	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----	
Zinc	7440-66-6	0.005	mg/L	0.024	0.085	0.070	0.072	----	
Iron	7439-89-6	0.05	mg/L	<0.05	0.59	1.15	----	----	
EG020T: Total Metals by ICP-MS									
Lead	7439-92-1	0.001	mg/L	----	----	----	----	0.019	
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----	
EK055G: Ammonia as N by Discrete Analyser									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FSGW1	FSGW2	FSGW3	FSGWDUP	FSLRS1
Sampling date / time				17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	17-Oct-2024 00:00	
Compound	CAS Number	LOR	Unit	EB2435960-001	EB2435960-002	EB2435960-003	EB2435960-004	EB2435960-016	
				Result	Result	Result	Result	Result	
EK055G: Ammonia as N by Discrete Analyser - Continued									
Ammonia as N	7664-41-7	0.01	mg/L	2.29	0.11	0.15	----	----	
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L	0.03	<0.01	<0.01	----	----	
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L	1.57	0.01	<0.01	----	----	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	1.60	0.01	<0.01	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.6	1.4	1.1	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
[^] Total Nitrogen as N	----	0.1	mg/L	5.2	1.4	1.1	----	----	
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.44	0.17	0.16	----	----	



CERTIFICATE OF ANALYSIS

Work Order	: ES2434672	Page	: 1 of 4
Client	: HMC ENVIRONMENTAL	Laboratory	: Environmental Division Sydney
Contact	: MARK TUNKS	Contact	: Customer Services ES
Address	: SUITE 29, LEVEL 2 75-77 WHARF STREET TWEED HEADS 2485	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 07 5536 8863	Telephone	: +61-2-8784 8555
Project	: FLORENCE STREET TWEED HEADS	Date Samples Received	: 23-Oct-2024 17:43
Order number	: HMC2024.1001	Date Analysis Commenced	: 29-Oct-2024
C-O-C number	: ----	Issue Date	: 31-Oct-2024 15:42
Sampler	: MARK TUNKS		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 2		
No. of samples analysed	: 2		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	FSLTRIP Received as FSTRIP	----	----	----	----
			Sampling date / time	17-Oct-2024 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2434672-002	-----	-----	-----	-----
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	10.4	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	205	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	FSGWTRIP	----	----	----	----
Sampling date / time				17-Oct-2024 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2434672-001	-----	-----	-----	-----	-----
				Result	---	---	---	---	---
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	----	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	0.002	----	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.072	----	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	----

APPENDIX 14 - DEECW WATER SUBMISSION



Our ref: OUT25/16074

Janith De Silva
Planning Group
NSW Department of Planning, Housing and Infrastructure

Email: janith.desilva@planning.nsw.gov.au

11/12/2025

Subject: Residential development with affordable housing – Florence Street, Tweed Heads (SSD-80229208) – Environmental Impact Statement

Dear Janith De Silva,

I refer to your request for advice sent on 14 November 2025 to the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) Water Group about the above matter.

The NSW DCCEEW Water Group has reviewed the Environmental Impact Statement and makes recommendations to confirm:

- A reliable water supply.
- If the basement is to be drained or tanked.
- The dewatering infrastructure and associated impacts for any ongoing water take in the operational phase.

Please see Attachment A for further detail.

Should you have any further queries in relation to this submission please do not hesitate to contact the DCCEEW Water Assessments team at water.assessments@dcceew.nsw.gov.au.

Yours sincerely



Rob Brownbill,
Manager, Water Assessments, Knowledge Division
NSW Department of Climate Change, Energy, the Environment and Water

Attachment A

Detailed advice to DPHI Planning & Assessment regarding the Residential development with affordable housing – Florence Street, Tweed Heads (SSD-80229208) – EIS

1.0 Water supply, water take and groundwater management

1.1 Recommendation – pre-determination

That Department of Planning, Housing and Infrastructure (DPHI) request the proponent to confirm the development has a reliable water supply to meet the projects demands.

Explanation

The proponent has stated they will consult relevant service providers however no confirmation has been provided that a suitable water supply authority has been consulted to ensure there is sufficient availability to meet demands.

1.2 Recommendation – pre-determination

That DPHI request the proponent to:

- Confirm if the basement is to be drained or tanked.
- Quantify the maximum annual ongoing water take if the basement is to be drained and demonstrate sufficient entitlement can be obtained.
- Identify and assess the proposed water supply works to facilitate dewatering for the operational phase if required.

Explanation

The documentation has not specified if the basement design is to be tanked or drained, and therefore it is not possible for DCCEE Water to understand the potential for ongoing water take, licensing and associated impacts.

Should ongoing water take be proposed, this needs to be quantified and the ability to obtain sufficient water entitlement demonstrated. It is noted the dewatering infrastructure for construction is identified in the Dewatering Management Plan, however it is not clear if any dewatering infrastructure is required for the operational phase.

The documentation indicates a water supply work approval would be required for the basement dewatering. However if works are identified and impacts assessed as a part of the SSD application then a water supply work approval would not be required due to provisions under Section 4.41(g) of the *Environmental Planning and Assessment Act 1979*.

1.3 Recommendation - pre-determination

Should groundwater take for the operational phase of the development exceed 3 ML/year DPHI should request the proponent to assess the impacts of aquifer interference activities in accordance with the NSW Aquifer Interference Policy (NSW AIP) (2012).

Explanation

The proponent has not provided an assessment of impacts to groundwater for the operation of the project. The NSW AIP sets out the assessment requirements for aquifer interference activities. To enable water supply works to be excluded from the requirement for an approval under the *Water Management Act 2000*, these works must be assessed within the SSD documentation. Please refer to the following documents:

- https://water.dpie.nsw.gov.au/_data/assets/pdf_file/0005/151772/NSW-Aquifer-Interference-Policy.pdf
- https://water.dpie.nsw.gov.au/_data/assets/pdf_file/0007/171097/Aquifer-Interference-Assessment-Framework.pdf

1.4 Recommendation – post determination

That DPHI request the proponent to prepare an Acid Sulfate Soil Management Plan.

1.5 Recommendation – post determination

The DPHI request the proponent to obtain a water access licence (WAL) to account for the maximum predicted water take for construction and operation activities unless an exemption applies under the *Water Management (General) Regulation 2025*.

Explanation

The documentation has estimated 36.9 ML of water take during a construction period of 18-weeks. The requirement for ongoing water take during the operational phase is unclear at this point. Under the *Water Management Act 2000*, if groundwater is intercepted a WAL must be obtained prior to any water take occurring unless an exemption under the *Water Management (General) Regulation 2025* applies. An exemption may be available for water take during construction activities in coastal water sources under Clause 6 of Schedule 4 of the WM Reg, or where the groundwater take during construction or operation is less than or equal to 3ML per water year (cl 19, sch 4 of WM Reg). To claim either of these exemptions certain requirements must be met, such as

- the person claiming the exemption keeps a record of the water taken under the exemption and provides this to the Minister within 28 days of the end of the water year; and
- the records are kept for 5 years.

Further information on these requirements and other information on licensing and approvals and exemptions, including a form to report and record water taken can be found at:

<https://water.dpie.nsw.gov.au/licensing-and-trade> and [Groundwater access licence exemptions | NSW Government Water](#).

End Attachment A

APPENDIX 15 - AQUIFER INTERFERENCE ASSESSMENT



AQUIFER INTERFERENCE ASSESSMENT FRAMEWORK

Assessing a proposal against the NSW Aquifer Interference Policy – step by step guide

Note for proponents

This is the basic framework which the NSW Office of Water uses to assess project proposals against the **NSW Aquifer Interference Policy (AIP)**.

The NSW Aquifer Interference Policy can be downloaded from the NSW Office of Water website (www.water.nsw.gov.au under Water management > Law and policy > Key policies > Aquifer interference).

While you are not required to use this framework, you may find it a useful tool to aid the development of a proposal or an **Environmental Impact Statement (EIS)**.

We suggest that you summarise your response to each AIP requirement in the tables following and provide a reference to the section of your EIS that addresses that particular requirement. Using this tool can help to ensure that all necessary factors are considered, and will help you understand the requirements of the AIP.

Table 1. Does the activity require detailed assessment under the AIP?

Consideration		Response
1	Is the activity defined as an aquifer interference activity?	If NO , then no assessment is required under the AIP. If YES , continue to Question 2.
2	Is the activity a defined minimal impact aquifer interference activity according to section 3.3 of the AIP?	If YES , then no further assessment against this policy is required. Volumetric licensing still required for any water taken, unless exempt. If NO , then continue on for a full assessment of the activity.

Note for proponents

Section 3.2 of the AIP defines the framework for assessing impacts. These are addressed here under the following headings:

1. Accounting for or preventing the take of water
2. Addressing the minimal impact considerations
3. Proposed remedial actions where impacts are greater than predicted.

1. Accounting for, or preventing the take of water

Where a proposed activity will take water, adequate arrangements must be in place to account for this water. It is the proponent's responsibility to ensure that the necessary licences are held. These requirements are detailed in Section 2 of the AIP, with the specific considerations in Section 2.1 addressed systematically below.

Where a proponent is unable to demonstrate that they will be able to meet the requirements for the licensing of the take of water, consideration should be given to modification of the proposal to prevent the take of water.

Table 2. Has the proponent:

	AIP requirement	Proponent response	NSW Office of Water comment
1	Described the water source(s) the activity will take water from?	Tweed Brunswick Coastal Sands Groundwater Source	
2	Predicted the total amount of water that will be taken from each connected groundwater or surface water source on an annual basis as a result of the activity?	36.2 ML over 18 Weeks	
3	Predicted the total amount of water that will be taken from each connected groundwater or surface water source after the closure of the activity?	Nil Tanked watertight basement construction proposed	
4	Made these predictions in accordance with Section 3.2.3 of the AIP? (refer to Table 3, below)	Analytical model used based on borelogs from ASS investigation and installed temporary monitoring bores	
5	Described how and in what proportions this take will be assigned to the affected aquifers and connected surface water sources?	100% of the groundwater extraction would be from the groundwater source. The site is elevated and distant from local water bodies. The unconfined Coastal Sands Groundwater Source is not connected to the local surface water source	
6	Described how any licence exemptions might apply?	No exemption required	
7	Described the characteristics of the water requirements?	Temporary dewatering construction site only	
8	Determined if there are sufficient water entitlements and water allocations that are able to be obtained for the activity?	The proposal is located within the Tweed-Brunswick Coastal Sands Groundwater Source and is subject to the Water Sharing Plan for the North Coast Coastal Sands Groundwater Sources 2016. The Plan sets a long-term average annual extraction limit of 19,000 ML/year for this groundwater source.	

		<p>The proposed temporary dewatering volume of approximately 36 ML over 18 weeks represents a negligible proportion of this limit and is not expected to materially affect water availability or compliance with extraction limits.</p>	
--	--	--	--

	AIP requirement	Proponent response	NSW Office of Water comment
9	Considered the rules of the relevant water sharing plan and if it can meet these rules?	See above Subject to appropriate licensing and accounting of extracted volumes, it is considered that sufficient entitlement capacity exists and the rules of the Water Sharing Plan can be met.	
10	Determined how it will obtain the required water?	Temporary dewatering construction site only	
11	Considered the effect that activation of existing entitlement may have on future available water determinations?	Temporary dewatering construction site only	
12	Considered actions required both during and post-closure to minimize the risk of inflows to a mine void as a result of flooding?	NA Tanked basement carpark	
13	Developed a strategy to account for any water taken beyond the life of the operation of the project?	NA Tanked basement carpark	
Will uncertainty in the predicted inflows have a significant impact on the environment or other authorised water users? If YES , items 14-16 must be addressed .NO			
14	Considered any potential for causing or enhancing hydraulic connections, and quantified the risk?	NA	
15	Quantified any other uncertainties in the groundwater or surface water impact modelling conducted for the activity?	NA	
16	Considered strategies for monitoring actual and reassessing any predicted take of water throughout the life of the project, and how these requirements will be accounted for?	NA	

Table 3. Determining water predictions in accordance with Section 3.2.3
(complete one row only – consider both during and following completion of activity)

	AIP requirement	Proponent response	NSW Office of Water comment
1	<p>For the Gateway process, is the estimate based on a simple modelling platform, using suitable baseline data, that is, fit-for-purpose?</p>	NA	
2	<p>For State Significant Development or mining or coal seam gas production, is the estimate based on a complex modelling platform that is:</p> <ul style="list-style-type: none"> • Calibrated against suitable baseline data, and in the case of a reliable water source, over at least two years? • Consistent with the Australian Modelling Guidelines? • Independently reviewed, robust and reliable, and deemed fit-for-purpose? 	Analytical model used to estimate water predictions based on information collected from temporary monitoring bores, installed on the site, and site borelogs from an acid sulfate soil investigation	
3	<p>In all other processes, estimate based on a desk-top analysis that is:</p> <ul style="list-style-type: none"> • Developed using the available baseline data that has been collected at an appropriate frequency and scale; and • Fit-for-purpose? 	NA	

Other requirements to be reported on under Section 3.2.3

Table 4. Has the proponent provided details on:

AIP requirement		Proponent response	NSW Office of Water comment
1	Establishment of baseline groundwater conditions?	YES Groundwater monitoring bores installed & water quality assessed (refer to report section ???)	
2	A strategy for complying with any water access rules?	Compliance with license conditions including ongoing monitoring and management	
3	Potential water level, quality or pressure drawdown impacts on nearby basic landholder rights water users?	No mapped approved water users within 500m of temporary dewatering operation	
4	Potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources?	As above	
5	Potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems?	No mapped GDE within 213m of proposed temporary construction dewatering operation with site generally significantly elevated above GDE with no drawdown.	
6	Potential for increased saline or contaminated water inflows to aquifers and highly connected river systems?	NIL No connection with saline water estuary due to elevation of site above estuary (Tweed Marina) >270m distant	
7	Potential to cause or enhance hydraulic connection between aquifers?	NIL Unconfined aquifer	
8	Potential for river bank instability, or high wall instability or failure to occur?	NIL	
9	Details of the method for disposing of extracted activities (for coal seam gas activities)?	NA	

2. Addressing the minimal impact considerations

Note for proponents

Section 3.2.1 of the AIP describes how aquifer impact assessment should be undertaken.

1. Identify all water sources that will be impacted, referring to the water sources defined in the relevant water sharing plan(s). Assessment against the minimal impact considerations of the AIP should be undertaken for each ground water source.
2. Determine if each water source is defined as 'highly productive' or 'less productive'. If the water source is named in then it is defined as highly productive, all other water sources are defined as less productive.
3. With reference to pages 13-14 of the Aquifer Interference Policy, determine the sub-grouping of each water source (eg alluvial, porous rock, fractured rock, coastal sands).
4. Determine whether the predicted impacts fall within Level 1 or Level 2 of the minimal impact considerations defined in Table 1 of the AIP, for each water source, for each of water table, water pressure, and water quality attributes. The tables below may assist with the assessment. There is a separate table for each sub-grouping of water source – only use the tables that apply to the water source(s) you are assessing, and delete the others.
5. If unable to determine any of these impacts, identify what further information will be required to make this assessment.
6. Where the assessment determines that the impacts fall within the Level 1 impacts, the assessment should be 'Level 1 – Acceptable'
7. Where the assessment falls outside the Level 1 impacts, the assessment should be 'Level 2'. The assessment should further note the reasons the assessment is Level 2, and any additional requirements that are triggered by falling into Level 2.
8. If water table or water pressure assessment is not applicable due to the nature of the water source, the assessment should be recorded as 'N/A – reason for N/A'.

Table 5. Minimal impact considerations – example tables

Aquifer	Alluvial aquifer	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
<p>Water table</p> <p>Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic post-water sharing plan variations, 40 metres from any:</p> <ul style="list-style-type: none"> • high priority groundwater dependent ecosystem or • high priority culturally significant site <p>listed in the schedule of the relevant water sharing plan.</p> <p>OR</p> <p>A maximum of a 2 metre water table decline cumulatively at any water supply work.</p>		NA
<p>Water pressure</p> <p>A cumulative pressure head decline of not more than 40% of the post-water sharing plan pressure head above the base of the water source to a maximum of a 2 metre decline, at any water supply work.</p> <p>OR, for the Lower Murrumbidgee Deep Groundwater Source:</p> <p>A cumulative pressure head decline of not more than 40% of the post-water sharing plan pressure head above the top of the relevant aquifer to a maximum of a 3 metre decline, at any water supply work.</p>		NA
<p>Water quality</p> <p>Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.</p> <p>No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity.</p> <p>No mining activity to be below the natural ground surface within 200 metres laterally from the top of high bank or 100 metres vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a reliable water supply.</p> <p>Not more than 10% cumulatively of the three dimensional extent of the alluvial material in this water source to be excavated by mining activities beyond 200 metres laterally from the top of high bank and 100 metres vertically beneath a highly connected surface water source that is defined as a reliable water supply.</p>		NA

Aquifer	Coastal sands	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
<p>Water table</p> <p>Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any:</p> <ul style="list-style-type: none"> • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. <p>OR</p> <p>A maximum of a 2 metre water table decline cumulatively at any water supply work.</p>		<p>There are 8 water supply works within 500m recorded on the Water NSW <i>All Groundwater Map</i> Real-time water data</p> <p>Seven of the eight are recorded as monitoring/dewatering bores with the license status shown as "<i>cancelled</i>". A single bore shown as "<i>current</i>" was actually decommissioned/removed with a new multi-level development constructed on the site in 2016</p> <p>No active water supply works are mapped within 500m of the site.</p>
<p>Water pressure</p> <p>A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.</p>		See above
<p>Water quality</p> <p>Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.</p>		See above

Aquifer	Porous Rock – except Great Artesian Basin	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: <ul style="list-style-type: none"> • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. OR A maximum of a 2 metre water table decline cumulatively at any water supply work.	NA	
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	NA	
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	NA	

Aquifer	Porous Rock – Great Artesian Basin – Eastern Recharge and Southern Recharge	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
<p>Water table</p> <p>Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any:</p> <ul style="list-style-type: none"> • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. <p>OR</p> <p>A maximum of a 2 metre water table decline cumulatively at any water supply work.</p>	NA	
<p>Water pressure</p> <p>Less than 0.2 metre cumulative variation in the groundwater pressure, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any:</p> <ul style="list-style-type: none"> • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. <p>A cumulative pressure level decline of not more than 15 metres, allowing for typical climatic 'post-water sharing plan' variations.</p> <p>The cumulative pressure level decline of no more than 10% of the 2008 pressure level above ground surface at the NSW State border, as agreed between NSW and Queensland.</p>	NA	
<p>Water quality</p> <p>Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.</p>	NA	

Aquifer	Porous Rock – Great Artesian Basin – Surat, Warrego and Central	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
Water table NOT APPLICABLE		
Water pressure Less than 0.2 metre cumulative variation in the groundwater pressure, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: <ul style="list-style-type: none"> • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. A cumulative pressure level decline of not more than 30 metres, allowing for typical climatic 'post-water sharing plan' variations. The cumulative pressure level decline of no more than 10% of the 2008 pressure level above ground surface at the NSW State border, as agreed between NSW and Queensland.		NA
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.		NA

Aquifer	Fractured Rock	
Category	Highly Productive	
Level 1 Minimal Impact Consideration		Assessment
<p>Water table</p> <p>Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any:</p> <ul style="list-style-type: none"> • high priority groundwater dependent ecosystem; or • high priority culturally significant site; <p>listed in the schedule of the relevant water sharing plan.</p> <p>OR</p> <p>A maximum of a 2 metre water table decline cumulatively at any water supply work.</p>		NA
<p>Water pressure</p> <p>A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.</p>		NA
<p>Water quality</p> <p>Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.</p>		NA

Aquifer	Alluvial	
Category	Less productive	
Level 1 Minimal Impact Consideration		Assessment
<p>Water table</p> <p>Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any:</p> <ul style="list-style-type: none"> • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. <p>OR</p> <p>A maximum of a 2 metre water table decline cumulatively at any water supply work unless make good provisions apply</p>		NA
<p>Water pressure</p> <p>A cumulative pressure head decline of not more than 40% of the 'post-water sharing plan' pressure head above the base of the water source to a maximum of a 2 metre decline, at any water supply work.</p>		NA
<p>Water quality</p> <p>Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.</p> <p>No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity.</p> <p>No mining activity to be below the natural ground surface within 200 metres laterally from the top of high bank or 100 metres vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a 'reliable water supply'.</p>		NA

Aquifer	Porous rock or fractured rock	
Category	Less productive	
Level 1 Minimal Impact Consideration		Assessment
<p>Water table</p> <p>Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any:</p> <ul style="list-style-type: none"> • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. <p>OR</p> <p>A maximum of a 2 metre water table decline cumulatively at any water supply work.</p>		NA
<p>Water pressure</p> <p>A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.</p>		NA
<p>Water quality</p> <p>Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.</p>		NA

3. Proposed remedial actions where impacts are greater than predicted.

Note for proponents

Point 3 of section 3.2 of the AIP provides a basic framework for considerations to consider when assessing a proponent's proposed remedial actions.

Table 6. Has the proponent:

AIP requirement	Proponent response	NSW Office of Water comment
1 Considered types, scale, and likelihood of unforeseen impacts <i>during operation</i> ?	Due to topography and significant physical buffers to mapped current licensed Water Supply Works (>500m) and GPE (>213m), the likelihood of unforeseen impacts for this temporary dewatering operation are minimal	
2 Considered types, scale, and likelihood of unforeseen impacts <i>post closure</i> ?	Tanked basement proposed with no operational dewatering proposed	
3 Proposed mitigation, prevention or avoidance strategies for each of these potential impacts?	The dewatering operation would be installed by an experienced contractor and monitored in accordance with the Water Supply Works approval to ensure drawdown was controlled to minimise any off-site impacts	
4 Proposed remedial actions should the risk minimization strategies fail?	Various remedial actions are available including reducing discharge, recharge, and make good provisions for off-site users	
5 Considered what further mitigation, prevention, avoidance or remedial actions might be required?	See above	
6 Considered what conditions might be appropriate?	Appropriate conditions would be included in the Water Supply Works approval	

4. Other considerations

Note for proponents

These considerations are not included in the assessment framework outlined within the AIP, however are discussed elsewhere in the document and are useful considerations when assessing a proposal.

Table 7: Has the proponent:

AIP requirement	Proponent response	NSW Office of Water comment
1 Addressed how it will measure and monitor volumetric take? (page 4 of the AIP)	Extraction from the temporary construction dewatering operation would be metered by the contractor	
2 Outlined a reporting framework for volumetric take? (page 4 of the AIP)	Reporting would be in accordance with the Water Supply Works approval	

More information

www.water.nsw.gov.au

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Disclaimer:

This is a draft document produced as a guide for discussion, and to aid interpretation and application of the NSW Aquifer Interference Policy (2012). All information in this document is drawn from that policy, and where there is any inconsistency, the policy prevails over anything contained in this document. Any omissions from this framework do not remove the need to meet any other requirements listed under the Policy.




The information contained in this publication is based on knowledge and understanding at the time of writing (August 2018). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the Department of Primary Industries or the users independent adviser.

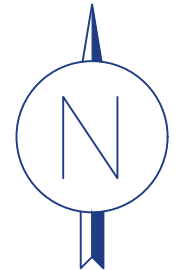
Published by the NSW Department of Primary Industries.

Reference 12279.1

DEWATERING MANAGEMENT PLAN

Groundwater Dependant Ecosystems

-  Groundwater Dependant Ecosystems
-  500m Buffer
-  Subject Site Boundary



Lot 1 DP781624, Lot 1 DP419177
& Lot 2 DP 300515
12-14 Florence Street
Tweed Heads NSW

HMC2024.1001
DATE: February 2026
VERSION: 10/02/2026
DRAWN: MF
BASE: Nearmap 2025








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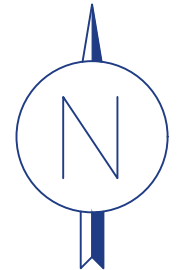
Tweed Heads NSW
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DEWATERING MANAGEMENT PLAN

Registered Groundwater Bores

-  Registered Domestic GW Bores
-  Registered Monitoring GW Bores
-  Registered Dewatering GW Bores
-  500m Buffer
-  Subject Site Boundary



Lot 1 DP781624, Lot 1 DP419177
& Lot 2 DP 300515
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